Dive Fitness—The Clock :: UWP—Lenses for Mirrorless Cameras

X-ray mag

GLOBAL EDITION
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Number 52

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COVER PHOTO BY CHRISTIAN SKAUGE

DIRECTORY

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COVER PHOTO: Nudibranch, Gulen, Norway
by Christian Skauge

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Soft corals and sponges on reef, Costa Brava, Spain. Photo by Olga Torrey

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Let Sharks Live

Here we are at the start of a new year filled with both challenges and possibilities. This statement couldn't be more accurate when referring to the plight of sharks worldwide. Yet, despite the barrage of media doom and gloom, 2012 saw some encouraging developments in the world of shark conservation.

The Cook Islands became the latest territory to ban shark fishing within its territorial waters. They join Palau, the Maldives, Tokelau, Honduras, the Bahamas, the Marshall Islands, Pitcairn Island and French Polynesia in establishing shark sanctuaries with a combined area of more than 11.4 million square kilometres of ocean.

However, with such an immense protected area, enforcing the law will prove challenging. The worldwide appetite for shark fin soup remains voracious, a fact illustrated by a sickening photo of shark fins drying on a Hong Kong rooftop. Despite falling sales in recent years, Hong Kong remains one of the world's biggest shark fin markets. Forced to retreat from public sidewalks due to public outcry, the practice has retreated to the rooftops to remain out of sight and mind. Well, not quite. Attitudes are changing, albeit slower than many people would like.

Time and time again, the tired old "cultural discrimation" card gets played, a point recently illustrated in San Francisco, one of an increasing number of North American cities that has banned shark fins. A federal judge has refused to block enforcement of the California's shark fin sales ban, rejecting arguments the law is discriminatory towards Chinese Americans. The law was challenged by San Francisco's Chinatown Neighborhood Association and another group representing Chinese Americans and businesses. They claim restaurant owners, merchants and importers have lost hundreds of thousands of dollars in the past year due to lost sales of shark fin soup and shark fins.

Fortunately, the judge wasn't buying it. In a written ruling, U.S. District Judge Phyllis Hamilton stated the law serves a legitimate local purpose based on concerns that shark finning kills millions of sharks annually, causing a serious threat to the ocean ecosystem.

"Plaintiffs have provided no evidence that the law was enacted for the purpose of discriminating against Chinese Americans," Hamilton ruled. "Plaintiff's own evidence shows that only a small percent of Chinese Americans eat shark fin soup regularly, and that approximately half of Chinese Americans actually support the Shark Fin Law."

For those of us who cherish the undersea world and its inhabitants, it is incomprehensible that the ocean's apex predators are being wiped out due to "cultural rights". I'm always reminded of a quote from the movie Jurassic Park: "Just because you can do something doesn't mean you should." But let's not dwell on the negative and focus on the positive.

The tide is turning and education is the key. Sharks have been around for many millions of years and have earned the right to remain for many more. Let's ensure that they do.

— Scott Bennett
Associate Editor

News edited by Peter Symes & Kelly LaClaire

from the deep

NEWS

Dont touch! Injured coral don't reproduce

It can take years for coral to recover their reproductive abilities after suffering tissue damage.

Touching a coral may do far more damage than just the immediate injury or wound. Damaging a coral can also have lasting adverse effects, affecting its ability to reproduce new research has showed. Four years after suffering tissue damage, coral colonies in the Bahamas were still producing low numbers of eggs and spermaries were also in short supply. The slow recovery was a surprise, said Howard Lasker, professor of geology at the University at Buffalo, who led the study on the coral species *Antillogorgia elisabethae,* a Caribbean gorgonian coral.

Antillogorgia elisabethae with newly released eggs

To study the effect of tissue damage on sexual activity, Lasker's team looked at egg and sperm production in *A. elisabethae* colonies near Cross Harbour, Abaco, in the Bahamas. In this region, workers harvest the coral, pruning branches from large, sexually mature colonies to obtain an anti-inflammatory chemical used in skin care products. Such harvests took place in 2002 and 2005. In 2009, Lasker and Page returned to the area before the annual spawning, which for *A. elisabethae* occurs in November and December. The researchers compared 24 colonies that had been cropped to 20 that had not, carefully dissecting 24 individual coral polyps from each of the 44 colonies to count the reproductive organs within.

Fewer eggs

In cropped female colonies, roughly one in three polyps carried no eggs at all, compared with roughly one in six in uncropped colonies. The uncropped colonies also had more than double the number of polyps producing three or more eggs—120 polyps in all, compared with just 53 polyps in the cropped colonies. More than three-quarters of polyps in uncropped male colonies housed 11 or more spermaries, organs that produce sperm. In contrast, less than 60 percent of polyps in cropped colonies had 11 or more spermaries.

The new research is the latest to support the notion that damaged corals may have lower fecundity because they divert resources away from reproduction and toward growth and injury repair. ■

Corals show resilience to climate change

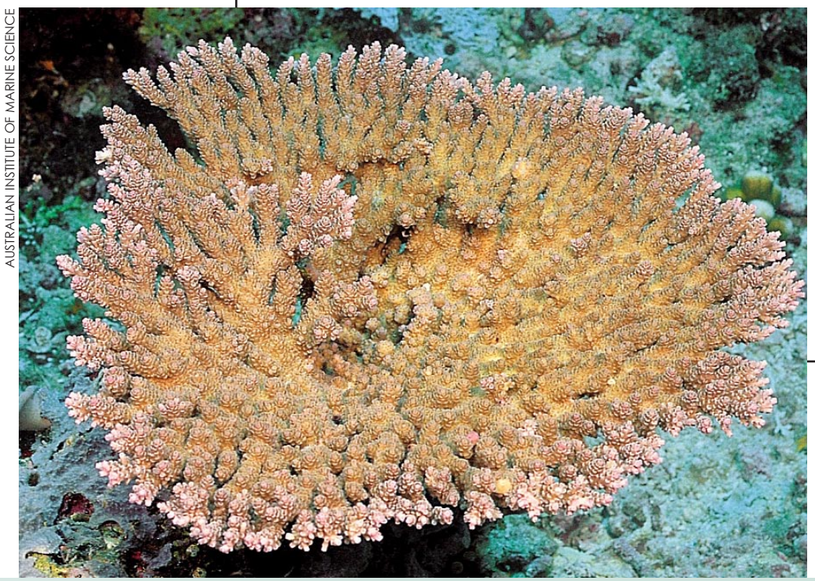
Climate change is expected to devastate coral reefs but a number of studies have found coral colonies that endure high water temperatures.

It is clear that the world will undergo a certain amount of climate change but most major reefs harbor high-temperature habitats that may be fostering the diversity needed for corals to survive extreme temperatures. Because of local factors that isolate some areas of the reef from winds and waves that might mitigate temperature extremes, some pools in the reef are highly variable in temperature, with summertime water temperatures topping 34°C.

By comparing corals in markedly different environmental conditions in two nearby but separate pools on a reef in the Southern Pacific, researchers from Stanford University in California found that the staghorn coral *Acropora hyacinthus,* a common reef-building coral found in these pools, grows faster and is more thermally tolerant than corals of the same species in nearby pools that do not get as hot. The team took samples of corals from both the highly variable and the moderately variable pools and subjected them to thermal stress experiments under laboratory conditions while monitoring the levels of expression, or activity, of a wide range of genes.

The scientists identified 60 genes with an unusual expression pattern. Under normal temperatures, these genes were more active in the corals from the highly variable pool. But when water temperatures rose, they were more active in the corals from the moderately variable pool. These genes included thermal tolerance genes such as heat shock proteins and antioxidant enzymes, as well as a broad array of genes involved in apoptosis regulation, tumor suppression, innate immune response, and cell adhesion.

The experiment did not examine the potential contribution of the zooxanthellae, the symbiotic unicellular algae commonly that provide the energy and nutrients of photosynthesis to the coral while gaining a home within the coral tissue. Some types of zooxanthellae are associated with greater coral heat resistance. It's also not yet clear if the observed resilience reflects short-term acclimatization to higher water temperatures or adaptation that might be passed on to future generations within a coral population. ■ SOURCE: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES. JANUARY 7, 2013



AUSTRALIAN INSTITUTE OF MARINE SCIENCE

Recent advances in DNA-sequencing technologies now allow for in-depth characterization of the genomic stress responses of many organisms such as reef-building corals

News edited
by Scott Bennett

Mozambique boasts some of the most prolific reefs systems in Anfrica

Africa's second largest marine protected area is established

Primeiras and Segundas Archipelago is declared an Environmental Protected Area by the government of Mozambique.

The Primeiras and Segundas Archipelago is a chain of ten sparsely inhabited barrier islands and two coral reef complexes situated in the Indian Ocean off the coast of Mozambique and near the coastal city of Angoche. The islands lie in two groups along the western side of the Mozambique Channel. Made up of ten islands off the coast of northern Mozambique, this coastal marine reserve in the Primeiras and Segundas Archipelago will cover more than 4,020 square miles and contains abundant coral and turtle species.

The archipelago includes the most robust and diverse coral community in Mozambique. It is rich in mangroves, marine life, deep underwater canyons and large seagrass beds. Due to cold nutrient-rich upwellings, the archipelago is spared coral bleaching, a common problem in other coral-rich areas, making these some of the most globally productive and important reefs on the planet.

Vegetation on these low islands includes mangrove, grass and scrub. Offshore, they are more noted for the biodiversity of their spectacular coral reefs, which support an important fishery. The archipelago also hosts the most important dugong population in the western Indian Ocean.

The European discovery of the archipelago came on 25 February 1498 during Vasco da Gama's first expedition to India. The islands became an important stopping-off point for Portuguese trading fleets sailing for India and the Orient, which were often in need of emergency repairs after rounding the Cape of Good Hope.

"Protecting the rich natural resources of this magnificent area will make a major contribution to the long term food security and livelihoods of the people of the region," said John Tanzer, Director of WWF's Global Marine Program. ■

SOURCE: WWF

Cyprus to expand dive sites

Five new marine parks set to open by summer. Area's number of wreck dives increased to 16.

Snorkellers and divers visiting Cyprus this summer will be spoilt for choice with the opening of five new marine parks. It is hoped that the €1.5 million project will boost growth and protection of the island's marine life while encouraging more visitors. The new marine parks will be positioned around the waters of Paphos, Limassol, Agia Napa, Protaras and Latchi. Fishing will be prohibited in each at any time.

Between January and June, four large fishing boats are due to be scuttled in the Cypriot Mediterranean, with some sites opening to divers as early as July. The project is being funded by the Cyprus Diver Centre Association, the Department of Fisheries and the Cyprus Tourism Organisation as part of a larger project to increase and diversify the region's marine life.

"We are thrilled that Cyprus' diving offering will be further improved through the creation of these five new marine parks. It is the Cyprus Dive Centre Association's mission to promote awareness of the importance of our underwater ecosystems and we are committed to preserving and monitoring our sites," said Photos Socratous, Vice-Chairman of the Cyprus Dive Centre Association. With the support of the Cyprus Tourism Organisation, the European Union and our Fisheries Department we are working towards an exciting future for diving in Cyprus," he added.

With one of the longest diving seasons in the Mediterranean, Cyprus attracts more than 2 million travellers annually. ■

Paphos Coastline, Cyprus

Deep corals discovered on Great Barrier Reef

A new exploration by a remote-operated submersible has found the reef's deepest coral yet.

The coral *Leptoseris* is living 410 feet (125 meters) below the ocean's surface, a discovery that expedition leader Pim Bongaerts of the University of Queensland called "mind-blowing". Bongaerts and his colleagues received funding from insurer the Catlin Group Limited to explore the Great Barrier Reef as part of an effort to understand how climate change is altering the oceans.

The Catlin Seaview Survey is a game-changing scientific study, which aims to reveal the life and science of our oceans for all to see. Starting with the Great Barrier Reef, reefs around the world will be captured like never before, in high-resolution, 360 degree panoramic vision, producing a benchmark for the scientific community to monitor change and for the public at large to experience unprecedented accessibility to our oceans through 'virtual diving'.

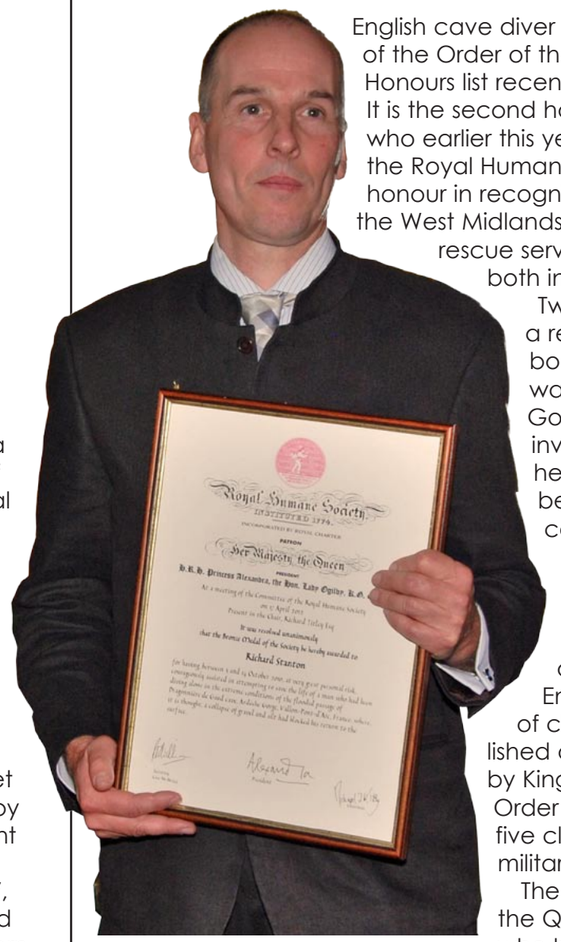
On the outer edge of the Ribbon Reefs, off the northern Great Barrier Reef, the researchers hit unusually calm seas and were able to deploy a remote-operated vehicle, or ROV, off the edge of the Australian continental shelf, where the ocean floor plummets hundreds of feet.

The team brought one precious Leptoseris coral sample back to sea level. Typically, such corals peter out in the Great Barrier Reef above 330 feet (100 m), replaced by non-light-dependent sponges and sea fans. Using the ROV, the team also found the deepest Staghorn Acropora, a type of coral that makes up the majority of most of the world's reefs.

"The discovery shows that there are coral communities on the Great Barrier Reef existing at considerably greater depths than we could have ever imagined," said Dr Pim Bongaerts, University of Queensland. ■

Kyra Hay sorting coral samples

Queen awards Richard Stanton a MBE



English cave diver Richard Stanton was made a Member of the Order of the British Empire (MBE) in the New Year Honours list recently announced by Buckingham Palace. It is the second honour of 2012 for 51-year-old Stanton who earlier this year was awarded a Bronze Medal from the Royal Humane Society. Rick Stanton received the honour in recognition of his service to the communities of the West Midlands as a firefighter and for the cave diving rescue services he carries out on a voluntary basis both in the Unite Kingdom and abroad.

Two years ago he was instrumental in a rescue attempt and recovery of the body of French diver Eric Establie who was trapped by silt inside the Ardeche Gorge, near Marseille. Mr Stanton has been involved with other rescue missions—he helped rescue six British soldiers who had become trapped in rising flood water in a cave in Mexico.

It isn't particularly unusual for me to get official looking letters in the post because of my international rescue work, but when I got notification of this on behalf of the Palace I was absolutely astounded.
—Rick Stanton

What is a MBE?

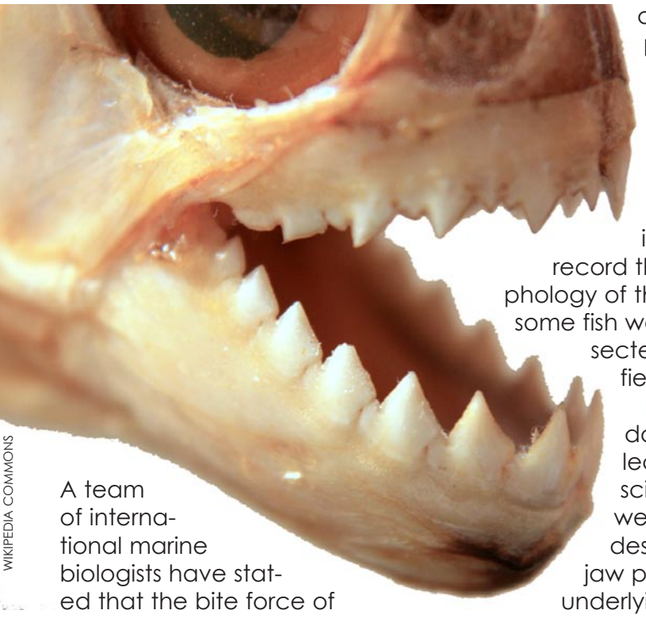
The Most Excellent Order of the British Empire is an order of chivalry established on 4 June 1917 by King George. The Order is composed of five classes in civil and military divisions.

The award bestowed by the Queen to those people who have made a significant achievement or outstanding service to the community. An MBE is also awarded for local 'hands-on' service which stands out as an example to other people. ■

SOURCE: GOV.UK

Richard Stanton seen on another occasion, presented the Bronze Medal from the Royal Humane Society for his efforts to help recover the body of French cave diver Eric Establie who became trapped in France's Draggonniere Gaude cave system in 2010. On the right, the MBE medal

Two piranhas, one extinct, found to have mightiest bite



WIKIPEDIA COMMONS

A team of international marine biologists have stated that the bite force of the now extinct Megapiranha and today's black piranha have the most powerful bite of all apex predators for the size of its body.

The researchers' study, which appeared in the journal *Scientific Reports,* recorded first bite-force measurements from 15 wild black piranha specimens from the Amazon River in Brazil. The biologists used nets and low-impact fishing techniques to study the piranha in the Xingu and Iriri tributaries of the river.

In the study, the researchers said that the piranha "readily performed multiple defensive bites with the transducer placed between the tips of the jaws." In order to examine and record the morphology of their jaws, some fish were dissected in the field.

From the data collected the scientists were able to describe the jaw physiology underlying the powerful bite, which is 30 times greater than the body weight of the fish. They found a highly specialized jaw-closing lever as well as a large but short muscle mass in the piranha's jaw, which permits the fish to bite down with incredible force.

Megapiranha

The researchers were then able to make conservative estimates on the bite force of the Megapiranha—a much bigger, extinct relative of the black piranha, which had a similar jaw physiology but a bite force four times greater. Based on this finding, the scientists extrapolated that the Megapiranha could probably bite into a bovine femur with no difficulty. So, the contemporaries of the Megapiranha, armored catfish and turtles, were most likely vulnerable to the fish's destructive bite.

So, what exactly did the Megapiranha eat, wondered the researchers.

"Did Megapiranha use their strong jaws and novel dentition to not only slice into their prey's compliant flesh, but also crush through their stiff bones? Our bite simulations indicate Megapiranha's hybrid teeth were indeed capable of transmitting sufficient bite pressure to generate micro-fractures in robust cortical mammalian bone as well as complete mechanical failure of thinner vertebrate bony tissues," stated the researchers in the study.

From findings in the tooth orphology of this extinct fish, it was assumed that they hunted bony fish and turtles.

National Geographic organized and filmed the study's fieldwork, resulting in footage to be aired on the National Geographic Channel in a program entitled Megapiranha. ■

SOURCE: REDORBIT.COM

36,000-year-old fossil of extinct whale discovered

Scientists from the University of Georgia (UGA) have found the fossil of an Atlantic gray whale off the coast of the U.S. state of Georgia. The Atlantic gray whale was hunted to extinction the 1700s. However, California and Pacific gray whales are near pre-whaling levels today. The fossil find is reviving efforts to establish a connection between the two species.

The large fossilized whalebone was found near Gray's Reef National Marine Sanctuary about 20 miles off the coast of Georgia in 2008 by UGA geoarcheology professor Ervan Garrison, marine scientist Scott Noakes and research scientist Alexander

WIKIPEDIA COMMONS

Gray whale

Cherkinsky of the Franklin College of Arts and Sciences, along with Greg McFall of the National Oceanic and Atmospheric Administration (NOAA). Their findings were published in journal Paleontologica Electronica.

The big dig

It took the scientists two years to fully recover the fossil because it was embedded in substrate on the ocean floor at a depth of 70ft. Recovered in sections, the bone, which was a left mandible, measured a total of 1.5 meters in length. Radiocarbon dating places the bone's age at around 36,000 years.

The paper's lead author, Garrison, descibed the moment of discovery: "We were looking for more terrestrial animals that lived there when humans lived there, when Scott Noakes saw something unusual and called us over to take a look." He added, "When colleagues at the Smithsonian said that it was clearly an Atlantic gray, we realized that the discovery would take on much more meaning."

DNA analysis of the bones was attempted by cetacean experts at Trent University in Peterborough, Ontario. However, the age of the whalebone proved to be a problem. Despite the unsuccessful attempt, the biologists' interest in the whalebone helped the UGA team reach their final conclusions about the origin of the fossil.

"The California grays looked exactly like the bones that were dug up in Scandinavia back in the 19th century," Garrison said, "one of the first instances where a living species was named based on the fossil evidence." ■ SOURCE: UNIV. OF GEORGIA

news

News edited by Kelly LaClaire

Scottish proposal for Marine Protected Areas to be announced


Scottish coast

—Massive network of marine protected areas to be discussed.

The Scottish parliament will consider a new proposal to establish a vast network of protected seas equalling 32,000 square miles of water—roughly the same size as Scotland itself. A recent report given to the government by the Scottish Natural Heritage group and the Joint Nature Conservation Committee proposes that 33 new Marine Protected Areas (MPAs) be created.

This would create an impressive and far-reaching network of safeguarded sea waters of the country in an attempt to bolster conservation of marine life and maintain a healty ecosystem in the area.

According to the BBC, four other MPAs have been identified to protect dolphins and whales specifically—as well as basking sharks, black guillemot, sand eels and certain seabirds.

"A healthy marine ecosystem underpins the nursery grounds for the species our fisherman rely on, the reefs and kelp forests that protect our coast by buffering against storms," said Enviromental Secretary, Richard Lochhead.

Scottish Parliment will also be hearing some opposition from certain fishing groups and possibly energy companies with offshore interests. Dates for a final decision by parliment have not been anmounced. ■ SOURCE: BBC

Western Australia invests millions in shark deterrents

The WA state government has announced AU$2 million in funding for shark hazard-reduction research, following one of the worst years for shark attacks in the state's history. The grants will be spread over the next three years, with $900,000 already allocated to four major research projects. Attacks have increased nationally over the last 20 years, although scientists are unable to pinpoint exactly why.

One of the first projects aims to test existing shark deterrent devices. Among these is a device that produces an electric field, aiming to provide swimmers with a radius of protection by interfering with the electroreceptor organs that help sharks find prey.

SURF LIFE SAVING WESTERN AUSTRALIA

Over the last 10 months, the WA coast has seen five fatal shark attacks. Last year the South-West Surf Life Saving WA helicopter service patrolled for 65 days and in that time spotted 77 sharks

Grant recipient Professor Shaun Collin, a neuroecologist at the University of Western Australia, and Associate Professor Nathan Hart also plan to test new deterrent methods, including the ways in which light, sound and bubble curtains may be used to encourage sharks to migrate elsewhere. Shaun says bubbles can interfere with the minute hair cells along the flank and head of the shark that help it to detect water movement.

Shaun says hazard prevention technologies are a way to try to protect both humans and sharks, by providing an alternative to the practice of shark culling.

Jet ski patrols

Twelve new jet-skis are to be used by WA lifeguards to help prevent shark attacks at popular beach spots.

WA premier, Colin Barnett, said the bolster in lifeguard presence in the water had been introduced in response to recent shark attacks, drownings and a high number of rescues and will "give beachgoers added confidence" at both metropolitan and country beaches.

Surf Life Saving Western Australia has been promised the jet-skis by the state government, funded by a $500,000 package over two years, as part of a $6.85 million shark mitigation program.

Barnett said the first six jet-skis have been delivered and will be based at Perth beaches from Fremantle to Mullaoo, with SLSWA teams on call year-around. ■ SOURCES: AUSTRALIAN GEOGRAPHIC, WA TODAY

Have jellyfish blooms been blown out of proportion?

A new multinational collaborative study, involving the University of Southampton, suggests these trends, as so frequently reported by media in recent years, may be overstated. Increased speculation and discrepancies about current and future jellyfish blooms by the media and in climate and science reports formed the motivation for the study.

The key finding of the study showed that global jellyfish populations undergo concurrent fluctuations with successive decadal periods of rise and fall, including a rising phase in the 1990s and early 2000s that has contributed to the current perception of a global increase in jellyfish abundance.

Bias created by media

The previous period of high jellyfish numbers during the 1970s went unnoticed due to limited research on jellyfish at the time, less awareness of global-scale problems and a lower capacity for information sharing (e.g. no Internet).

While there has been no increase over the long-term, the authors detected a hint of a slight increase in jellyfish since 1970, although this trend was countered by the observation that there was no difference in the proportion of increasing versus decreasing jellyfish populations over time.

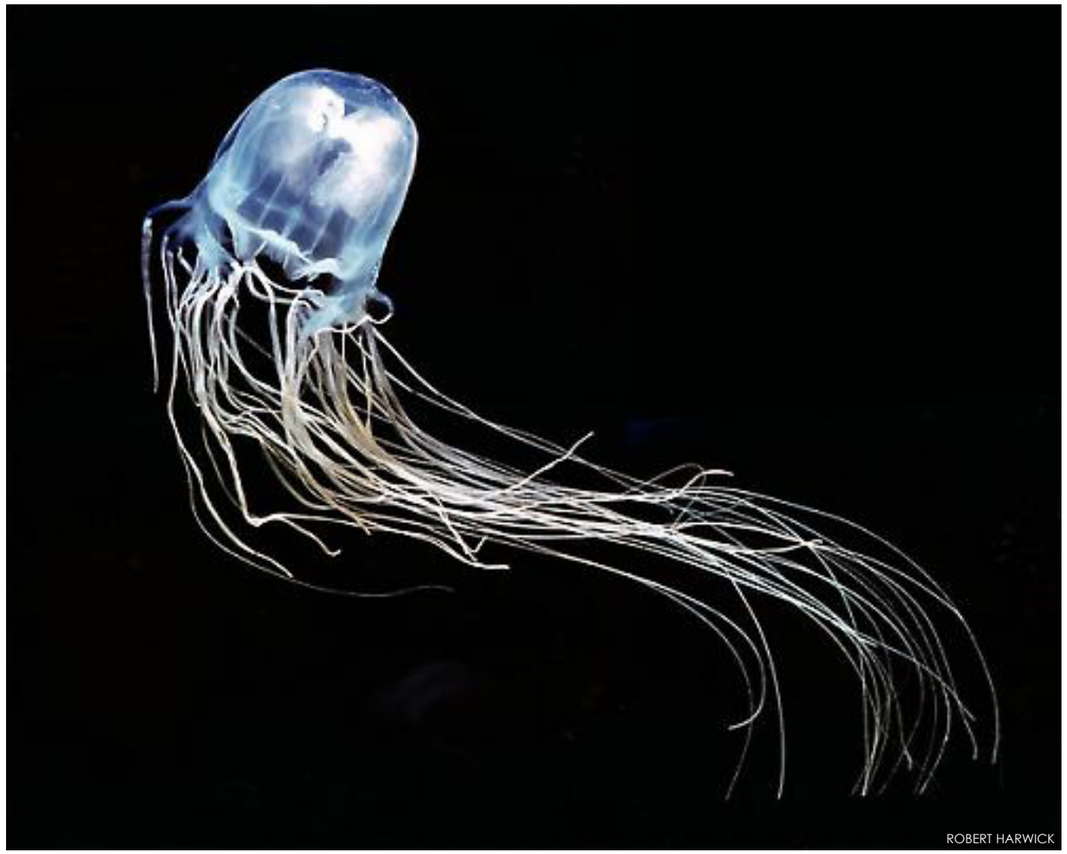
Although there are areas where jellyfish have increased—the situation with the giant jellyfish in Japan and parts of the Mediterranean are classic examples—there are also areas where jellyfish numbers have remained stable, fluctuated over ten-year time periods, or actually decreased over time.

"The realisation that jellyfish synchronously rise and fall around the world should now lead researchers to search for the long-term natural and climate drivers of jellyfish populations, in addition to begin monitoring jellyfish in open ocean and Southern Hemisphere regions that are underrepresented in our analyses," said lead author, Dr Rob Condon, marine scientist at the Dauphin Island Sea Lab (DISL) in Alabama. ■

SOURCE: UNIVERSITY OF SOUTH HAMPTON


FILE PHOTO: PETER SYMES

Moon jelly


ROBERT HARWICK

Australian box jellyfish (*Chironex fleckeri*) stings can cause acute cardiovascular collapse and death

Zinc can treat deadly jelllfish stings

Rapid administration of zinc could be life saving in human sting victims. Researchers also find that venom from stings seems to poke holes in red blood cells, triggering the release of potassium that stops the heart when tested in mice. But in mouse and human blood, the venom's effects appeared to be blocked by zinc, the scientists report. So Dr Angel Yanagihara, researcher at the University of Hawaii, says she is advising a company that is seeking to develop antidotes using the compound zinc gluconate.

A human-sized body needs a large dose of venom to be fatal, but the more tentacles that come into contact with the skin, the more deadly venom is injected. Heart failure in the victim rapidly follows a severe sting. Immediate action can save lives.

Vinegar

Vinegar flooded over wounds and tentacle fragments kills the stinging cells without releasing more venom. Fragments should never be touched before the vinegar wash. If the victim is resuscitated and rushed to a hospital, fast-acting anti-venom will increase the chances of recovery without further complications.

This reaction to taste and feel of human skin also explains why nylon suits, panty hose, indeed any clothing cover, works as protection. Cloth does not taste like food, so the tentacles simply brush over it. ■

SOURCE: PLOS ONE

The hooded nudibranch, *Melibe leonina*, is also called the lion nudibranch. This mollusk is almost transparent with a slight yellowish-green cast

Nudibranchs have sleep cycles too

—Sea slugs go to sleep based on internal clocks.

Dr Jim Newcomb, associate professor of biology at New England College, studied the lion-hooded nudibranch to try to figure out how circadian rhythms in human beings work. Though scientists know that humans have an internal clock that, using the light as a cue, sets and resets itself to control things like falling asleep, the raising and lowering of our body temperatures from day to night, and the slowing of our heartbeats, they don't quite know how that internal clock works on a cellular level.

To try to figure that out, Newcomb has begun researching the lion-hooded nudibranch, a sea slug found in the kelp beds and eel grass that grows in the water along the Pacific coast.

Knowing how circadian rhythm works is important because the body's internal clock impacts everything from productivity at work to disease and disorders. Whether people follow their natural rhythms can impact their health, said Newcomb, but scientists don't yet know why folks who work the third shift are more likely to have heart attacks, or why flying to New Zealand causes the physical and mental symptoms of jet lag to set in. Sea slugs may just help solve that mystery. ■ SOURCE: UNION LEADER

FILE PHOTO: PETER SYMES

School of Cardinalfish

Same-sex flirts makes fish more attractive

Female fish are attracted to males that "flirt" with other males, a study has found. Males of the tropical freshwater fish *Poecilia mexicana* increase their attractiveness to females not only by opposite-sex but also through same-sex interactions. In an unusual mating strategy, hard-up males of a tiny, promiscuous fish species engage in homosexual acts in a bid to entice females to copulate with them.

"Conumdrum"

In the scientific paper, just published in the Royal Society journal *Biology Letters*, researchers led by Dr David Bierbach from the University of Frankfurt, Germany, refer to homosexual behaviour in the animal kingdom as a "conundrum".

"Male homosexual behaviour can be found in most extant classes across the animal kingdom, but represents a Darwinian puzzle as same-sex mating should decrease male reproductive fitness," they wrote.

Researchers said small, non-dominant Atlantic molly males, often overlooked for larger, flashier rivals as mating partners, rose vastly in the esteem of females that observed them copulating—regardless of the partner's sex. ■

SOURCE: ROYAL SOCIETY JOURNAL BIOLOGY LETTERS

wreck rap

A WWII-era fighter recovered from Lake Michigan

The plane crashed during aircraft-carrier training near Waukegan on 28 December 1944. The FM-2 "Wildcat" Fighter went down in about 200 feet of water in an accident blamed on engine failure.

The Grumman F4F Wildcat was an American carrier-based fighter aircraft, which began service with both the United States Navy and the British Royal Navy in 1940. First used in combat by the British in Europe, the Wildcat was the only effective fighter available to the U.S. Navy and Marine Corps in the Pacific Theater during the early part of Second World War.

More than 17,000 pilots completed the training in Lake Michigan. The aircraft carriers used for the training docked at Chicago's Navy Pier. The pilots flew from Glenview Naval Air Station in Glenview. ■ SOURCE: FOX NEWS

World War II fighter plane retrieved from Lake Michigan

133-year-old wreck found in Lake Huron

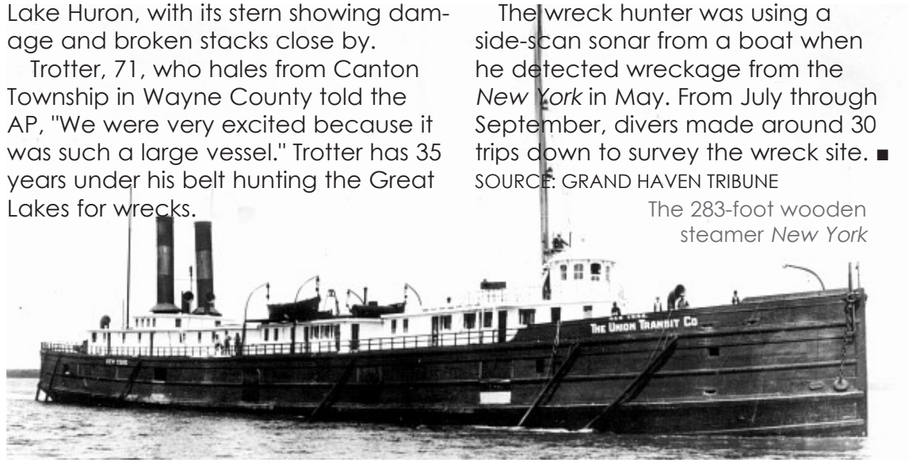
The wreck of a wooden steamer that sank during a storm more than a century ago has been found, according to shipwreck hunter, David Trotter.

The find winds up a two-year search for the 283-foot *New York*, which was built in 1879. It was found north of Port Austin resting upright in the bottom of Lake Huron, with its stern showing damage and broken stacks close by.

Trotter, 71, who hales from Canton Township in Wayne County told the AP, "We were very excited because it was such a large vessel." Trotter has 35 years under his belt hunting the Great Lakes for wrecks.

On 1 October 1910, the *New York* was ferrying coal from Detroit to Ontario, Canada, when a storm hit with gale-force winds. According to Trotter, the captain and 13 crew members, who scrambled into lifeboats, were rescued by another ship, the *Mataafa*.

The wreck hunter was using a side-scan sonar from a boat when he detected wreckage from the *New York* in May. From July through September, divers made around 30 trips down to survey the wreck site. ■ SOURCE: GRAND HAVEN TRIBUNE



The 283-foot wooden steamer *New York*

Swedes find another Soviet WWII submarine in the Baltic

According to Russian media, the submarine was discovered by Swedish civilian divers southeast of Öland. After being located by *HMS Belos*, a submarine rescue ship, pictures were taken of the wreckage S-6 Soviet submarine that went missing in 1941. Russian military has been informed of the discovery site, which is now considered a war grave.

The Navy said it believed the submarine was one of several that went missing in 1941. The submarine had sustained severe damage and was found in an area known as the "Wartburg minefield", which was mined by German forces, the Navy said. The former minefield lies within Sweden's economic zone, but in international waters.

Open hatches

One of the submarine's hatches was open, suggesting it had been at the surface when it entered the minefield.

"In those days, submarines travelled at the surface to move quickly or also to charge their batteries," Commander Christian Allerman from the Swedish Navy said.

The submarine remained in two main pieces. The bow rested two meters north of the stern, found next to a torpedo-shaped object. The submarine was imprinted with Russian text and symbols of a Soviet hammer and sickle.

Several war-time submarines, including Soviet submarines, which unofficially were nicknamed 'Stalinets'—have been found in recent years off the Swedish coast. ■ SOURCE: SWEDISH ARMED FORCES

View video of discovery here >>>


WIKIPEDIA COMMONS

Aerial view of present day Acre (ancient city of Akko) in northern Israel

Ancient Hellenistic harbour and ship-wrecks found at Akko

Underwater wreckage of a fleet of early-19th century ships and ancient harbor structures from the third to first century B.C. have been found at the city of Akko by archaeologists from the University of Rhode Island (URI), the University of Louisville and the Israel Antiquities Authority (IAA). Akko, or Acre, was one of the major ports on the eastern end of the Mediterranean Sea during the ancient period. The discoveries provide more information on a period of history of which little is known. They also provide clues to how and where more remains may be found.

On November 15 and 17, the findings were presented by URI assistant professors Bridget Buxton and William Krieger on behalf of the Israel Coast Exploration project at the annual meeting of the American Schools of Oriental Research in Chicago.

Discovery

A sub-bottom profiler was used to detect three of the four well-preserved shipwrecks found off the coast south of Akko in 2011, according to Buxton. Storms later took off a few meters of inshore sediments to reveal the wrecks temporarily, as well as another large vessel. Since the storm, the wrecks have been reburied.

While the shipwrecks were briefly exposed, however, the Israel Antiquities Authority took a closer look at one of them. They inspected a 32-meter vessel, with its brass gudgeon (rudder socket) still preserved, as well as several small artifacts including a candlestick, plates and a cooking pot, which had bones still in it.

"We're in a race against time to find other ships in the area and learn from them before storms totally dislodge or destroy them," said Buxton.

It was found that the ship's wood came from Turkey, according to laboratory analyses completed over the summer by the IAA. It is thought that these ships may have indeed been involved in a failed attempt to capture Akko during the Egyptian-Ottoman War of 1831. Records show that Admiral Osman Nurredin Bey led a fleet that was severely damaged in this attempt. It was in 1832, with Egyptian land forces under the leadership of Ibrahim Pasha, that Akko eventually fell.

Keys to further finds

Researchers are excited by the discovery because of what it can tell them about where much older ships may be found.

"Like many underwater archaeologists I'm very interested in finding a well-preserved example of an ancient multi-decked warship from the Hellenistic age," said Buxton. "These ships were incredible pieces of technology, but we don't know much about their design because no hulls have been found. However, a combination of unusual environmental and historical factors leads us to believe we have a chance of finding the remains of one of these ships off the northern coast of Israel." ■

SOURCE: ARCHEOLOGY NEWS NETWORK

Ballard Finds Site of Biblical Flood

Le Lâcher de la colombe (The dove sent forth from the ark) engraving by Gustave Doré (1832–1883)

Discoverer of the *Titanic*, Robert Ballard, believes he's found evidence of the Biblical flood. The former U.S. Navy officer and professor of oceanography at the University of Rhode Island told ABC that his underwater archaeology team has been scanning the depths of the Black Sea off Turkey seeking traces of ancient civilizations, which date back to the days of Noah.

While probing at around 400 feet, Ballard's team found a shoreline that had carbon dating back to about 5,000 BC. Researchers believe that this is the exact time period when a worldwide flood took place. It is thought that rock beds can show visible shorelines as a result of a rapid disaster or cataclysm sweeping through an area.

Several pieces of ancient pottery were also found buried in these depths by the archaeology team, according to Ballard, as well as other intriguing objects:

"We started finding structures that looked like they were man-made structures," Ballard said. "That's where we are focusing our attention right now."

Although the archaeologist doesn't think he and his team will locate the ark of Noah, he believes they can find evidence of a civilization that existed during the time of Noah as well as proof that the people were hit by a devastating flood.

"It's foolish to think you will ever find a ship," he said. "But can you find people who were living? Can you find their villages that are underwater now? And the answer is yes."

One such discovery may be a sea vessel, he located, which also contained human remains. "That is a perfectly preserved ancient shipwreck in all its wood—looks like a lumber yard," Ballard said. "But if you look closely, you will see the femur bone and actually a molar." ■ SOURCE: CHRISTIAN NEWS NETWORK

Mewstone mystery wreck site at Plymouth

Divers in Plymouth, United Kingdom, are probing a wreck site that is thought to date back to the 18th century. Discovered in 1968 off the coast of Wembury, the Mewstone Cannon site has cannons, anchors and olive oil jar fragments.

Through the Nautical Archaeology Society's Adopt-A-Wreck scheme, the Plymouth Diving Centre, based at Queen Anne's Battery, has adopted the site, which covers a large area of five to 18 metres depth. Strewn across the sea bed, the cannons are around two meters long. The olive jars, which are just fragments now, originally measured over a meter each.

After the initial discovery by visiting divers, a survey and findings report were completed, but not much else until last year, when the non-profit marine research organisation ProMare got involved. In cooperation with Plymouth University, Promare did a geophysical survey as part of its Shipwrecks and History in Plymouth Sound program (SHIPS). Researchers mapped out accurate locations for the cannons at the site before handing their findings over to Plymouth Diving Centre.

"This project will test our divers' investigative skills, as the cannons are in the same area as a couple of other wrecks, " said Lisa McLernon, manager of the dive center, adding that already there were various theories being tossed about on how the wreckage came to be at the site.

"It could be a shipwreck destroyed in a storm in the 1700s, with the wood eaten away by marine organisms over time. It could be that the cannons were thrown overboard in bad weather in an attempt to save the ship," she said.

All agree that it will be exciting to find out what really happened. In addition to the research, a diver trail with an easy-to-follow map will also be created by the investigating team. ■
SOURCE: NORTHCLIFFE MEDIA

training bulletin

Edited by
Peter Symes

PADI partners in new film on diving for the disabled

COURTESY OF MAKE A HERO.ORG

Directed by Kurt Miller and narrated by Jean-Michel Cousteau, *The Current*, due out this summer, is a 40-minute documentary that follows six people of various backgrounds and disabilities, as they face the many obstacles of regaining mobility with the aid of water sports. Celebrities and athletes such as Olympic gold medalist Missy Franklin, disabled surfer Bethany Hamilton of the movie *Soul Surfer*, U.S. Paralympian Mallory Weggemann, NCAA wrestling champion Anthony Robles and other noble characters will be featured diving in this inspirational film.

PADI is a major partner in the production of the movie, the second film in the inspirational series created by the non-profit organization Make A Hero. The group assists individuals with disabilities overcome obstacles and challenges, building confidence and experiencing freedom through participation in sports and recreation.

The intent of the film series is to inspire viewers, build awareness and generate revenue, which Make A Hero gives directly to adaptive organizations which support volunteers who work with individuals with disabilities.

With beautiful cinematography in the underwater realm of exotic locations such as the Bahamas and Mexico, both abled and disabled people will be filmed discovering the wonders of the marine world whether it is swimming with dolphins and whales, freediving or learning how to scuba dive with Jean-Michel Cousteau.

For more information about the film, go to ***Makeahero.org****. You can also make a donation to the project at* ***Kickstarter.com****.* ■

New features added to SSI app

SSI

Due to popular demand, the SSI app, *Everything Diving*, is now available in ten languages including English, German, Dutch, Polish, Hungarian, Russian, Indonesian, Chinese, Japanese and Korean.

New contents in the updated app include a settings feature for switching between languages and units, a support request page, as well as a status page for dive professionals.

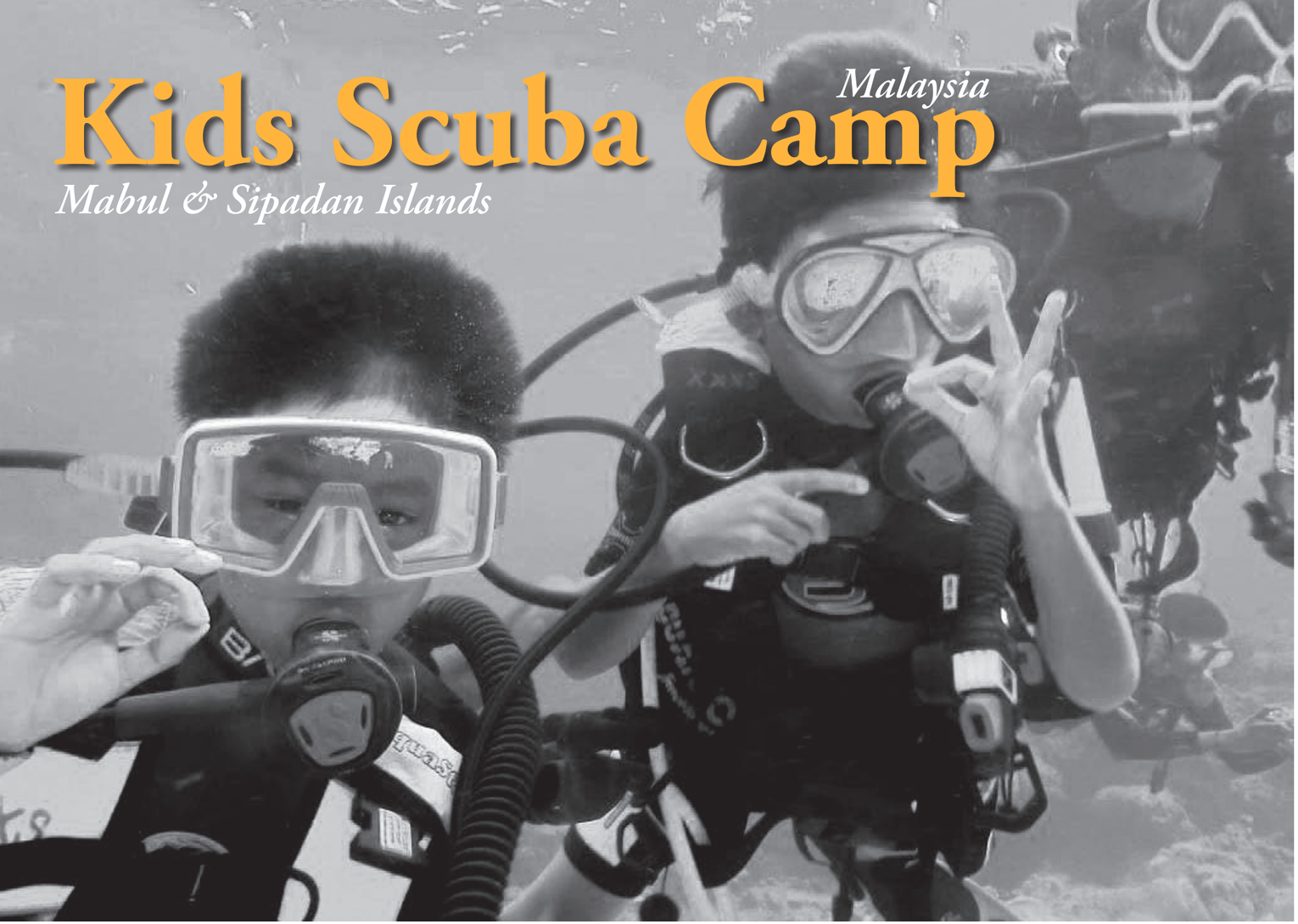
Aside from being free and easy to install, SSI says on its website that the app is intuitive and provides the diver everything he or she would need on dive trips including dive planning, buddy check list, equipment checklist, first aid and neuro assessment flow charts, hand signals, and SSI dive center and resort search functions.

For more information, visit the App Store and download *Everything Diving by SSI* Phone App. ■

Kids Scuba Camp

Malaysia

Mabul & Sipadan Islands



THIS PAGE: Children and parents participating in the Kids Scuba Camp on Mabul and Sipadan Islands in Malaysia; On the Borneo Divers Resort jetty for a check dive (below)

Text edited by Gunild Symes. Photos courtesy of Syed Abd Rahman

Every year, a group of children have the unique opportunity to experience scuba diving at what is arguably one of the best diving locations on Earth—the islands off the eastern coast of Borneo, Malaysia. Here, under the experienced guidance of Syed Abd Rahman—PADI instructor, Master Scuba Diver Trainer, founder and educator of Kids Scuba Malaysia—Malaysian children get up close and personal with the marine ecosystems in their own backyard, world-renown for their beauty and abundant biological diversity.

Syed started the scuba organization for children, Kids Scuba Malaysia, because he saw that while there were many foreigners and their children enjoying and appreciating the awesome underwater realm of Malaysia, the majority of Malaysians and their children were not aware of the natural treasures in the seas that surrounded their own country. So, he started with his own young daughter, teaching her how to scuba dive, and continued on in sharing the experience of learning scuba with other Malaysian children. Kids Scuba Malaysia is now the largest group of its kind in the world, and Syed has been called to consult fledgeling children's scuba clubs all over the planet, assisting dive educators and parents with devising unique and well-coordinated organizations and activities that benefit the children of their local communities.

Back in Malaysia, the children in the Kids Scuba Camp, which recently took place in early December 2012 at Borneo Divers Mabul Resort, were getting ready to enjoy an experience of a lifetime. Twelve children and teens, with ages ranging from nine to 16, participated in the PADI Seal Team and Junior Open Water courses. Their first encounters with the underwater world in open sea happened in their check out dive right off the jetty at Borneo Divers Resort.

Assisting the children were a team of five dive professionals and instructors from Kids Scuba and Borneo Divers. With only two students per instructor, the children received optimal attention and quality education, with a constant eye on their safety.

Due to its success, there is a lot of local and international support for the Kids Scuba Camp at Mabul/Sipadan. Sponsors include Borneo Divers Mabul Resort, PADI Asia Pacific, Tourism Malaysia, SportDiving Magazine, DiveLog Australia and A & L Adventure & Leisure Sdn. Bhd. It is a testiment to the success and quality of the program.

Sipadan

After their check out dive at the jetty, the children, parents and instructors boarded a speed boat and headed off across the sparkling, calm sea to Sipadan Island, known the world over for its incredible diving. Passing breathtaking scenery on the 30-minute boat ride to the dive site, the children were met by turquoise blue waters promising great things to come. On first impression, there was a sense of peace and tranquility at Sipadan's jetty built by Sabah Parks Authority. This is where the children and their parents would experience the beauty of a balanced ecosystem in a natural marine environment.

One of the children saw a lone 4-foot barracuda hanging out in the shallow waters under the jetty. Then, all the eager children peered at the huge resident fish at the shore line. It was an amazing moment for these children to come face

LEFT TO RIGHT: Three of the 12 children and teens participating in the Kids Scuba Camp graduated to PADI Master Seal Team in a ceremony conducted during the surface interval on Sipadan Island. Kids Scuba founder and educator, Syed Abd Rahman (in front row right), hands a certificate to one of the graduates

Kids Scuba

to face with a real barracuda! After that awesome experience, the kids went straight to the beach to enjoy the clear blue waters of the island.

Syed said, "Sipadan Island boasts a tremendous diversity of marine life living harmoniously together, like the symbiosis of the clownfish in the coral colony. It reminds me how we human beings should appreciate life in our modern civilization and should practice harmony in our everyday lives."

Diving Sipadan Island was a first for the PADI Seal Team Kids and Kids Scuba Camp participants. Here, they could observe and appreciate healthy marine life, from clown fish, jacks and sharks to the great barracuda. The children had to master patience in their approach and good buoyancy in order to enjoy the marine life.

"This is a unique experience," said Syed, "Especially for the new Kids Scuba divers... to really understand and appreciate how the marine life lives in the water. They'll slowly descend from the shore to depths of 3-5m to view the lively and beautiful corals in the protected Sabah Parks, to which they've never dreamt of getting this close before, and get to scuba dive along with schools of fish. As they turn around, the kids get to catch a glimpse of black tip sharks swimming by." Syed added, "This time, as we dived and passed through the schools of jacks numbering in the thousands, we later noticed a huge school of barracuda's circling near to us in the shallow waters."

Syed said that each healthy barracuda measured as long as three to four feet in length and swam by the camp participants, following their leader, in a circular path. Excited to be so close to sea creatures, the children and their instructors swam slowly over to a group of clownfish hiding among the anemone. The children observed the clownfish being buffetted around by the sea current. Soon, there also appeared a group of parrotfish feeding on the coral, which is their main source of food.

The Kids Scuba Camp participants managed to do two dives in one day, in the vicinity of the Sipadan Island, to a maximum depth of 5m. The children dived, played on the beach, and squeezed in a quick lunch before going on their second dive. During the surface interval time on Sipadan Island, there was also a special graduation ceremony held for three boys (aged 10, 9 and 9) in the group who were being upgraded to PADI "Master" Seal Team Members by their instructor, with their proud parents looking on. After all the fun and adventure, it was time to go back to Mabul Island. It was late afternoon, and everybody was too exhausted to do anything but "sack out on the boat", said Syed.

What parents say

Positive comments on the event were offered by the parents. "The service and professionalism is up there with the best dive trips organized by the Borneo Divers Team, and undoubtedly, it was the most well-planned trip by the organizer of the Kids Scuba Team," said Dr Khamsiah Muda, Lead Maternity Specialist at one of Kuala Lumpur's large private hospitals, who accompanied her three sons (aged 9, 9 and 10) on the trip.

Another parent, Mr Khoo, said, "My two sons truly enjoyed themselves at the camp. It was their first experience diving in open water, and Syed and his Kids Scuba Team ensured that they were well taken care of. The camp not only taught them diving skills but also taught them about underwater marine conservation, and more importantly, strengthened the bond between a father and his sons. They also made new friends and can't wait for the next camp. As [one of my sons] exclaimed, 'Daddy, I feel like I am in a huge aquarium!' Thank you, Kids Scuba."

Parent Dr Khamsiah Muda and son underwater during Kids Scuba Camp

Non-divers

Have a non-diver in the family? Fear not, as non-divers are not forgotten on the islands. Snorkeling, swimming in the pool or just lazing around will keep everyone occupied, said Syed. The islands of Mabul and Sipadan are family-friendly, good destinations for families who just want to get away from the hectic city life for a few days. However, there is a limit as to how many people can dive and snorkel while visiting the islands, a conservation action put in place for the protection of the fragile marine ecosystem. Visitors will find that the positive results of putting less stress on the reef habitats are evident.

As another fantastic sunset brought another perfect day of the Kids Scuba Camp to a close, the serene setting of Mabul Island, where camp participants stay, was difficult to say good-bye to. All too soon, it was time to return home, and both children and parents looked forward to next year when another great experience at one of the world's best places to dive can be enjoyed. ■

*For more information, contact Syed Abd Rahman at **kidsscuba@yahoo.com** or visit **www.kidsscuba.com***

Participants of Kids Scuba Camp 2012 celebrate

travel news

Edited by
Gunild Symes

Wear your luggage

JAKTOGO.COM

Tired of paying extra fees for luggage? Try wearing your luggage with a Jaktogo. Not the most stylish or flattering garb to wear, they will save you cash, maybe even lots of cash in baggage fees. And if you don't mind a few odd glances from passersby at the airport, then you could become a savvy traveller saving thousands of dollars, according to designers of the line.

The wearable luggage was created by Irish engineer John Power of Antwerp, Belgium, who invented these unique garments in order to get around the exorbitant baggage fees that airlines charge today. Since he travelled twice a week on budget airlines, he was more than familiar with the way airlines strictly enforced luggage weight limits and charged extra for checked bags.

By taking more on board, one can check less. The Jaktogo transforms from a bag into a coat or a dress or a poncho with lots of pockets in which to put things to bring onto a flight. Made of a light, durable polyester, the coat can carry a total of 15kg of luggage in its 14 pockets of various sizes. The garment folds up and can be carried as a shoulder bag after boarding.

Most carriers permit passengers to take one piece of hand luggage on board at no charge, as well as a jacket or coat. The Jaktogo allows travellers to get around the baggage charges altogether.

"I do get some funny looks at the airport, but I usually sell about ten after every trip," said Power. You can order the Jaktogo online at: **Jaktogo.com** ■

SOURCE: DAILY MAIL

Semi-submersible being built in Fiji

In Nadi, Fiji, a unique underwater vessel is being constructed. A first for Fiji, the 18-meter-long semi-submersible is bigger and more comfortable than anything of the like built to date, according to Rob Moigg, owner and director of South Sea Sub. Capable of sailing underwater, the semi-submersible will give tourists a whole new underwater experience touring the lush and diverse coral reefs off the coasts of Fiji.

"No one has ever really done this on this scale before. It's exciting for Fiji. It's the first of its kind in the world as well. It's a great place and Fiji Tourism has exploded over the last few years ... we see it going a lot further, and we want to be here for that ... this one is not just about tourism, it's about experience—bringing something that no one has seen before," said Moigg to FBC News.

With an expected inaugural sail on 1 March 2013, the sub is being built at Marine Power and Services, Copra Boats shipyard, Wailoaloa, with material shipped in from the United States. ■ SOURCE: FBC NEWS

New bomb-sniffing departure gate in Japan

As passengers swipe their boarding passes at the gate to their next flight, a new machine devised by the Japanese firm Hitachi may soon scan them for bomb explosives.

A world's first, the bomb detecting departure gate emits a puff of air on each passenger's hand as they swipe their ticket. Then the air is sucked back into the device with any small particles from the passenger's hand. The machine is then able to detect explosive particles with which the passenger has recently been in contact—within two seconds. While impressive, it only works for non-metal-based bombs.

"This allows screening of all passengers and can make air travel safer," said Minoru Sakairi to *News Limited* in Australia.

Further testing will see if the device will be employed along with current safety measures already in place. ■

SOURCE: GADLING

Bundling is the new black

After years of cost-cutting by airlines, travellers have gotten used to the idea that when they go on an airplane, they will get a seat and not much more. Forget the meal, forget the drink, forget the second piece of luggage. And on some carriers, forget even a slug of coffee in a styrofoam cup.

However, a quiet movement has begun, initiated by airlines such as Delta and American. It's called *bundled options*. These airlines are testing out the idea that people will pay more for a few extra services.

As it happens, these bundles come in tiers.

QUINN DOMBROWSKI / CREATIVE COMMONS

Atlanta-based Delta Airlines has two. Their Lift package at US$34 provides priority boarding and 1,000 extra frequent flier miles. Then there's their Ascend package at $19, which includes priority boarding and a 24-hour Wi-Fi pass.

American Airlines has three tiers: Choice, Choice Essential and Choice Plus. The regular ticket constitutes the Choice option. At $68, Choice Essential includes one checked bag (round-trip)—which is valued at $50—and there's no penalty fee for changing your ticket. At $88, Choice Plus adds to this priority boarding, stand-by privileges, extra frequent flier miles and an alcoholic drink, which you will most likely need after paying for all these extra services.

The airline executives say these bundles are akin to options one gets when buying a new car. They want to permit customers to "control not just their transportation, but their experience", said Delta executive vice president Glen Hauenstein to *Pioneer Press*. But he conceded that they are just starting to look into what other products the airline can sell in bundled options.

While these bundled options might save you a few bucks over buying them à la carte, there are some limitations. These bundled options are only available through the airlines' websites, in selected airports, and only on planes that have Wi-Fi.

Target audience

Who would buy bundled options you ask? Why the business travellers with no elite status, that's who, according to Chris McGinnis, editor of traveller newsletter *The Ticket*. "They're very willing to pay for Wi-Fi, and if by doing so in a package helps get a little discount off the price, then yeah, I think they would probably do that," McGinnis said.

For divers and underwater photographers, priority boarding may indeed be important since these folks probably need to grab the space in overhead bins for sensitive equipment. According to Henry Harteveldt, co-founder of Atmosphere Research Group, bin space is also a priority for a variety of business travellers.

Nickel-and-diming it

Sounds like "nickel-and-diming" to you? Maybe. But others in the airline industry see it as a new type of product with services not yet included in current airline fares. In fact, more and more airlines are switching to this relatively positive-sounding 'bundled options' to get away from the negative perceptions of 'additional fees'.

In actuality, isn't it really air travel just going back to the good old days when coffee was included in the fare? ■

SOURCES: PIONEER PRESS, DETROIT FREE PRESS

Costa Brava

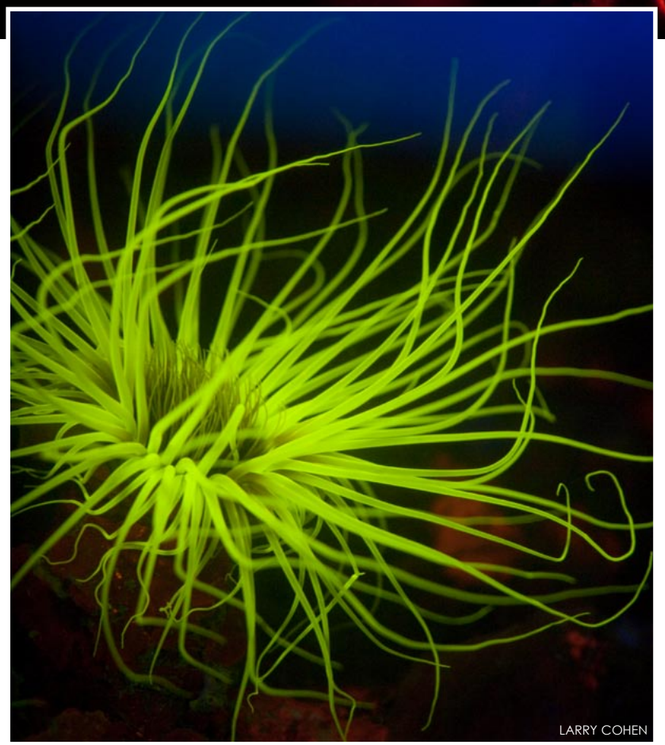
Spain

Text by Larry Cohen. Photos by Larry Cohen, Olga Torrey, Martine Desitter

LARRY COHEN


LARRY COHEN

Fluorescent leopard slug, *Peltodoris atromaculata*; Port LLigat (right); Red starfish (lower right). PREVIOUS PAGE: Dive master Saara-Kaira Takala with Mediterranean gargonian, *Paramuricea clavata*


LARRY COHEN

Fluorescent tube anemone, *Cerianthus membranaceus*

Spain


OLGA TORREY

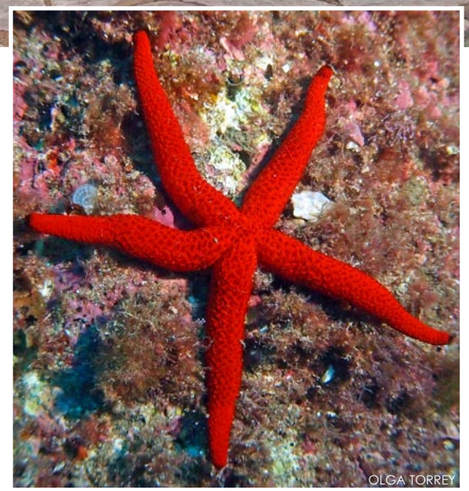
When people from the United States go on a European vacation, diving is usually not on the agenda. But the Costa Brava area on the northeastern coast of Spain offers some interesting diving. It might not be as colorful as the Red Sea or Indonesia, but add on the cultural experience, and it is worth a visit. Divers from France, Belgium, Switzerland, Netherlands and the rest of Europe have been coming here for years. This is the journey of two divers from New York City, as they explore Spain's sites and culture above and below the water.

Barcelona

Barcelona is about a two-hour drive from Costa Brava. On a trip from the United States this a great place to start. Barcelona offers world-class museums, cuisine and beaches. It is also a party town with plenty of clubs, and bars. Just strolling along the streets from neighborhood to neighborhood is an adventure. People watching, viewing the architecture and visiting the cafés is very compelling. Arriving from New York City on the red-eye, the time difference does take its toll. Arriving in Barcelona mid-morning, the local custom of a siesta seemed appropriate before hitting the streets.

An evening walk in the Gothic Quarter was the perfect start for our exploration of the city. The narrow streets have an abundance of restaurants and bars located in ancient Roman style buildings. Las Ramblas is one of the wider streets in the area. It is primarily a pedestrian walk with only two narrow one-way traffic roads on both sides of the central area. This gives the boulevard a street fair ambiance 24 hours a day.

Having only one full day in Barcelona, we decided to concentrate on the architecture of Antoni Gaudí. Gaudí was born in 1852 and died in 1926. He was part of the Catalan Modernista (Modernism) movement. This widescale movement reached its peak in the late 19th and early 20th centuries across all of the arts. Gaudí's work transcended mainstream Modernism, having an organic style inspired by nature.


OLGA TORREY


LARRY COHEN


LARRY COHEN


OLGA TORREY

Spain

structure is more a sculpture than a building. It was built during the years 1905–1910, being considered officially completed in 1912. The roof is unusual; its architectural and sculptural elements can be seen from the street. Ventilation shafts and chimneys are decorated with broken fragments of tile. The stone railings around the perimeter follow the shape of the façade. You could tell Gaudí was fond of a harmonious solution between the curves of the façade and roof.

Casa Batlló is the total restoration in 1904 of an old conventional house built in 1877. The building is located at Passeig de Gràcia 43. Gaudí replaced the original facade with a new composition of stone and glass. He redesigned the external walls to give them a wavy shape, which was then plastered with lime mortar and covered with fragments of colored glass and ceramic discs. The balcony railings are in the shape of a mask. The building was highly criticized during construction for its radical design. But in 1906, the Barcelona City Council deemed it one of the three best buildings of the year.

La Sagrada Familia is located at Carrer de Mallorca 401 in the centre of Barcelona. It has become one of the most universal symbols of the city. Construction on the church began in 1882 by the diocesan architect Francisco de Paula del Villar. At the end of 1883, Gaudí was commissioned to carry on the work. He did not abandon this project until his death. The church presents a great depiction of the relationship between man, nature and religion through its architecture and façade sculptures. Construction on the church is still taking place today. It is anticipated the church will be completed in 2026. This will be the centennial of Gaudí's death.

When walking around Barcelona, you see signs everywhere of the Catalan independence movement. What is now the northern region of Spain was part of Catalonia since the Middle Ages. The people of this area have their own culture and language. With unemployment in Spain at an all time high, many people believe the area would be better off as an independent state. A flag with red and yellow stripes and a white star inside a triangle symbolizes the movement. This flag can be seen hanging on many balconies along the streets of Barcelona.

OLGA TORREY

Streets of Barcelona are lined with scooters and Vespas

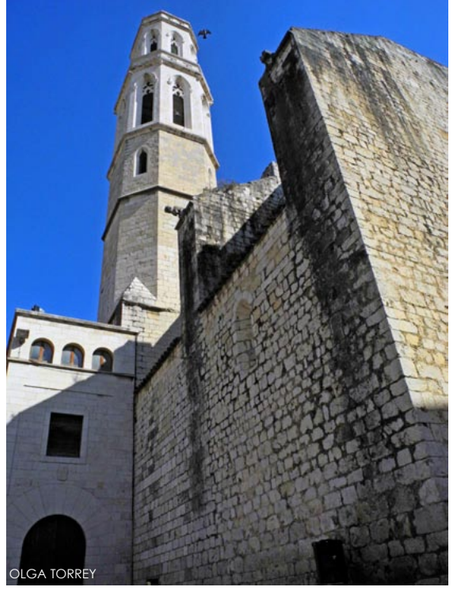
Gaudí rarely drew detailed plans of his works; he would create three-dimensional scale models while he was conceiving the ideas. A Gaudí building is so unique, even people who know nothing about architecture or Gaudí will intuitively be able to identify one. For this reason, UNESCO recognized his buildings as World Heritage sites in 1984.

La Pedrera is one of Gaudí's main residential buildings and is extremely imaginative. It is located at Passeig de Gràcia 92. This


OLGA TORREY

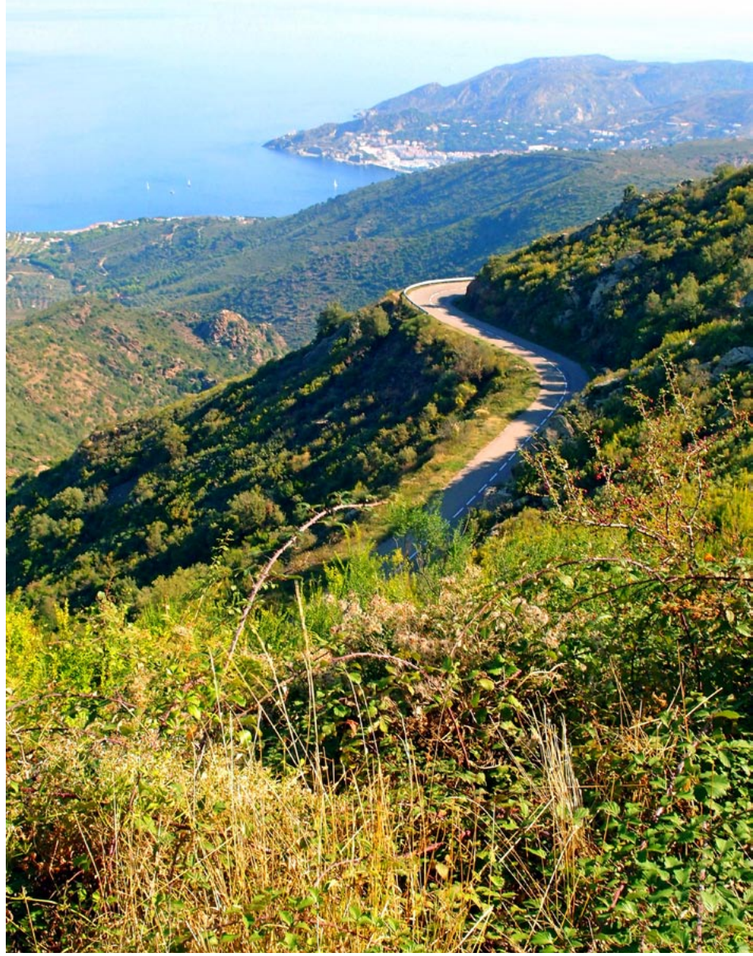
THIS PAGE: Scenes from Barcelona; Buildings by the great architect Antoni Gaudí can be found throughout the city, including La Pedrera, Casa Batlló, Casa Milà (top right) and Temple Expiatori de la Sagrada Família (top left) still in progress


LARRY COHEN


OLGA TORREY

Spain

featuring the work of Salvador Dalí. This is the largest surrealistic object collection in the world. The museum is located on the site of the former Municipal Theatre—a 19th century building that was destroyed at the end of the Spanish Civil War. Dalí purchased the old theatre and created his own museum in the town where he was born. Showing up at the museum on a Monday, it was closed, but the building itself and the surrounding sculptures were certainty worth the visit.


OLGA TORREY


LARRY COHEN


OLGA TORREY

CLOCKWISE FROM ABOVE: Sant Pere Church interior; Dalí Theater Museum; Sant Pere Church; Winding road between Figueres and Rosas; Small fishing village of Rosas; Surreal sculpture on Dalí Theater Museum includes Mark V dive gear

The drive

Getting around Europe by train is supposed to be very easy. But to get to Hotel Cala Joncols in Rosas would have required a train to Figueres, a bus to Rosas, and then a pick up with the hotel's car. We decided that renting a car would be a more practical way to go, considering the cases and cases of equipment.

Prior to departure, we arranged to rent a Peugeot Partner, which is a small van. We went with Sixt, a popular rental company in Europe that now has a few locations in the United States. We picked the Hilton Hotel at Diagonal Mar, since it looked like it had easy access outside the city. The car rental agent spoke fluent English and gave us directions on how to exit Barcelona and get to Rosas. Once I remembered how to drive a manual transmission car, the drive went rather smoothly.

Figueres

Upon leaving the main highway, we decided to take a detour to the town of Figueres. This town has a compact historic area that has the ambiance of the Gothic Quarter of Barcelona but on a much smaller scale. The town was established during the 10th century, according to the records from the Sant Pere Monastery. The Sant Pere church is still at this location. The name *Figueres* means fig trees, which are abundant in the area. It is the last major town before crossing the boarder into France.

The main attraction here is the Dalí Theatre-Museum, of course

Getting there is half the fun

After leaving Figueres, we did get lost going to Rosas. The road between Figueres and Rosas had a number of round-abouts. There were signs, and then they would just disappear, so we did not know in which direction to head. After getting directions from someone who hardly spoke English, we managed to arrive at the marina in Rosas. Here, we found someone who spoke fluent English, and we asked for directions to Hotel Cala Joncols.

They directed us to a road up a steep hill. This two-way road was narrower than most one-way roads on the U.S. east coast. The road also overlooked a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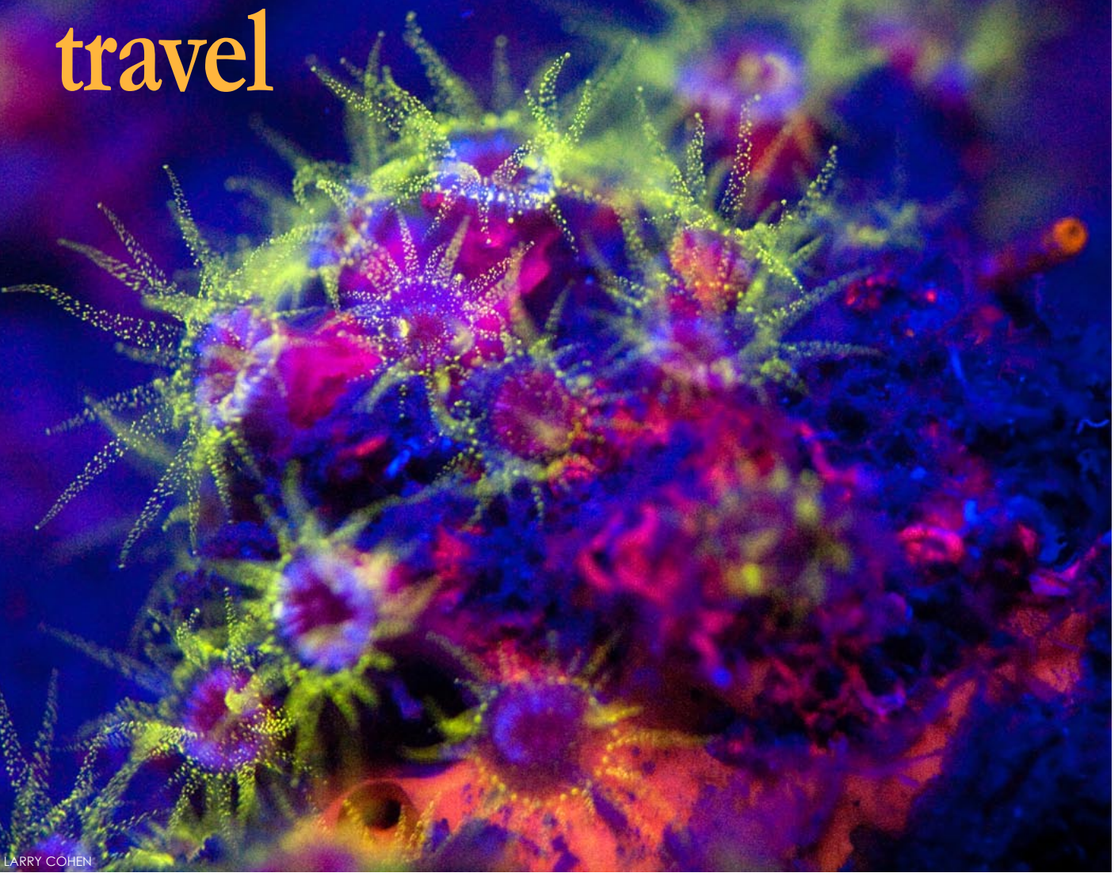
LARRY COHEN


LARRY COHEN


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LARRY COHEN


LARRY COHEN

LEFT TO RIGHT: Hotel Cala Joncols, nestled on a hillside; Fluorescent sunset cup coral, *Leptopsammia pruvoti*; Female blenny, *Tripterygion*, and bigscale scorpionfish, *Scorpaena scrofa*; Diver Martine Desitter enters swim-through at La Caverna

steep cliff. To add to the adventure, after a short drive, it turned into a rough dirt road. Considering the fact that I had not driven a manual transmission car in many years, this drive was an experience all on its own.

Once we were able to subdue the fright factor, it was a picturesque ride. Most of it was through the Cap De Creus National Park. This is the most easterly point of Spain where you see the last glimpse of the Pyrenees before they plunge into the Mediterranean Sea. Part of the park is underwater, but it is also known for bird migration. Kites, eagles and honey buzzard are just a few of the bird species that migrate past the park. Bonelli's eagles and sea birds including Cory's, balearic and yelkouan shearwaters call the park home.

Finally arriving at the hotel, we were so happy to get out of the car. When we commented on the experience, a hotel staff member asked jokingly, "So, you don't like Spanish super highways?"

Hotel Cala Joncols

Besides diving, the theme of this hotel is *adventure*. Kayaking, hiking and mountain biking are some of the other activities. When there is a full moon, you can do a night kayak tour, which includes a guide and a bottle of cava (sparking wine). This out-of-the-way establishment has 33 rooms, and many of the guests come back every year. The hotel is only open from April to October.

The place has a fascinating history. Jose Gomez and his wife, Maria Fernandez, came to Rosas in 1969. Jose worked as a gardener for the hotel's Italian owners. In 1970, Jose and Maria rented the hotel from the owners and ended up purchasing it in 1995. Their two sons, Michael and Manuel Gomez Fernandez, now run the hotel.

They also run a water taxi to Port LLigat. This is the village where Salvador Dalí lived. Port LLigat has been represented in several of Dalí's paintings, such as *The Madonna of Port Lligat, Crucifixion* (*Corpus Hypercubus*), and *The Sacrament of the Last Supper*.

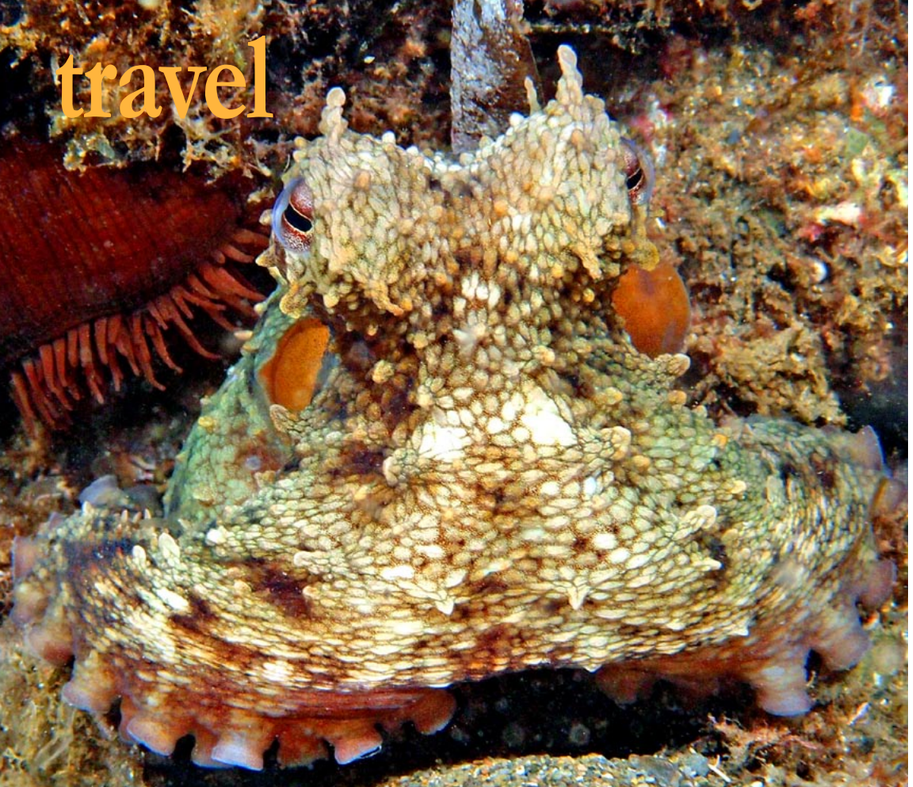
With all the outdoor activity, food is very important, and Cala Joncols does not disappoint. All the Spanish and Catalan food is very local. The family owns its own 21-foot fishing boat, which provides the seafood for the hotel. The olive trees on premises produce 3,000 kilos of olives a year, which are used to produce olive oil for the hotel.

Diving

Euro-Divers has been running the five star PADI facility at Cala Joncols since 2003, but the dive operation has existed for 20 years. Euro-Divers also has operations


OLGA TORREY

Delicious meals and stunning views greet guests at Hotel Cala Joncols



OLGA TORREY

LARRY COHEN

OLGA TORREY

Diver photographs white sea fan at La Piscina

LEFT TO RIGHT: Common octopus in sand of house reef in front of Hotel Cala Joncols; Anemone, *Alicia mirabilis*, closed up, opens at night; Shark egg case of nursehound, *Scyliorhinus stellaris* (inset right)

in Croatia, Egypt, Indonesia, Japan, Maldives, Mauritius, Oman and Thailand. The international staff in Spain is led by the husband and wife team of Jan Boelen and Martine Desitter from Belgium. Etienne Zind from France is the dive center manager. Dive masters include Mauro Valverde from Uruguay, Saara-Kaira Takala from Finland, and Dennis Rabbeling from the Netherlands. Dennis is also the resident photographer.

Euro-Divers' season runs from April to October, but many locals dive all year round. Water temperature is 55°F (13°C) in the winter and can get as warm as 73°F (23°C) in the summer. Besides the staff, guest instructors come in to teach specialties including rebreather, side-mount, photography and marine biology. They also run an IDC (instructor development course) course. Michael and Manuel Gomez Fernandez own the 60-foot dive boat, and they rent it to Euro-Divers. The boat with two diesel engines features an hydraulic lift instead of a dive ladder. Diving with double tanks and photo gear, this setup is a pleasure.

Safety

Safety is a major concern for the diving and other adventure activities. Euro-Divers does not allow decompression diving and limits run times to one hour. In Spain, the law states that you cannot dive deeper than 130ft (40m). In case there is a problem, Martine is a trained EMT (emergency medical technician). The hotel is secluded, but from June to September, there is a Red Cross station just 20 minutes away. In Rosas, there is a small hospital and a large one in Collado de Fenes. There are recompression chambers in both Palamós, Spain, and Perpignan, France. Both of these locations are about 43.5 miles (70km) away.

LARRY COHEN

Diving the beach

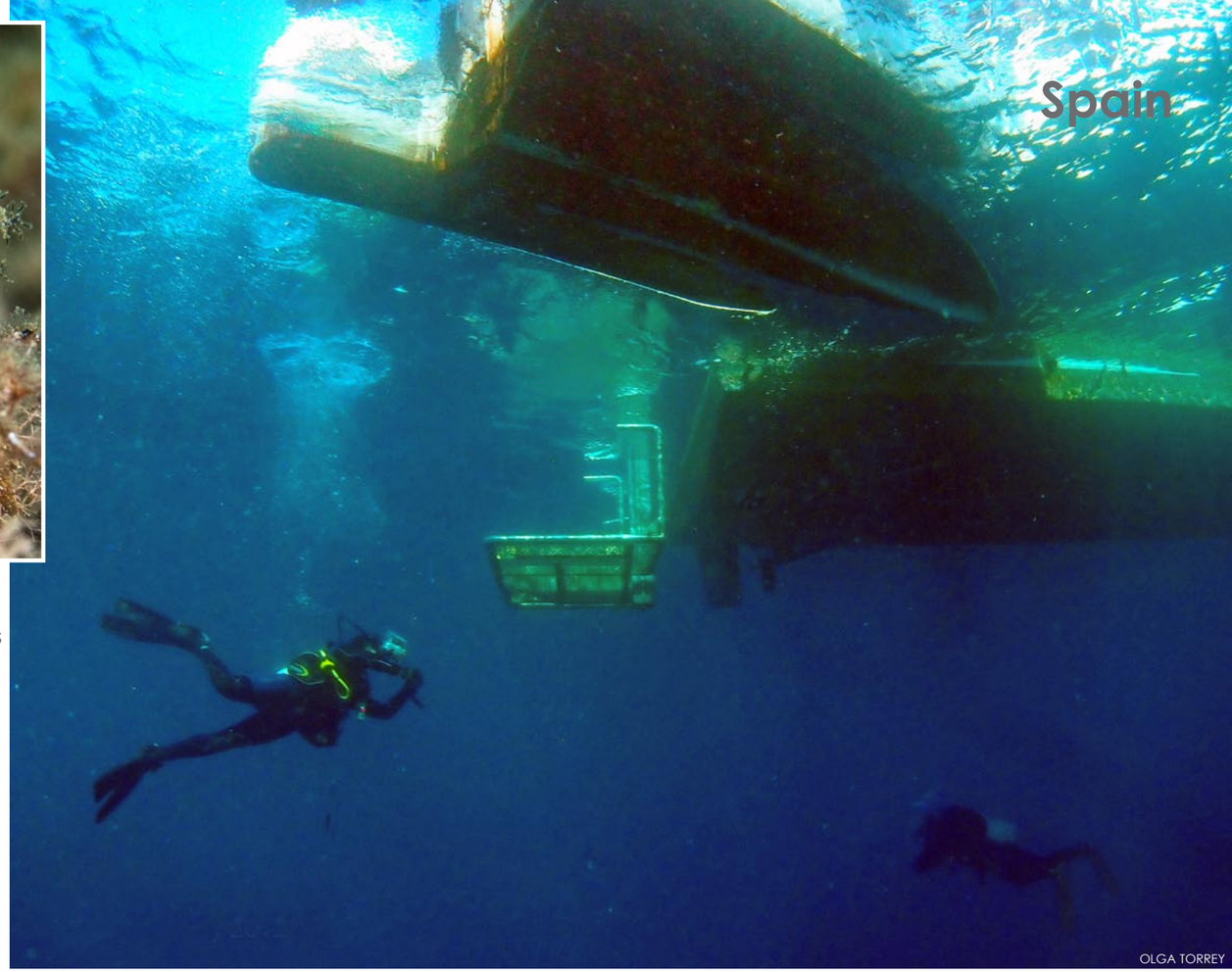
The beach right next to the hotel is full of tiny creatures. This is far from a pretty dive site. Mostly gray with plenty of silt, it is the Spanish version of muck diving. Diving in less than 20ft (6m) of water, one can encounter tiny scorpionfish, octopus and squids. The trained eye can spot a number of different species of seahorses. We spotted a small goby, which was being very aggressive. Upon later examination of the photos, we saw that the tiny creature was protecting a nest with eggs.

It also pays to check under the silt. Our eagle-eyed guide Dennis spotted an outline


OLGA TORREY


LARRY COHEN

LEFT TO RIGHT: Yellow sponge, *Clathrina clathrus*; Long-snouted seahorse; Hydrolic lift on dive boat provides easy access


OLGA TORREY

in the sand. After some gentle fanning he uncovered a large skate.

Boat diving

Dive sites such as La Caverna, Norfeu Nord, Punta Prima, Trencat, La Piscine and El Bisbal are only about a 10- to 15-minute boat ride away. All of these sites are part of the Cap De Creus nature reserve. These sites have a rocky terrain with many swim-throughs and small caves. The walls are decorated with gorgonians of many different colors. Red gorgonians are very common in the Mediterranean Sea, but the multicolored ones are only found is a small triangle that includes Rosas, Cadaqués and L'Estartit.

On these walls is a variety of marine life. One can spot grouper, barracuda, scorpionfish and a variety of gobies. Mola molas can be spotted at the end of May to the beginning of June. Although these sites are in a nature reserve, it does appear that over-fishing has taken its toll. There really is not a large number of fish compared to other dive locations. But the dives are still worth doing.

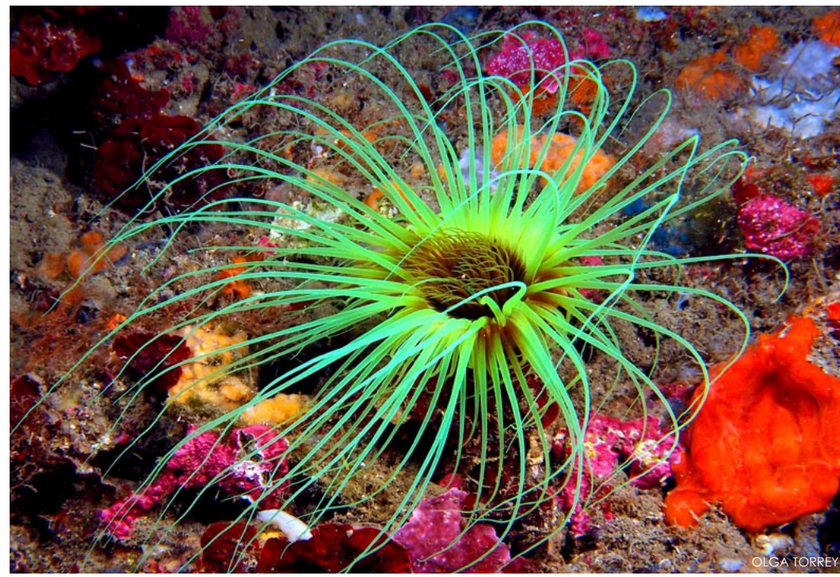
There are many smaller creatures including an assortment of nudibranchs. Most of these tiny animals can be seen swaying in the current on a colorful gorgonian. But we also saw one the size of a dinner plate. Octopus, moray eels and seahorses can also be observed on these dives. There is a small shipwreck at El Bisbal. Here, we saw a spotted stingray.

Fluorescent diving

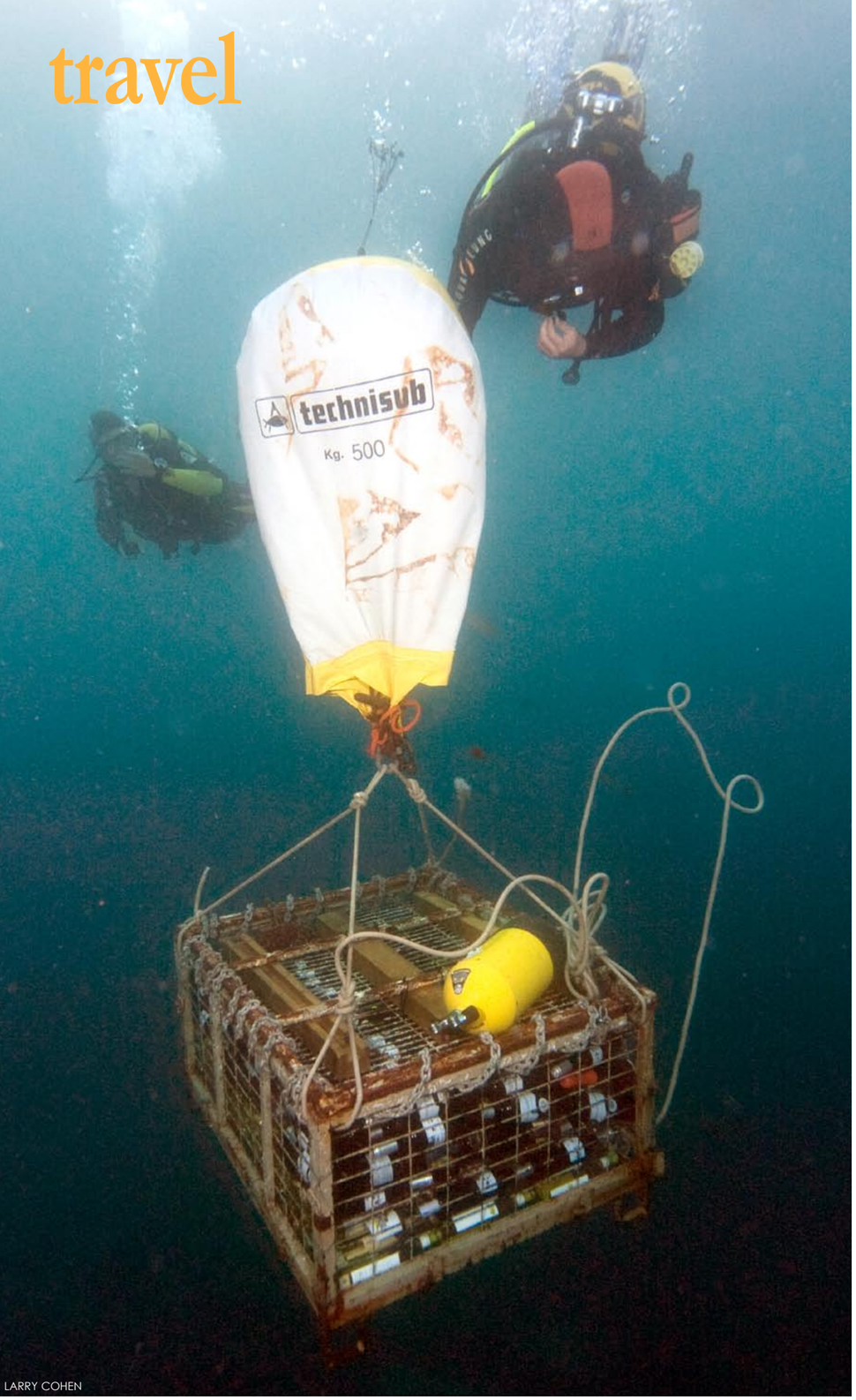
Fluorescence is the absorption of one wavelength of light and the re-emission of another different wavelength of light. A fluorescent object under white light reveals the object's true color. Under ultraviolet (UV) light, the object absorbs the blue and re-emits a glowing fluorescent color. This is different than phosphorescence, or bioluminescence. Marine life that fluoresces has the ability to convert one color into an entirely different color. Scientists are not sure why marine life produce fluorescence. Some believe marine life fluorescence is a way for them to express themselves, similar to our moods. In any case, it is a unique way to observe the underwater world.

The way this works is you have a special orange filter taped into your dive mask. You then use a special ultraviolet LED dive light. In order to see the fluorescence, we have to remove all the white light. So, these dives should be done at night or in one of the small caves.

In order to do photography, we taped the special orange gel onto our lenses. We then mounted the special ultraviolet LED dive lights to our strobe arms. Between the blue dive lights and the orange


OLGA TORREY

With special filter masks, divers can see fluorescence as in this tube anemone



LARRY COHEN

Divers sinking wine in crate (above); Fluorescence of tube anemone is revealed (right)

OLGA TORREY

Euro-Divers staff prepare wine for sinking (above); A taste of the sunken wine (right)

filters, you lose a significant amount of light. We pushed the ISO to 1000 but were still shooting at a slow 1/15th of a second shutter speed. In order to get sharp images, we had to brace ourselves creating a human tripod with our elbows. It would have been much better to have UV filters to place over our strobes. This way, we would not have had to deal with the slow shutter speeds.

The other problem with fluorescence photography is that we needed to have the special orange filter over our eyes to find our subjects, but then had to remove the filters so we could use our cameras. We wore welding masks over our dive masks with the filters taped into the visors. The plan was to leave the welding masks on, raising and lowering the visors as needed.

Well, so much for plans! As soon as we jumped in the water, the welding masks floated off our heads. We kept putting them back on and making them tighter. But no matter how hard we tried, the welding masks would not stay in place. So, we just hand held the welding masks, while trying to shoot. This was frustrating and comical at the same time. It is amazing we captured any photographs at all. But the entire process was well worth the effort. Seeing marine life in, literally, a new light was one of the highlights of this trip.

Spain

OLGA TORREY

Sinking of the wine

Espelt is a large family-run winery five miles (8km) from Cala Joncols. Damia Espelt is the owner, and now Anna Espelt is in charge. Three years ago, the Espelt family, Cala Joncols and Euro-Divers decided to do an experiment. The Euro-Diver staff sunk a number of crates of wine to 33ft (10m). The wine was retrieved eight months later and tested. Both expert wine tasters and lab testing showed that being under pressure did improve the wine. The wines sunk were very young, and they matured faster under the Mediterranean Sea.

The wines sunk during our visit were Vailet (white), ViDivi (red) and Escuturit Brut Cava (sparkling). The process was fascinating. Two huge locked crates filled with wine bottles were placed on the beach. Lines were attached connecting the crates to the boats, and the wine was dragged into deeper water. Lift bags were attached to the crates so they would float until they were positioned over the spot they would be sunk. Once over the spot, divers carefully removed the air from the lift bags lowering the wine to the bottom of the Mediterranean Sea. Then a small amount of air was added to the bags, and the crates were moved into the exact spot. After this, all the lines were removed.

These days, the underwater wine is only being served at Cala Joncols, being sold for double the normal price. If there is a small group of divers at the hotel when it

LARRY COHEN


MARTINE DESITTER

Larry Cohen and Olga Torrey ready to dive with special masks to see fluorescence in marine life on the reef


LARRY COHEN


LARRY COHEN

Scenic point on Costa Brava (top right); Precious coral, *Corallium rubrum* (top center); Nudibranch *Cratena peregrina* (left)

is time to retrieve the wine, Euro-Divers runs a scavenger hunt. The locks are removed, and any diver that finds the crate can take one bottle of wine.

Special grouper study

Rosas and San Carlos De Rapita are the largest fisheries in Catalonia. Confraria de Pescadors de Roses is an association of individual fishermen from these ports, but they act as a corporation. Having power in numbers, they buy their equipment as a group, saving money.

Besides running fishing boats, they farm 50 tons of Luvina (sea bass) a year in the Bay of Rosas. They also produce fish products including jars of Fumet de peix (fish stock). They started selling this product in January 2012 and have sold over 30,000 jars worldwide. Keeping the local flavor, the caps have an illustration of a wave and the La Ciudadela de Rosas, which is the old fort overlooking the Bay of Rosas. All together, they sell eight to 11 million euros worth of seafood a year. The fish market in Rosas is operated like an auction. Buyers from all over Spain come to try and get a low price on large quantities of seafood.

Antonio Abad Mallol is the president of Confraria de Pescadors de Roses and works closely with government agencies and environmental groups. One of his most important programs is the XRAQ scientific project. This is a group of many projects to help the fish population in the area. Biologist Anna Nebot and Pablo Bou are the coordinators. Many different universities do the research, and Anna and Pablo make sure the data gets used. Antonio and the staffs at Cala Joncols and Euro-Divers are working with the local fisherman. If fishermen catch groupers with eggs, the fish are not brought to market. Instead, they will be held, studied and released. The fisherman will be paid the same amount of money as if the fish were sold for food.

Groupers are one of the many fish species that change sex. The females are small; as they grow larger they become males. The large males tend to get over fished. Another project is to take the small females and inject them with hormones. This process will turn them into large males. They are then reintroduced into unprotected areas where they can be fished. During our dives, we only observed small groupers once. Hopefully, these projects will increase the grouper population.

Diving the Costa Brava region of Spain is a perfect addition to a vacation in Europe. Hotel Cala Joncols offers enough adventure activities to keep non-diving family members happy while the diver is exploring the sites under the Mediterranean Sea. This is easy recreational diving. There might not be enough fish to please some critter hunters, but there are still plenty of subjects for the underwater photographer. The fluorescent diving and the sinking of the wine were very unique underwater activities to experience and enjoy. ■


NASA

Global map (above) with location of Spain; Location of Cala Joncols on map of Spain (left)

Larry Cohen and Olga Torrey are underwater photographers based in New York City.

Edited by Peter Symes
& Rosemary 'Roz' Lunn

POINT & CLICK ON BOLD LINKS

Equipment *at depth*

UnderSee Defogger

We have all had that 'one dive' where, for no apparent reason, our mask fogs up and it turns into a dive from hell. Wouldn't it be wonderful if it was possible to resolve that problem underwater. It would seem that the makers of UnderSea Mask Defogger have heard our prayers. They have developed a patented product that can be applied in seconds, during a dive. Simply open the pack and remove the applicator pad. Take your mask off, apply, and then shake the mask for 2 - 3 seconds to rinse. Replace your mask, clear and the manufacturer states that your mask will be defogged. The only downside that we see is the environmental impact. Will every diver religiously dispose of the packaging and product upon surfacing? **www.underseedefog.com**

Apex XTX200

At first glance, the new XTX200 has had a visual makeover. The compact, environmentally sealed, over-balanced diaphragm first stage has been redesigned for improved gas flow. It also comes with an optional 5th Low Pressure port for optimal elegant hose routing. Design attention has also be paid to the purge button and diver adjustable controls; the Venturi lever and Cracking Resistance Control benefit from improved ergonomics. Other improvements include the Diver Changeable Exhaust System (DCE) on the second stage. This gives the diver the option to change from a small to a large exhaust. The thought behind this is that the large exhaust reduces bubble interference, (a feature sought by photographers), whilst the lighter smaller exhaust is better for travelling. **www.apeks.com**

Casio Logosease

Casio has developed a pocket-sized transceiver that lets divers converse with each other underwater. At 107 grams, it is lightweight and small enough to attach to the strap of a diving mask. No full face mask needed, divers can talk normally with the scuba regulator in their mouths. Ultrasound and bone conduction technology enables wireless communication. Just by lightly tapping the device once, you can switch between reception and transition modes. Digital speech conversion technology helps make garbled underwater speech easier to hear. Waterproof performance up to 55 meters (180 feet). **www.yamagata-casio.co.jp**

Atomic Aquatics T3

"Coming soon to a dive shop near you." Information about Atomic Aquatics' new top end regulator, [which we understand will hit the market in March or April], is still scant, and we don't have that many details on it, other than it's lighter than the T2X, which is not being discontinued in favour of this new regulator. The T3 will have a three-year/300-dive service interval non-contingent lifetime warranty. **AtomicAquatics.com**

DiveRite XT2

Dite Rite's remit was to create a second stage that delivers outstanding performance and simplicity, that can be routed either right or left handed, that required no extra parts or adjustments to change the routing. The result is the XT2 ambidextrous second stage, a pneumatically balanced downstream regulator. Features include a unique deflection ring to maximise performance whilst deterring free flow; all internal moving parts are Teflon® coated for cold-water diving; a compact, yet easy to grip dive / pre-dive switch to avoid surface free flows and a long bite orthodontic mouthpiece to reduce jaw fatigue.. **www.diverite.com**

C-Explorer 5

Is this the World's first subsea limousine? U-Boat Worx state that "the C-Explorer 5 offers freedom, autonomy, vision and an infinite array of opportunities, that are just waiting to be explored." Their target market is the yachting fraternity that wish to explore the the ocean, and tourist operators that want to offer their clientele a semi-private undersea experience. The full 360-degree acrylic cylindrical pressure hull accommodates up to 5 people and can dive to 300 metres. Features include 6 powerful thrusters, a robotic manipulator arm, imaging sonar, high-intensity LED lights and a small Remote Operated Vehicle (ROV); for those times when you want to explore places the C-Explorer 5 just can't reach.
www.uboatworx.com

Nocturnal Lights

The M700t technical LED dive light is the latest offering from Nocturnal Lights. It is ultra compact and can be held or mounted. There are two power settings; 300 lumens / 4 hours burn time or 700 lumens / 1.5 hours burn time. The ali light head acts as a heat sink, so that you can also use it pre and post dive on the surface. A built in controller monitors the heat generated by the bulb and cuts the power accordingly. This uses 2 x CR123 batteries (available globally) and there is the option to fit a rechargeable lithium ion battery and charger. These are available from Nocturnal LIghts. **Nocturnallights.com**

Hollis SMS 50 Sidemount

Hollis state that their side mount systems "SMS" have been designed not only for cave and technical divers, but for any diver. This looks to be an ideal solution for ladies who want the redundancy of diving a twinset or doubles, but don't want to carry the weight on land. There are two versions of this BCD. The sport version has the low pressure inflator (lpi) hose routing over the left hand shoulder. It is aimed primarily at recreational diver who wants the ease and comfort of side mount diving, but prefers their lpi to be routed in the traditional manner. Meanwhile the cavern or technical version has the low pressure inflator hose elbow routing from the left hip area to avoid overhead interference and potential snagging. The one-size-fits-all harness is based on a minimalist design. We have been advised by Hollis that this hugs the body in a snug manner, and is easily adapted for your own comfort zone. It looks to be a good solution for travelling divers and comes ready to dive out of the box. **hollisgear.com**

Titanium Boot

This new lightweight boot is made 6mm SCS Titanium Open Cell neoprene which Camaro writes is so flexible that no zip is required and its snug fit reduce water entry to a minimum. The coating repels waters and also helps neutralising bad odours.
www.camaro.at

Sola Nightsea

Fluorescence diving and photography continues to evolve with the DEMA 2012 launch of Light and Motion's (LAM) 'Sola Nightsea'. This has a respectable pedigree - it was developed in conjunction with Nightsea and leading fluo-scientist, Dr Charles Mazel. Industry rumour has it that everyone who has played with it say it is a fantastic light, and it will get you excited about night diving. The Sola Nightsea blue light allows you to see a hidden world when you 'fluo-dive', because it is a 'fluorescent exciter'. Various proteins in the bodies of coral, jellyfish, anemones etc fluoresce when they are illuminated by a light of a certain wavelength. LAM state that the Sola Nightsea is five times more efficient at exciting fluorescence than a UV 'Black' light, hence the fluorescence you see is brighter and more vibrant. We suspect the scientists are itching to get their paws on it – fluo photography can be a useful research tool.. **www.lightandmotion.com**

Diving Heaven in the Honduras

Roatan

SCOTT JOHNSON

Cryptic teardrop crab on sponge

Text by Robert Osborne
Photos by Robert Osborne and Scott Johnson at Seascapesimages.com

First off, a confession. I love diving in Roatan. Why? For a couple of reasons. Number one—the reefs around the island are still in superb shape. Not a lot of ocean-going pelagics, it's true. But I've been diving the reefs of the Caribbean for more than ten years, and I would rank Roatan in the top two. (Bonaire would be my other choice.) The second reason is I can wade through the snow on a wintery morning in Toronto, stumble onto a plane at 8 a.m., and by 2 in the afternoon, I can be stepping off the back of a dive boat in Roatan. What's not to love? As a result, I've dived the island for the past three years in a row.

And yet the most common reaction I get when I tell people I'm off to dive in Roatan is, "Isn't that somewhere in South America?" Roatan, it seems, remains something of an undiscovered treasure. So, I've decided to change that. For those divers around the world who haven't discovered my little corner of the Caribbean, consider this a primer, a sort of *Roatan 101: Introduction to the Bay Islands.*

Lesson One: The Basics
—Where the heck is it?

Roatan is part of the Bay Islands—a chain of islands off the east coast of Honduras. They consist of Roatan, Utila, Guanaja and Cayos Cochinos. The two most frequented dive destinations are Roatan and Utila. There are dozens of good dive operations


SCOTT JOHNSON

Spotted scorpionfish in sponge (left); Diver with giant sea rod, barrel sponge and sea fans on reef (right)

on both islands and close to a hundred dive sites to be explored on Roatan alone. Now I'm not about to do a complete inventory of all the dive sites I've visited; that would be like inflicting home movies on invited guests—a cliché for tedium and social boorishness. What I will do is show off my highlight reel, a kind of sneak preview of the kind of underwater adventures to be experienced.

I break diving in Roatan into three primary areas: the North Shore, the West End and the South Coast. Surprisingly, though the areas are only separated by a few kilometers, the diving can be radically different on each coast.


ROBERT OSBORNE

Turquoise Bay Resort

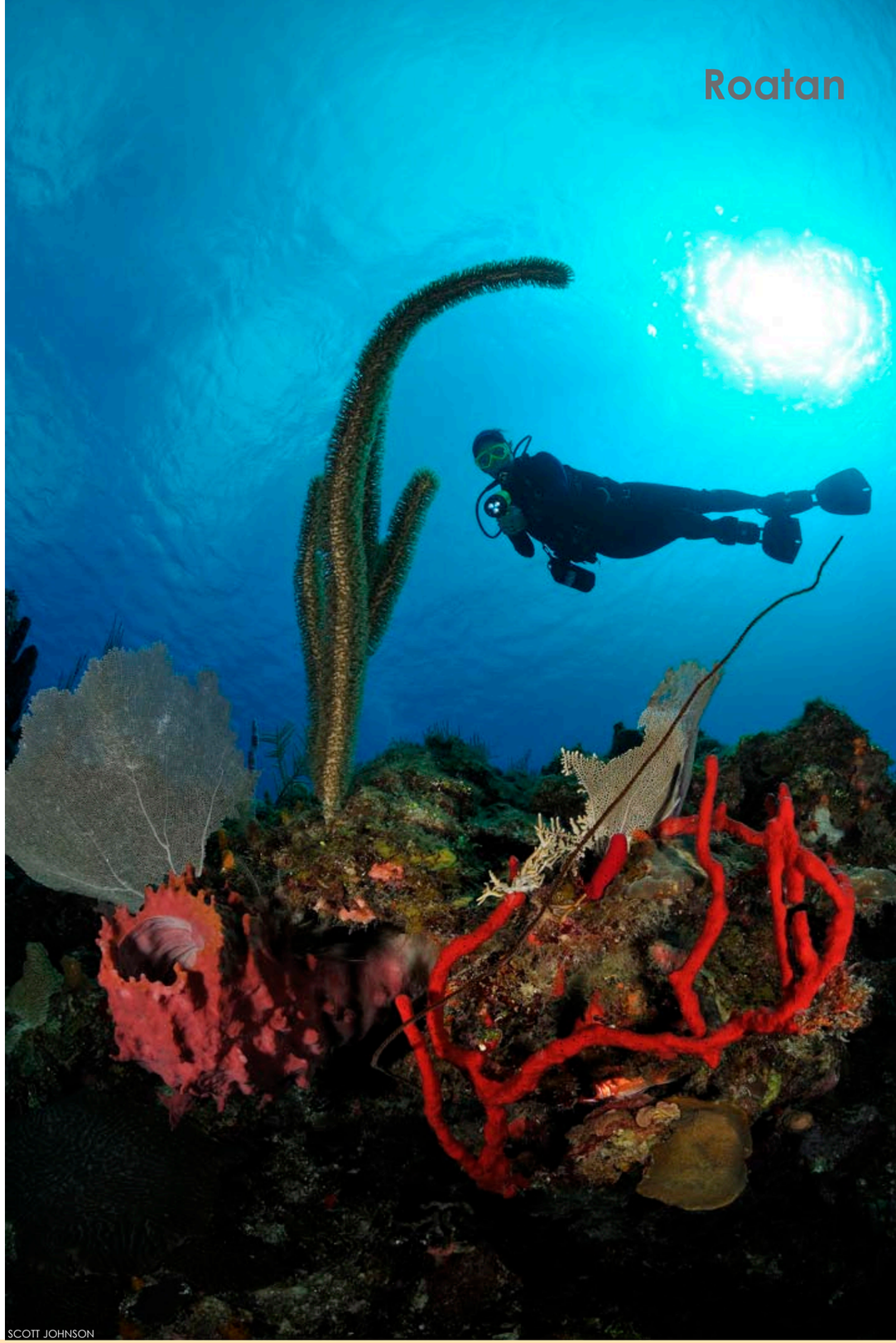
Lesson Two: The North Shore

One phrase describes the North Shore—coral canyons. The place is teeming with them. They're lush with hard and soft coral and teeming with small reef life. They're some of the best I've ever experienced, with overhangs so vast that the dive often seems more like a cavern dive.

Now another confession: I won't pretend that I don't have favorite places to dive and preferred operations to dive with on Roatan. Frankly, I just don't believe it's possible to be some kind of unbiased writing machine. So instead, I tell people about my biases up front, and I try to be as fair as I can.

When I'm diving the North Shore, my operation of choice is Subway Watersports at Turquoise Bay Resort. I like the place because of the laid back atmosphere—often I've been one of only two or three divers on a boat, and we've come and gone at our own pace. I also like the fact that from here, you're literally within minutes of many of the best dive sites in the area.

Rock Star. Take Rock Star, for example—about a five-minute boat ride from the dive shop. You drop off the boat, sink down to about 75 feet and spend about 50 minutes meandering through a series of impressive coral canyons. The reef life is abundant and healthy: lots of tubes and vibrant blue sea fans hanging from the hard corals, large purple barrel



SCOTT JOHNSON

SCOTT JOHNSON

SCOTT JOHNSON

sponges everywhere and mounds of hill and sheet coral. A closer look at the crevices in the canyon wall reveal a thriving macro community—decorator crabs, lobster, juvenile spotted drum fish and yellowtail damselfish and the usual assortment of parrot and angel fish, grunts, squirrel fish and trumpet fish.

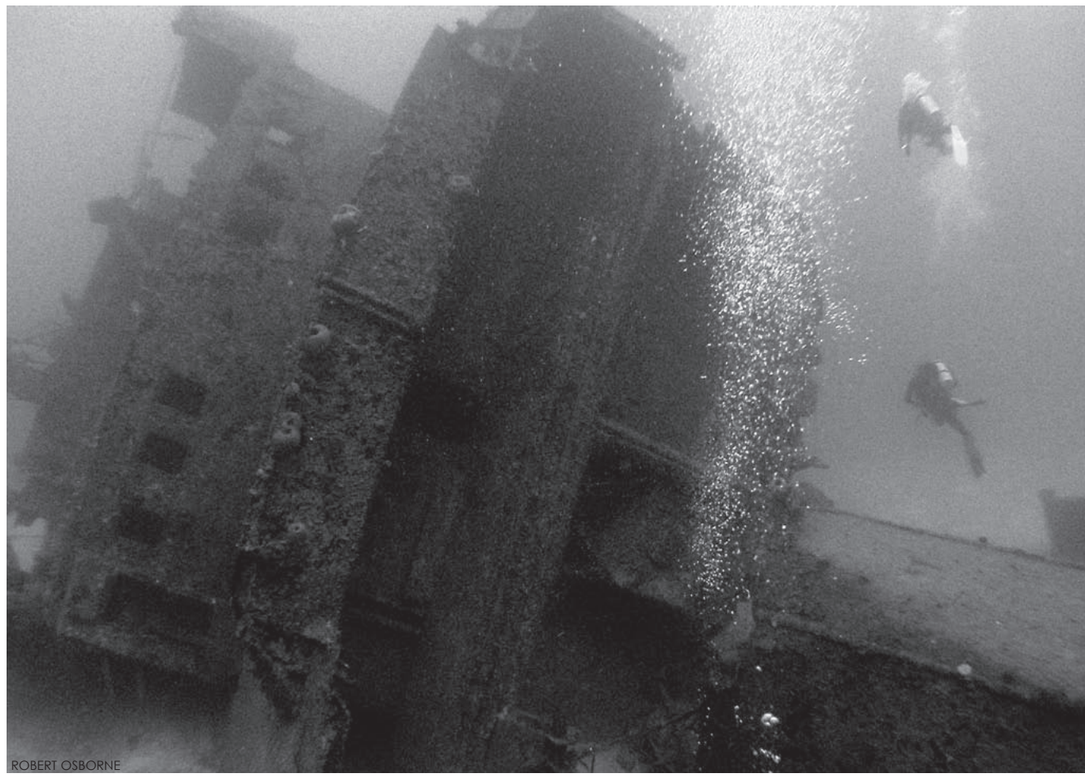
Dolphin Den. A few minutes more by boat and you can dive another one of my favorites, Dolphin's Den, a series of coral tunnels in shallow water (maximum 15 meters). The site gets its name because deep within the tunnels the skull of a dolphin sits in the back of one of the caves. Our dive master suggests the poor creature may have swum in and become disoriented and drowned.

Aside from the tunnels, the highlight of the dive was finding a large, nearly six-foot nurse shark hanging out in one of the caves. I swam in close and shot picture after picture—it was totally unconcerned.

Another dive of note on the North Shore includes Stingray Passage—a large canyon with overhanging coral walls—very impressive. At one point diving this site, I swam through what seemed to be an endless school of creole wrasse. It was everything I'd come to expect from what turns out to be one of the healthiest reef systems in the Caribbean. On my return trip to the boat we swam through hundreds of black durgeons—scattered across a massive section of shallow reef.

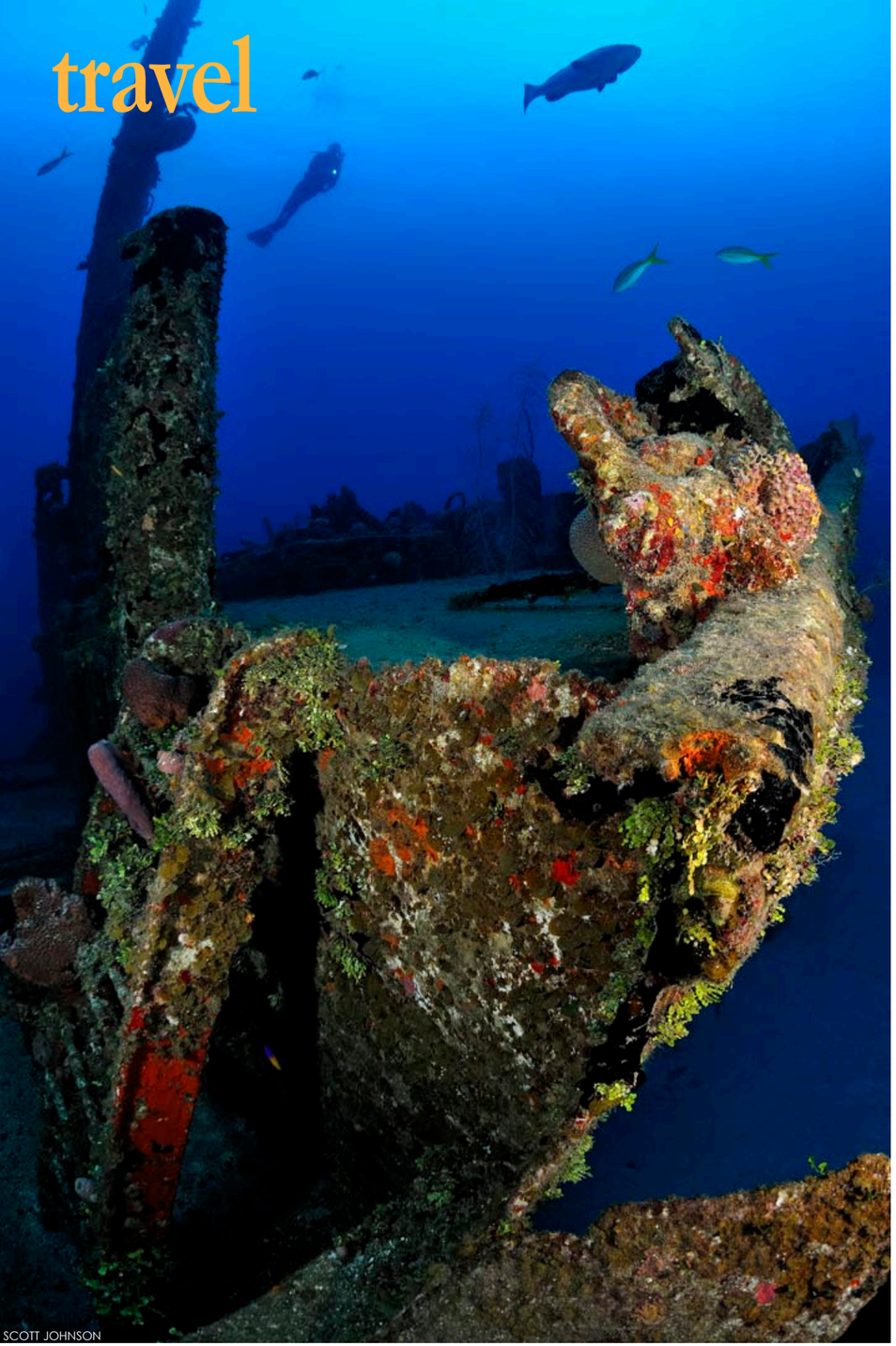
Aside from coral canyons, the North Shore also features a couple of impressive artificial reefs. But to get access to them, its best to move your base of operations a little further west. I prefer to use Anthony's Key Resort and Dive. This is a massive and very high end operation; if you want to pamper yourself, book a week at their lodge. They run a dozen boats and as many as 80 divers every day. The docks are crowded with divers and tourists but don't be intimidated by the numbers. The good news is that Anthony's Key is still first class and only a few minutes by boat from what I would argue is the best dive on the island.

SCOTT JOHNSON



ROBERT OSBORNE

CLOCKWISE FROM LEFT: Creole fish (inset) and school of creole fish; Spotted goatfish; Divers at the wreck of the *Odyssey*



SCOTT JOHNSON

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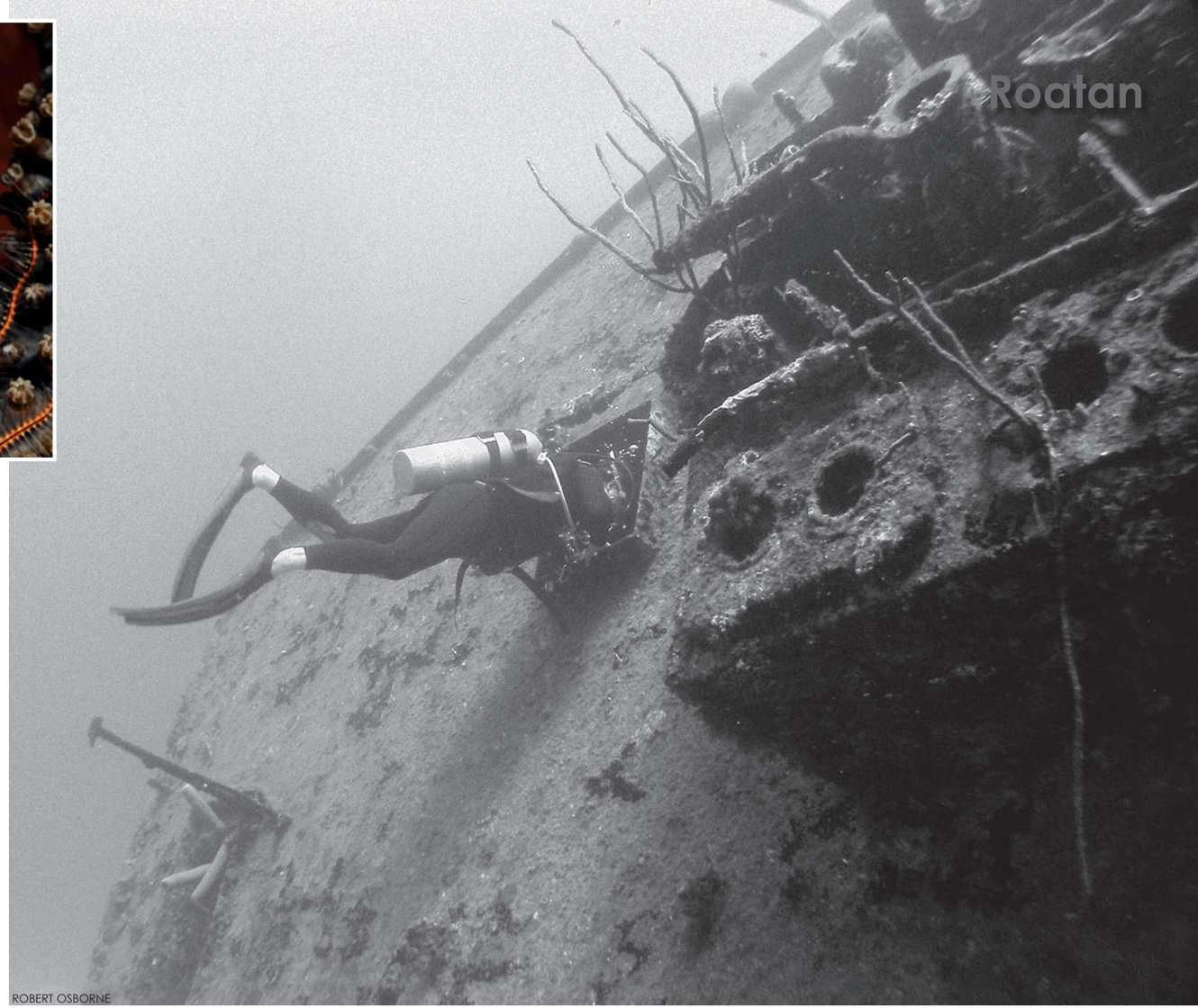
CLOCKWISE FROM LEFT: *El Aguila* wreck; Flamingo tongue on coral; Diver enters wreck of *El Aguila*; Large grouper



ROBERT OSBORNE

El Aguila. At about 33 meters, *El Aguila* is on the deepish end for some recreational divers. Typically, you should only have a few minutes of bottom time. But there's a way to make this dive a lot longer. The wreck sits beside a superb coral wall. So divers can pop down for a brief tour of the wreck, max out their bottom time and then head for the wall.

You can extend the dive by exploring the wall in about ten meters of water. It will give you a chance to visit with the groupers—and they're what really make *El Aguila's* site impressive. This is one of the few sites where you'll find an abundance of large sea creatures: huge black and goliath groupers, large green moray eels that often swim freely around the divers and impressively big baracuda. If you dive Roatan, *El Aguila* is a must-do kind of 't-shirt' dive.

The *Odyssey*. The other artificial reef that's within minutes of Anthony's Key is the *Odyssey*. Again it's on the deep side for some divers—about 30 meters; but again, there is a way to deal with that depth. A quick bounce to the deep part of the hull, followed by a drift towards the main superstructure that sits at only 20 meters depth. This wreck is busted up much more than the *Aguila* but still worth a couple of dives.

Lesson Three: The West End

The most notable feature of this part of the island is the fact that a large section of the West End is a protected marine park. Now, this doesn't seem to have brought in the large fish, but the place is positively boiling with small fish and macro life.

So, when I'm bored with wrecks and coral canyons and I'm more in the mood for marine life, I'll move again along the coast to the West End. There are a lot of great dive

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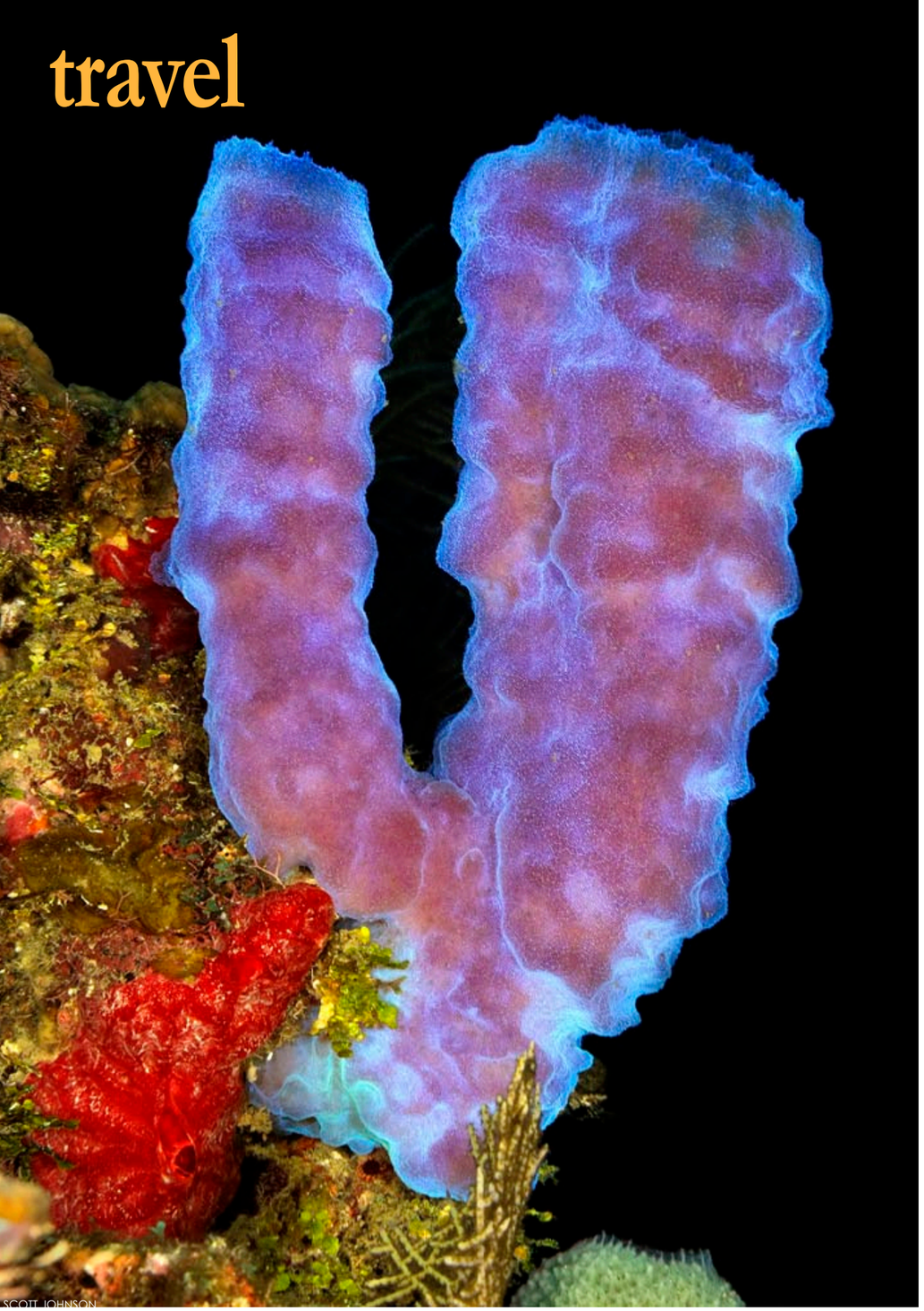
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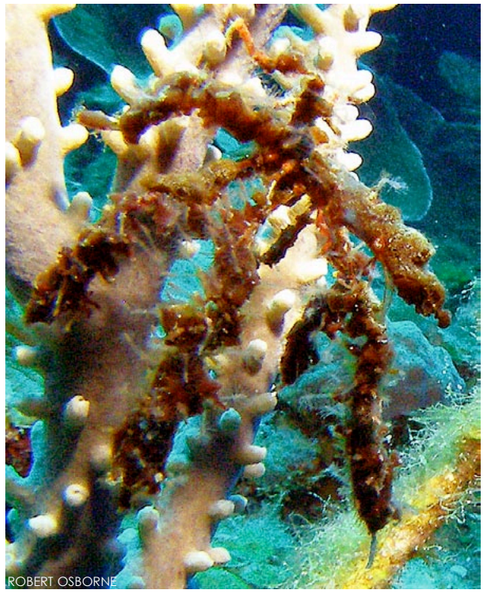
CLOCKWISE FROM FAR LEFT:
Azure vase sponge; Mayan Princess Resort; Redband parrotfish; Banded coral shrimp in sponge; Orangutan crab at West End reef

Roatan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operations on this part of the island—dozens—but my shop of choice is Mayan Divers at the Mayan Princess Resort. It's run by Anya and Liber Garrido Barnet. Both expats (she's from Germany, he's from Cuba), they've been on the island for years and know the reef at the West End like the proverbial backs of their hands. In fact, last year Anja volunteered to be my personal guide for a couple of days. The result was I saw the reefs in the marine reserve in a way I'd never imagined.

She waltzed me around a series of stunning sites: Overheat Reef, Bear's Den, Turtle Crossing—every one of them pulsing with life. I feel vaguely like I'm swimming through a *Where's Waldo* illustration. The intensity of activity made it difficult to concentrate on any one object. But Anja had no such problem. She pointed out one small wonder after another: tiny spotted nudibranchs, delicate decorator crabs and clear shrimp hiding inside sponges. She also knew all the little swim-throughs that pocket these reefs. Anja continually headed into holes—with me reluctantly at her heels—only to follow some winding passage for 20 or 30 meters and then re-emerging on another part of the reef (not recommended unless you have a guide).

Fish Den. On the site called Fish Den, I experienced my closest encounter ever with a green sea turtle. I've seen them before, of course. Quite a bit, in fact. But they've always been very shy and not allowed me to get in very close. This time, with just Anja and me in the water, I was able to slowly drift up alongside one.

This turtle was vigorously munching on a sponge on the reef. It gave me a casual glance and kept eating. Encouraged, I raised my camera and started taking pictures. Still no concern. In fact, it allowed me to get within about a half a meter taking pictures without showing any concern. Clearly, dinner was more of a priority than the annoying, bubbling creature swimming around.


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Roatan

CLOCKWISE FROM BOTTOM LEFT: Longsnout seahorse; Reef octopus; Reef shark; Yellowheaded jawfish with eggs in its mouth


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Lesson Four: The South Shore

If I had to describe this part of the island in one word, that word would be *walls*. One of my favorite types of dives, I like few things better than drifting along the face of a wall that drops off into blue oblivion below me. And there are plenty of chances for that kind of diving here.

The South Shore had been relatively unexplored territory for me until recently. I'd done a couple of dives not far from the capitol of Roatan—at Coxen Hole—but hadn't really had a chance to investigate extensively. That changed this year. I was invited to dive this area by Mitch Karlson, the manager of Coco View Diver Resort. A legendary dive operation on the island, it's most definitely designed for hardcore divers. Consider it a sort of liveaboard on dry land.

It's not uncommon for divers to log as many as 30 dives in a week—but four a day is the usual number. Part of the reason you can dive so frequently is that only a short swim (100 meters along a well marked underwater trail) from the resort, there are three superb dives: a wreck, the *Prince Albert*; and two walls—Coco View Wall and Neuman's Wall. In one mad day of diving, I hit all three of these sites, and my only regret was that my nitrogen load prevented me from hitting them twice.

Coco View Wall—a choice dive for resort guests at night I'm told—plunges down about 25 meters from the surface and is heavily encrusted with soft and hard corals. I love the under cuts in the wall. Given more time at this location, I would have spent extended periods poking around looking for critters.

Neuman's Wall held much the same promise of being the sort of place I could happily spend several dives.

The *Prince Albert* is an artificial reef that was sunk in 1987. It's an old tanker last used to ferry refugees from war-torn Nicaragua. The resort owners bought the boat, cleaned it up and made it safe for divers, then sank it just off the coast. Again, the proximity to the resort is one of the most appealing features of this wreck. It's also on the way to both Neuman and Coco View Wall, so you can always stop and explore on the way to and from the other dive sites.

I also took the opportunity to jump on board one of four main dive boats that Coco View runs and went out to dive a site called Menagerie. Aptly named, this wall teems with fish life. I spent the better part of about ten minutes trying to get one good shot of the numerous sea horses that populate the reef. No success, I regret to say. There's also a resident green moray that likes to comes out and play. It scared the hell out of a


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Roatan

CLOCKWISE FROM FAR LEFT: Diver with hawksbill sea turtle; Dolphin with trainer and guests at Anthony's Key Resort; Protected iguana in tree at the Iguana Farm; Beach at West End; Ziplining through the jungle is a thrilling activity to do while topside

ROBERT OSBORNE

couple of the divers in our group by getting a little too intimate.

Sadly, although I've dived Roatan three times in three years, I've yet to make it to what many consider on of the best dives on the South Shore: Mary's Place—another reason to go back next year.

Lesson Five: The Truth

Topside activities in Roatan are also well worth experiencing. There's some exhilarating ziplining through the jungle canopy and a couple of nature preserves—notably and most amusingly, the Mayan Monkey Park. And then there's my favorite—the Iguana Farm. Now, it may sound like a cheesy tourist attraction, but once you meet Archie Sherman (founder and operator of the farm), you'll change your mind. He's a sweet old islander who started this farm on his property as a way of saving the iguanas from extinction. Iguana is a local delicacy, and the locals had literally eaten almost every lizard on the island. Archie and his brother stepped in and created this protected area. Now there are thousands of the regal lizards on the property. Spend an hour or two with Archie, and he'll charm the hell out of you.

One final word—I did say that I would be up front about Roatan—so here goes. Take a lot of bug juice, really strong bug juice—the kind of stuff that soldiers doing jungle training use. There's a tiny insect that exists in abundance on the island. Some people call them sand flies or sand fleas; others call them No See-ums. Regardless, they bite like horse flies and leave a massive welt. Ironically, in three years, I've never seen one. But in one hour of unguarded folly this year, I ended up with more than 30 bites on my back and arms. They swell and itch like mad. I guess even diving heaven has to have a little bit of hell—to keep it real, I suppose.

But if you let a few gnats discourage you from visiting Roatan, then you're missing out on a lot of pleasure at the risk of a little (burning) pain. I'm going back next year. I've heard about a new operation that's setting up on the unexplored East Coast. Stay tuned. ■

Features editor Robert Osborne is an internationally published dive writer, television producer and reporter based in Toronto, Canada.

ROBERT OSBORNE

ROBERT OSBORNE

fact file

Honduras

SOURCES: U.S. CIA WORLD FACT BOOK,

History In 1821, Honduras became independent from Spain. Free elections led to a civilian government in 1982 after 25 years of primarily military rule. However, the 80's saw the country become a haven for anti-Sandinista contras who fought the Marxist Nicaraguan Government. Honduras was an ally to Salvadoran Government which fought leftist guerrillas. In 1998, the nation was devastated by Hurricane Mitch. The storm killed around 5,600 people and caused about $2 billion in damage. A slow rebound in the economy followed. Government: democratic constitutional republic. Capital: Tegucigalpa

Geography Honduras is located in Central America. It borders the Caribbean Sea and lies between Guatemala and Nicaragua as it borders the Gulf of Fonseca in the North Pacific Ocean and lies between Nicaragua and El Salvador. Terrain is mostly mountainous in the interior, with narrow coastal plains. Highest point: Cerro Las Minas 2,870m. Lowest point: Caribbean Sea 0m. Note: Honduras has just a short coast on the Pacific side, but has a long one on the Caribbean side, including the eastern Mosquito Coast, which is mostly uninhabited.

Climate In the lowlands, it is subtropical, while the mountains are temperate in climate. Natural hazards include earthquakes, which are frequent, but generally mild. However the country is very susceptible to destructive hurricanes and floods along the Caribbean shoreline.

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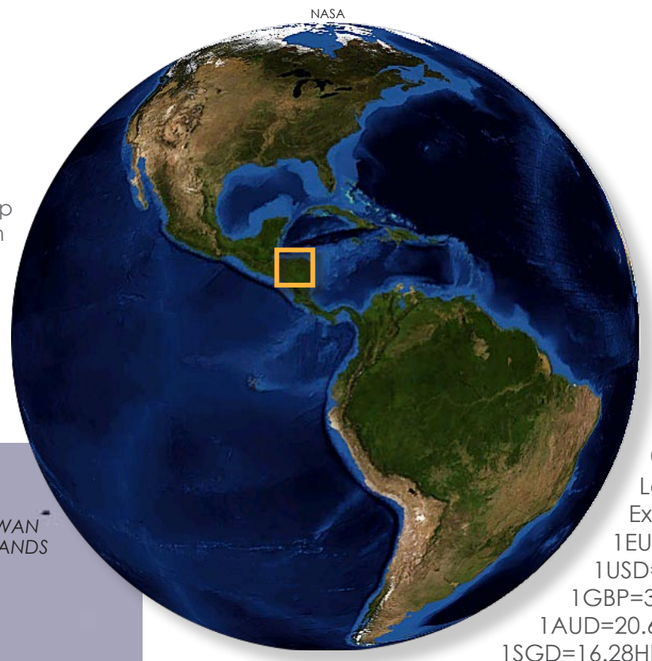


NASA

RIGHT: Global map with location of Honduras
BELOW: Location of Roatan on map of Honduras
BOTTOM LEFT: Anemone on reef

Environment Honduras is experiencing an expanding urban population. Logging and clearing for agriculture is resulting in deforestation, while uncontrolled development is contributing to further land degradation and soil erosion with the help of inappropriate land use practices including farming of marginal lands. Pollution of the nations largest fresh water source, Lago de Yojoa, is resulting from mining activities and heavy metals are finding their way into several rivers and streams. Party to the following agreements: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands

Economy As the second poorest nation in Central America, Honduras experiences a severe level of unequal distribution of income and high underemployment. However, the country has diversified its export base from just bananas and coffee to clothing and automobile wire harnessing. While almost half of the nation's economy is connected to the United States, the U.S.-Central America Free Trade Agreement (CAFTA) has helped create foreign investment since 2006, although problems in crime, security—both physical and political—and perceived corruption, may hinder potential investment. In 2010, the economy was slow in growth—not enough to improve living standards for the majority of the population who live in poverty. Recent administrations have been committed to cutting spending, improving tax collection and getting more foreign investment.

Currency
Lempiras (HNL)
Exchange rates:
1EUR=26.34HNL;
1USD=19.91HNL;
1GBP=32.13HNL;
1AUD=20.63HNL;
1SGD=16.28HNL

Population 8,296,693 (July 2012) Ethnic groups: Mestizo (mixed Amerindian and European) 90%, Amerindian 7%, black 2%, white 1%. Religions: Roman Catholic 97%, Protestant 3%. Internet users: 731,700 (2009)

Language Spanish is the official language; Amerindian dialects are also spoken

Health There is a high risk for food or waterborne diseases such as bacterial diarrhea, hepatitis A, and typhoid fever; vectorborne disease such as dengue fever and malaria; and water contact disease such as leptospirosis (2009)

Decompression chamber
Cornerstone Re-Compression Chamber and Clinic
Anthony's Key Resort
Sandy Bay, Roatan
Bay Islands, Honduras

Web sites
Tourism Roatan
tourismroatan.com

Kosrae & Pohnpei

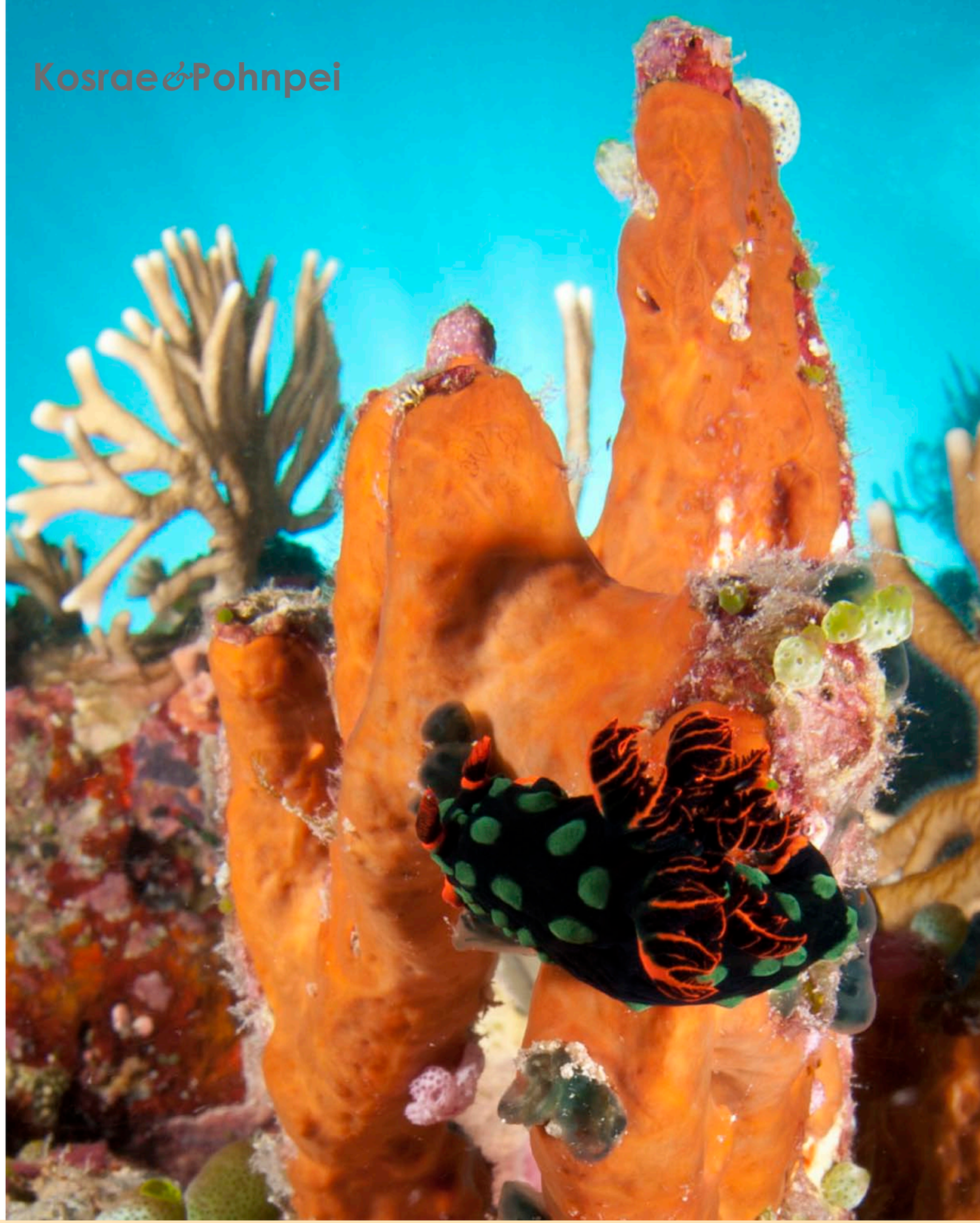
Micronesia

Crystal clear waters and white sand beaches

Text and photos by Brandi Mueller

The idea of diving Micronesia forms dreams of warm, crystal blue waters with big animals, wrecks and mantas. Most divers probably include it on their dream dive destination list, or, those who've been there eagerly recommend it to dive buddies and reminisce about sharks, mantas and the beauty of these wonderful islands. Palau's Blue Corner sharks come swimming back into view, mantas by the dozen from Yap and the anemone covered wrecks of Chuuk. But what about the other islands of Micronesia? Little known Kosrae and Pohnpei, both part of the Federated States of Micronesia (FSM), contain the same beauty and wonder as their better known neighbor islands, but are visited far less often.

Kosrae & Pohnpei



Long House at the Village Resort (above) and *Nembrotha kubaryana* nudibranch (right) on orange sponge, Pohnpei

I had returned from my second trip to Palau and, like the first trip, it was amazing. I was anything but disappointed with ten female grey reef sharks on one dive at Ulong Channel, ripping currents at Blue Corner and the curious mysteries of unidentified Japanese World War II wrecks. But along with the remarkable marine life, pristine corals and spooky wrecks, my dive group and I found crowds of people, with several boats at each dive site, lots of other divers hooked into the same areas, and restaurants and resorts congested with other divers and tourists.

It's not that I don't like diving with other people... well, okay, it is. I want paradise to myself, or at least just for me and the group of divers I prefer to travel with. So when my dive buddy—who didn't get to go with us to Palau—wanted to go diving in Micronesia six months later, I wasn't thrilled. I loved Blue Corner, but not with two other boat loads of people flying by in front of my group and interrupting our shark show. So, I set out to find us that untouched, perfect reef, the one reef that no one else knows about yet.

The Federated States of Micronesia (FSM) is made up of four island states: Pohnpei (the capital), Kosrae, Yap and Chuuk. Located just north of the equator and all having played a role in WWII, these islands have world class diving. We had heard of Chuuk and Yap, so we choose to go to Pohnpei and Kosrae. If anyone was going to ask us, "Why?" We were ready to answer, "Why not?" Of course, we couldn't tell anyone where we were going just yet, as we didn't know how to pronounce the islands' names. (Pohnpei is pronounced *pon-a-pe,* and Kosrae is *kosh-rye.*)

Pohnpei

It's cliché, but we wanted to go off the map. And my mother pointed out that not all maps have these small islands marked. Amazing adventures never were supposed to be easy, so we decided we would go, a week on each island. Our first stop—Pohnpei. A plane change in Hawaii or Guam is required, to board the "Micronesian Milk Route", which visits Majuro, Kwajalein, Kosrae, Pohnpei and Truk.

Our flight left Honolulu at 6AM for another nine hours in the plane, and at each island stop half the passengers on the plane had to disembark for a security check and then would re-board about 45 minutes later. As the plane descended to Pohnpei, 3,240 miles southwest of Hawaii, through the window we saw a lush, green, heavily forested island with almost no buildings or

Lizard on Pohnpei (left); Keperhoi waterfall (above); Colorful soft corals on reef at Pohnpei (right)

houses. The airport consisted of a large, outdoor shack-like building. We collected our luggage, which was hand carried from the plane and placed in front of us with the plane still in view and went to meet the small van waiting for us.

Pohnpei has the most land, the most people (estimated around 34,000) and the most development of the FSM. It's boasted to have the friendliest people. Birds flit about everywhere, several of which are endemic or only found on Pohnpei, and there are several species of lizards commonly seen. Pohnpei's only original mammal is bats, and with humans came rats, dogs, pigs and most recently deer.

It's thought that the first settlers to come to Pohnpei migrated from Southeast Asia to Yap and the FSM and then southward to Papua New Guinea, the Solomon Islands and New Caledonia. Historically, Pohnpei was divided into five tribes, with the tribal chiefs having complete control of the land, the people and everything on it. It's likely the five tribes battled amongst one another.

The first European documentation of the island of Pohnpei was from a Spanish ship in 1595, but they did not go ashore. Second contact was likely an Australian ship in 1825, and the ship was chased off by natives in canoes. A Russian ship in 1828 also attempted to land but could not due to native resistance, but for the first time, native Pohnpeians came aboard their ship. Due to whaling, more and more ships came to Pohnpei in the 1800s and with them they brought smallpox, which caused a huge epidemic and many casualties.

Pohnpei has been occupied by several countries, the first being the Spanish in 1886 as part of the Caroline Island chain in 1886. In 1899, the German Empire purchased the Caroline island group, part of the Marianas and the Marshall Islands, which was then granted to Japan as they assumed control of all German colonial possessions north of the equator in 1919 under the Treaty of Versailles at the end of World War I.

Although the FSM played quite a large roll in World War II, no shots were fired on Pohnpei. The island was bombed significantly during the Japanese occupancy and then the island was abandoned by the Japanese. Although there are no battlefields, there are some remnants of the Japanese occupation on land. Hiking into the jungle can be quite an adventure for a WWII history buff, as there are anti-aircraft guns, a few pillboxes and trenches that are carved-in tunnels. This is all mostly off the beaten track, and it's a good idea to find a local guide or at least get very good directions before setting off by yourself into the jungle. There are rusted gun emplacements, an overgrown airbase (where we had lunch one day), bunkers, bomb craters and several rusted tanks.

Kosrae & Pohnpei

Nudibranch on reef at Pohnpei; Waterbeds with mosquito nets (center) in a treehouse bungalow (below) at The Village Hotel on Pohnpei; Large, branching, cup coral (*Tubastrea micracantha*), Pohnpei (right)

In 1947, Pohnpei became part of the Trust Territory of the Pacific Islands created by the United Nations administered by the United States (as trustee only) and became part of the Federated States of Micronesia in 1979.

Diving

On the short ride to the Village Resort, we drove through Kolonia, often referred to as "the metropolis" of the FSM. Although not what you would expect from a metropolis, there was a small traffic jam caused by some children playing soccer in the street. On the side of a small cliff overlooking the ocean sits the Village Resort with tree house bungalows, our home for the next week. Thatch roof, mosquito nets and waterbeds (yes, waterbeds!) Nothing seemed more like paradise until we got in the water the next morning.

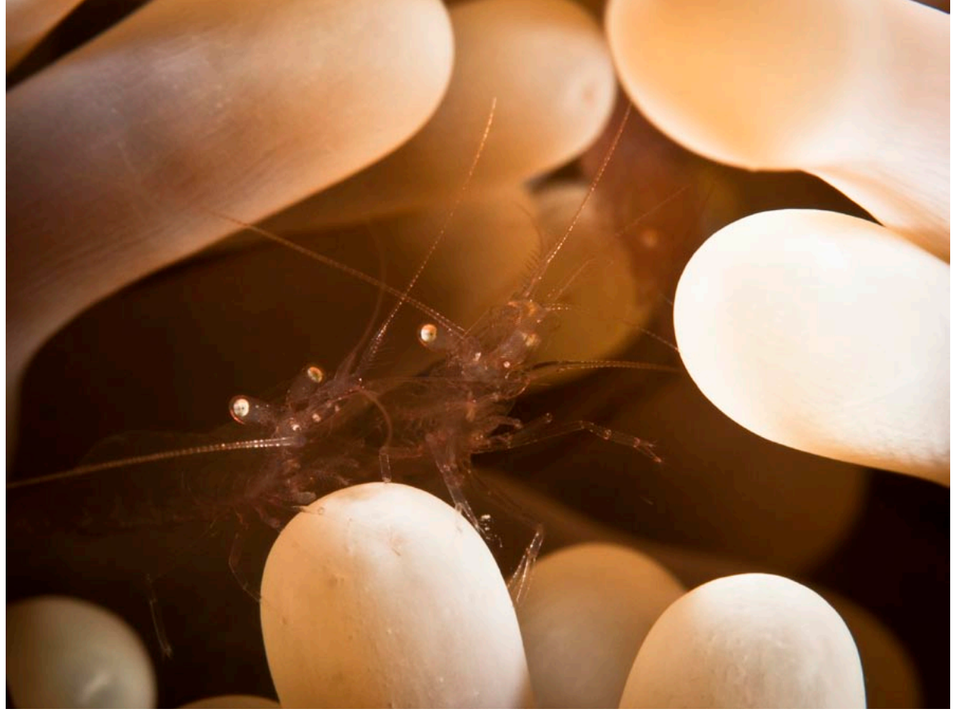
There is no rush in the Pacific though. With the time change, we woke up before dawn and headed to the Long House where meals are served. Being that it was before 5 AM we made ourselves comfortable on puffy lounge chairs out on the gazebo. We were unexpectedly surprised when the lone security guard appeared out of the darkness with a coffee pot and poured us two cups of coffee. We watched the stars slowly disappear, as the black sky turn slowly to light blue and daylight revealing flat, blue seas. After a leisurely, relaxing breakfast, it was time to dive.

We took a three minute pick-up truck ride down the hill to the water where our captain met us. Dressed in discarded Navy coveralls, he helped us onto the small flat bottom wooden boat. Sitting on the engine, our captain drove us away from the Village through mangroves so dense we had to duck a bit and out into the lagoon.

Pohnpei is surrounded almost entirely by a barrier reef, which protects the island, making for amazing pass diving and more often than not keeps the lagoon calm and smooth. As the only divers in the whole resort, we had the boat, a divemaster and the captain to ourselves.

After a 45-minute boat ride, we reached our first dive site just outside the barrier reef, Mwand Wall. Back rolling off the boat, we descended down a sheer wall covered in bright orange and yellow sponges and forest green branching tubastrea coral. A slight current carried us from the ocean side of the lagoon into the lagoon. Swimming sideways on the wall were so many brightly-colored fish, it appeared as if the wall was moving. The wall sloped down to just past 100ft and then turned to rubble and sand further down. One shark cruised with us for a while, and at the end of the dive, we were on top of the wall at 15ft, perfect for a long safety stop, and I found several anemones to photograph.

Wide-eyed with excitement after



Kosrae & Pohnpei

the first dive, our captain took us to a dive site called Manta Road. I have always thought that once you named a dive site after something, you never see it again, but as we finished our surface interval in the sunshine, we had already seen at least two mantas on the surface. Feeding on the nutrients brought in during tidal changes, the mantas are present several times a day and do large belly rolls toward the surface as if dancing an underwater ballet. This site is great for non-divers as well because the mantas come right up to the surface.

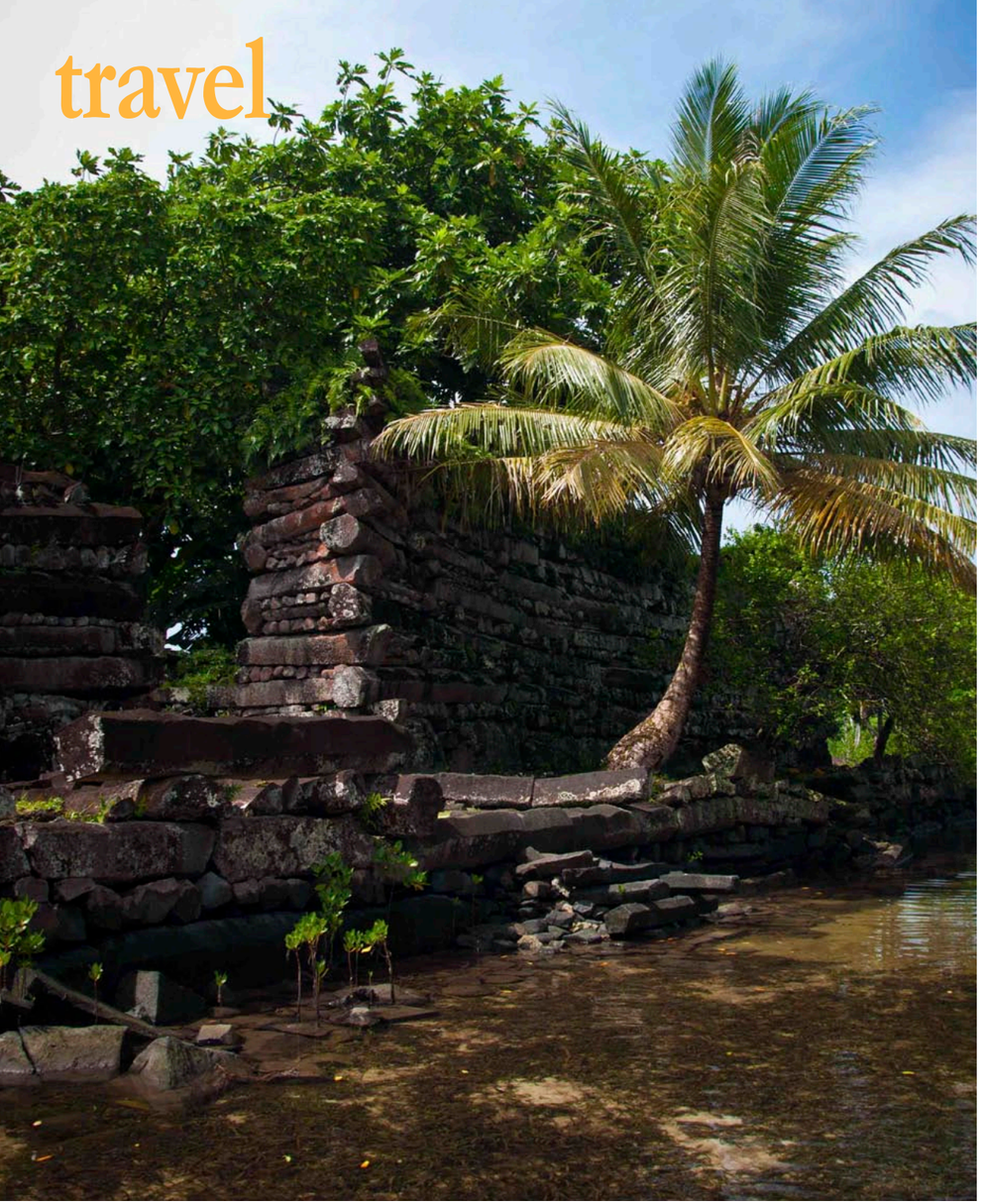
For lunch, we stopped at a beautiful uninhabited islet with mangrove trees dotting the coastline where we had a pack lunch prepared by the Village.

Wrapped in eco-friendly banana leaves were our pre-ordered rice mixes, with our choice of chicken, pork, shrimp or veggies. After two amazing dives, we were hungry, and almost as good as the food tasted, was the fun of throwing the banana leaves in the water afterwards, creating no trash. After eating and a nice long surface interval, we were back in the boat headed for a third amazing dive.

Back at the Village we settled in at the Long House for a few beers and dinner and were amazed by the food. Melt-in-your-mouth ahi tuna (just caught by a staff member, our servers pointed back to the kitchen to point him out), local mangrove crab, steak, tuna, mahi-mahi and macadamia nut chicken. If the huge proportions didn't fill you up, the desserts were to die for. Flaming bananas foster made at your table, homemade cookies, and my favorite, the homemade sorbet-like ice cream made on site with fresh fruits from the island (the soursop was amazing!)

The next day, with good weather

CLOCKWISE FROM FAR LEFT: Diver and mantas at Manta Road; Tiny shrimp on anemone; Pipefish and golden damselfish, Pohnpei; Delicious ahi tuna for dinner



THIS PAGE: Nan Madol, the "Venice of the Pacific", on Pohnpei. Massive stones, possibly from a quarry on the other side of the island, were used to build Nan Madol. It is unknown how they were moved to this location

on our side, we took a two-hour boat ride across the channel to Ant Atoll. With beautiful white sand beaches covered with palm trees reaching over the ocean, above water is almost as good as under the water. The sun lit up the reef through the clear water and revealed huge schools of fish, giant orange sponges, sea fans and soft coral. A turtle swam by the wall, munching on some coral, and our dive guide pointed out four different species of nudibranchs.

Nan Madol

The island of Pohnpei is beautiful topside as well. A day excursion can take you swimming under waterfalls, hiking through rainforest, visiting WWII remains and walking among ancient ruins. Pohnpei is home to Nan Madol, often referred to as the "Venice of the Pacific". Likely built around the 11th century for religious and political means, these ruins can be visited by boat and you can walk among large stone wall structures, which still stand. The mysteries of Nan Madol are numerous including who built the structures and how they got the massive stones to their current location. The nearest and likely quarry is on the other side of the island, although some legends say they came from Yap, over 1,000 miles away. One myth suggests that twin sorcerers levitated the stones from the quarry to where they stand now.

Kosrae

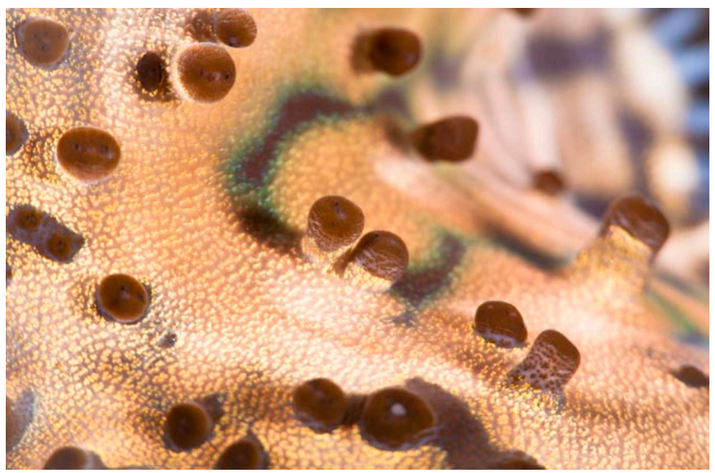
After a week on Pohnpei, we enjoyed a short hour-long flight to Kosrae, called the island of the sleeping lady. As you land, you can see the mountain formation that looks like a sleeping lady. Although we loved the romantic jungle atmosphere of the Village on Pohnpei, we were thrilled to reach the Nautilus Resort with glorious air conditioning, a TV and a fully enclosed room, so there was no need for mosquito nets.

We were picked up at the airport by Doug, co-owner with his wife Sally, of the Nautilus. Doug was delightful during our whole trip. It was as if we were visiting a good friend we hadn't seen in, well, forever. He dove with us, and his excitement for the diving and living in Kosrae was infectious, making the great diving even better.

Much smaller in population, Kosrae has less than 7,000 people. Similar to Pohnpei and other Pacific islands, Kosrae had a tribal society with noble chiefs controlling the land and commoners working the land, who served the chiefs. Nobel lineage was determined matrilineality, or traced through the mother or female ancestors.

The first European contact is thought to be in 1824, and the first missionaries came in 1852, converting most of the island to Christianity by the 1870s. Religion is still a very important part of today's culture in Kosrae. Similar to Pohnpei, Kosrae fell under German rule in 1899 and

Kosrae & Pohnpei



The mantle of a giant clam (above); Crab peering out from between two anemones (top left); Flatworm on coral head (top right), Decorated dartfish (bottom right), Kosrae

eral years ago, the Kosrae dive operators in association with the government put in 58 mooring buoys around the island to stop anchoring. At most sites, the boat is moored to a buoy, the divers jump in and drift to the next buoy where the boat would be moored and waiting, preventing coral damage from anchoring. Almost all the dives are sloping wall dives providing excellent safety stops with as much life at 15ft as at 100ft.

Our three dives a day ready to dive. Again we were the only divers (almost the only people in the whole resort) and Doug and a crew member drove us ten minutes to the harbor. The boat was a bit more modern than those in Pohnpei, providing more shade and an endless supply of delightfully sweet Kosrae tangerines and apple-bananas just off the tree.

Kosrae has calm waters and amazing visibility due to fringing reef surrounding the island. Our first dive site was at Walung Drop-off, and we were immediately blown away by the massive hard coral formations from the shallows (15ft) down to 120+ feet in a gradual wall. We didn't know what to take photos of first! Before the dive, Doug had told us of two anemones next to each other. Right under the boat, at about 20ft, he motioned us over to a green carpet anemone with a brilliant purple anemone next to it. We couldn't believe our eyes—two gorgeous anemones, two different fish species, and we counted five species of cleaner shrimp, all right next to each other! And then my dive buddy kept pointing at the edges of the anemone, and it took me a bit to see that there was a red-eyed, purple-clawed crab peering out at us from just below the two anemones. I could have spent numerous dives just at the spot, but Doug pointed out a huge school of barracuda off the wall, so we kept swimming.

Our second dive was at The Jacks, a dive with a reliable school of jacks right off the wall. After gawking at the huge school, the focus was back on the reef, and there were cleaning stations almost everywhere we looked. Wrasses were under every crevice waiting for a parrotfish or a moorish idol to stop in, get cleaned and then pass through leaving room for the next patient.

Being off the tourist track, Kosrae has very few divers. The reefs are nothing but pristine. To keep this unspoiled ecosystems intact, several years ago, the Kosrae dive operators in association with the government put in 58 mooring buoys around the island to stop anchoring. At most sites, the boat is moored to a buoy, the divers jump in and drift to the next buoy where the boat would be moored and waiting, preventing coral damage from anchoring. Almost all the dives are sloping wall dives providing excellent safety stops with as much life at 15ft as at 100ft.

Our three dives a day didn't seem to be nearly enough. On each dive, we were overwhelmed by the diversity. We were torn with

then Japanese rule after WWI. No WWII battles occurred on Kosrae, although a Japanese garrison was stationed there with more than 4,000 Imperial Japanese Army men and a company of tanks. Tunnel bunkers can see be seen on top of some of the islands peaks. During the Trust Territory period, Kosrae was considered a municipality of Pohnpei, but in 1977, it became a separate district. Kosrae joined Yap, Chuuk and Pohnpei to form the Federated States of Micronesia in 1979.

Diving

It had been two days out of the water due to the no diving after flying rule, and we were more than

Kosrae & Pohnpei

CLOCKWISE FROM ABOVE: Goby on coral; Sunrise view from the gazebo at the Long House at The Village Hotel, Pohnpei; Blenny sticks head out of a coral head, Kosra; Anemonefish, Pohnpei; Author Brandi Mueller

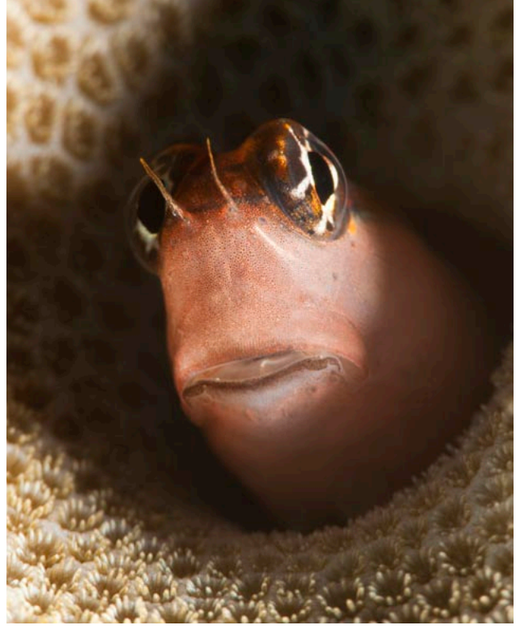
what to photograph, not being able to decide if we should shoot macro to capture the flatworms, nudibranchs and numerous juvenile fish, or to shoot wide-angle and capture the colorful reef, occasional sharks that cruised by, turtles and massive schools of jacks, barracuda and other fishes.

Dartfish are one of my favorites, and on almost every dive, we saw fire dartfish, and a few times, we spotted the more rare decorated dartfish. Schools of purple and pink anthias flitted about the reef (often getting in the shots of other fish). And rare juvenile fish that I often spend whole trips looking for were seen on almost every dive. Turquoise and purple giant clams dotted the reef and blennies peaked out from every nook and cranny. On our last dive of the week, Doug pointed out not one, but three yellow leaf scorpianfish. There was never a dull moment. Overall, the diving was fairly easy, with some mild currents, great visibility and full of life.

Topside attractions

Kosrae also has its own ruins. Although not as grand as Nan Madol, Kosrae has its own ancient site, the Lelu Ruins. Architecturally similar in building materials and design to Nan Madol (and thought to be built within 500 years of each other) the ruins suggest historical interactions between the two islands. Free to the public, easy to get to, although not quite maintained as well as Nan Madol, the Lelu ruins are a few minutes' walk from the Nautilus Resort. Bird watching, waterfall tours, hiking and kayaking are also available.

The small island doesn't have many dining options, but we were more than happy dinning at the Nautilus. They offered breakfast, lunch and dinner, with enough options to keep us trying new things every day.



Boasting Micronesia's best pizza, we were not disappointed, and the fish was fantastic. Much of the vegetables were grown on-site and local, and exotic fresh fruit is abundant.

While both islands are laid back and much slower than city folk may be used to, Kosrae takes "island time" to a whole new meaning. There is a 25mph speed limit enforced on the whole island, and some of the largest speed bumps I'd ever seen (they looked more like speed mountains!) And Sunday is truly a day of rest. Not only does everything shut down, but it is actually illegal (and enforced) that there is no drinking, diving, swimming, fishing, boating or any activities on Sundays.

A trip to Pohnpei or Kosrae is not complete without tasting the local spirit of choice, Sakau. It's actually a type of kava made with crushed roots of a pepper plant, which is mixed with water and squeezed through hibiscus bark. The taste is similar to dirt and causes the mouth to numb, and often a relaxed, calming feeling occurs.

Afterthoughts

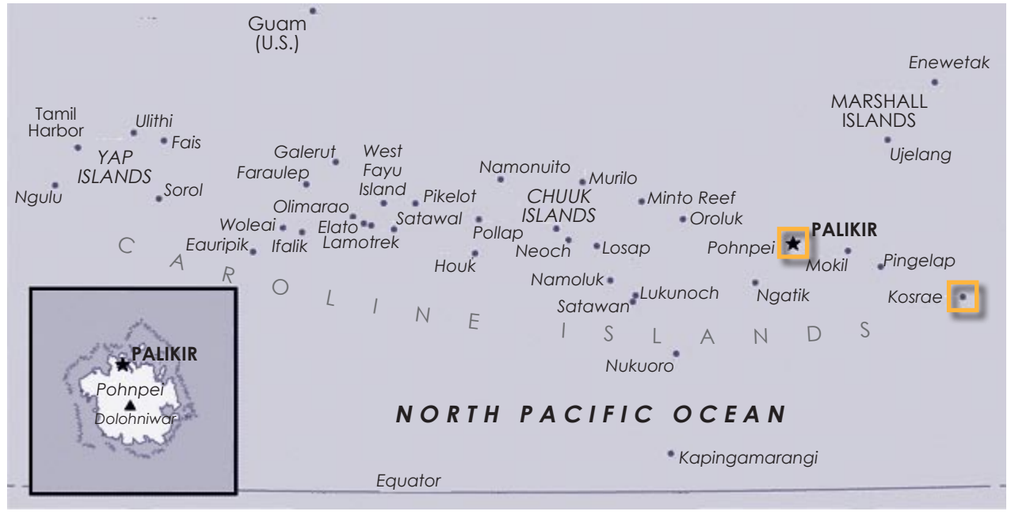
Like most dive trips, our two weeks flew by, and before we knew it, we were back on an airplane headed home. Although the flights were long, it was entirely worth it for the untouched, pristine and least touristy islands of Micronesia. We found the diving fairly easy with warm water, light currents and unspoiled reef life, and there were no big groups of divers at all. Although the big creatures were not as numerous as off Palau, there were reliable sites for sharks and mantas, and large schools of barracuda and jacks were common. The macro life was far better than Palau on both islands, especially Pohnpei, with its very colorful soft corals. It was a great trip for seeing healthy reef life and enjoying the extremely relaxing, slow paced, beautiful islands. Pohnpei and Kosrae are a must for anyone trying to get away from the crowds, but still wanting fantastic diving. ■

Brandi Mueller is an underwater photographer based in Honolulu, Hawaii. She is a PADI IDC Staff Instructor and 100ton USCG Captain. See: ***smugmug.sirenphotography.com***

fact file

Kosrae & Pohnpei

SOURCES: U.S. CIA WORLD FACT BOOK, VISIT-FSM.ORG

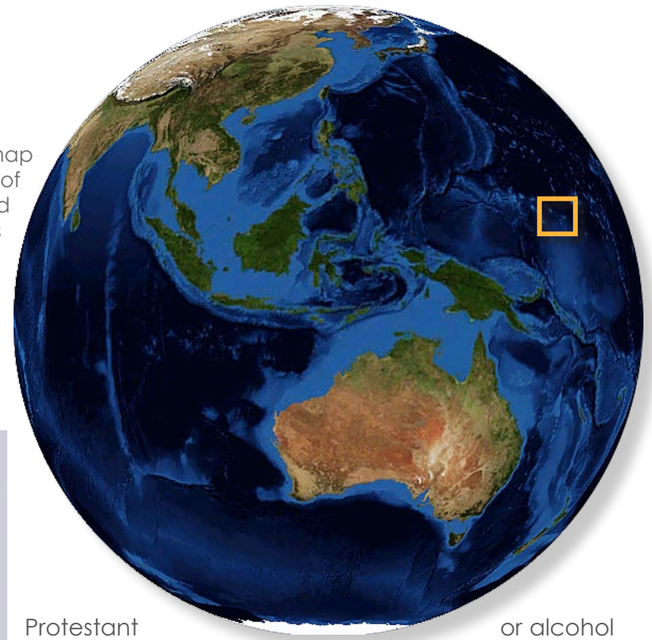


RIGHT: Global map with location of Kosrae and Pohnpei Islands

BELOW: Location of Kosrae and Pohnpei on map of Micronesia

BOTTOM RIGHT: Christmas tree worm

NASA



History The Federated States of Micronesia (FSM) was formed in 1979 including Pohnpei, Kosrae, Yap, and Chuuk (Truk). Currently the FSM is independent under a Compact of Free Association with the US. Occupied by the Japanese prior and during WWII all four islands played a role and evidence of battles remains both on land and underwater. Government: Constitutional government in free association with the United States. Capital: Palikir

Geography All four islands are located in the North Pacific as part of the Caroline Islands. Both are extinct volcanoes and the islands are mountainous with tropical jungle. Pohnpei is the largest of the FSM islands, has the highest point, and is mostly mangrove along the coastline with a surrounding barrier reef and outer atolls. Kosrae has both mangrove and sand beaches. Coastline: 6,112km

Climate Equatorial tropics with average temperatures of 23-30°C (75-86°F) year round. Heavy rainfall year round with summer and fall being the wettest. Little typhoon risk (June to December). Water temperatures are warm with 27-28°C (80-83°F).

Environment Overfishing, climate change and pollution pose challenges. The FSM is party to: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Hazardous Wastes, Law of the Sea, Ozone Layer Protection

Economy The economy of the FSM relies heavily on fishing and subsistence farming. High-grade phosphate is the only mineral deposit worth exploiting. The tourist industry has potential but is hampered by the remote location and a lack of sufficient facilities, as well as limited air connections. Between 1986 and 2001 the United States provided $1.3 billion in grant aid under the original terms of the Compact of Free Association. The amount of aid has since been reduced, but the Amended Compact of Free Association with the United States guarantees significant annual aid through 2023, wherein a Trust Fund has been established with annual contributions by the United States and the FSM to in effect provide payouts in perpetuity to the FSM after 2023. Despite this move, the medium-term economic outlook looks fragile due to current slow growth of the private sector.

Population Pohnpei: 35,000; Kosrae: 7700; The FSM has several ethnic groups: Chuukese 48.8%, Pohnpeian 24.2%, Kosraean 6.2%, Yapese 5.2%, Yap outer islands 4.5%, Asian 1.8%, Polynesian 1.5%, other ethnic groups 6.4%. Religions: Roman Catholic 52.7%, Protestant 41.7% (2000 Census) Internet users: 17,000 (2009)

Currency U.S. Dollar. The islands have few ATMs, although they can sometimes be unreliable.

Language Both islands have their own language (Pohnpeian and Kosraean) but English is widely spoken and taught in school. Japanese is also sometimes spoken in tourist establishments.

Health There is no risk for rabies or malaria, but occasional risk for Dengue. FSM is very close to the equator, so be aware of heat and sunburn. Local hospitals are on each island but have very few resources. Major illnesses should be flown to Guam (~3 hours) or Honolulu (~7 hours).

Security The islands are very safe in general. Be aware of weekend night driving when local consumption of sakau and/or alcohol is common. Local customs include 'borrowing' things such as if you leave your sandals outside a house and someone needs a pair, they may be 'borrowed'. But there is no issue in hotels or resorts with theft.

Cuisine Most diving packages include meals. Both islands have several restaurants with very good food, but sometimes limited choices. Things listed on menus were not always available, so checking what the daily specials are is recommended. Each island offers a few restaurants and very small grocery stores.

Decompression chamber Pohnpei has a chamber, Kosrae does not. Guam or Honolulu, Hawaii, are the next closest locations for chambers.

Dive season Year Round.

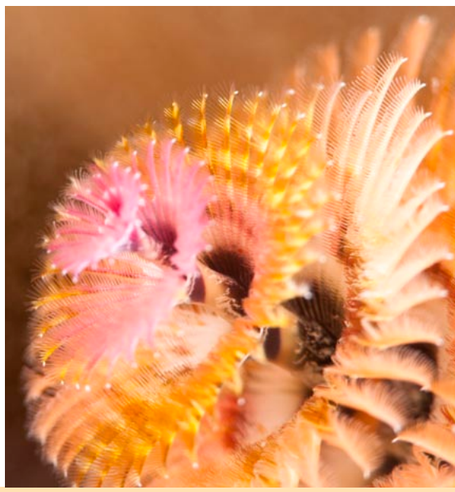
Getting there The islands are only serviced by United Airways and require a stop in Honolulu or Guam. Pohnpei flights are from Honolulu on Monday, Wednesday and Friday, and from Guam on Tuesday, Thursday and Saturday. Kosrae flights from Honolulu on Monday and Friday and from Guam on Tuesday and Saturday. From Honolulu the flight makes stops in Majuro, Kwajalein, Kosrae, Pohnpei, Chuuk, and Guam and reverses the next day. There are no flights in or out on Sundays.

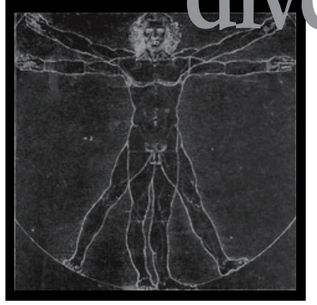
Topside attractions Both islands also have hiking, kayaking, bird watching, surfing, kite boarding, snorkeling and fishing.

Dive gear Although rental dive gear is available, it is limited due to the remoteness of these islands. It's recommended you bring your own gear and do not expect to be able to buy gear or parts or have gear serviced on either island.

Attire Conservative dress is suggested when leaving resorts, especially on Kosrae, with sleeves for both sexes and pants or skirts covering the knees for women.

Web sites
Tourism Micronesia
www.visit-fsm.org

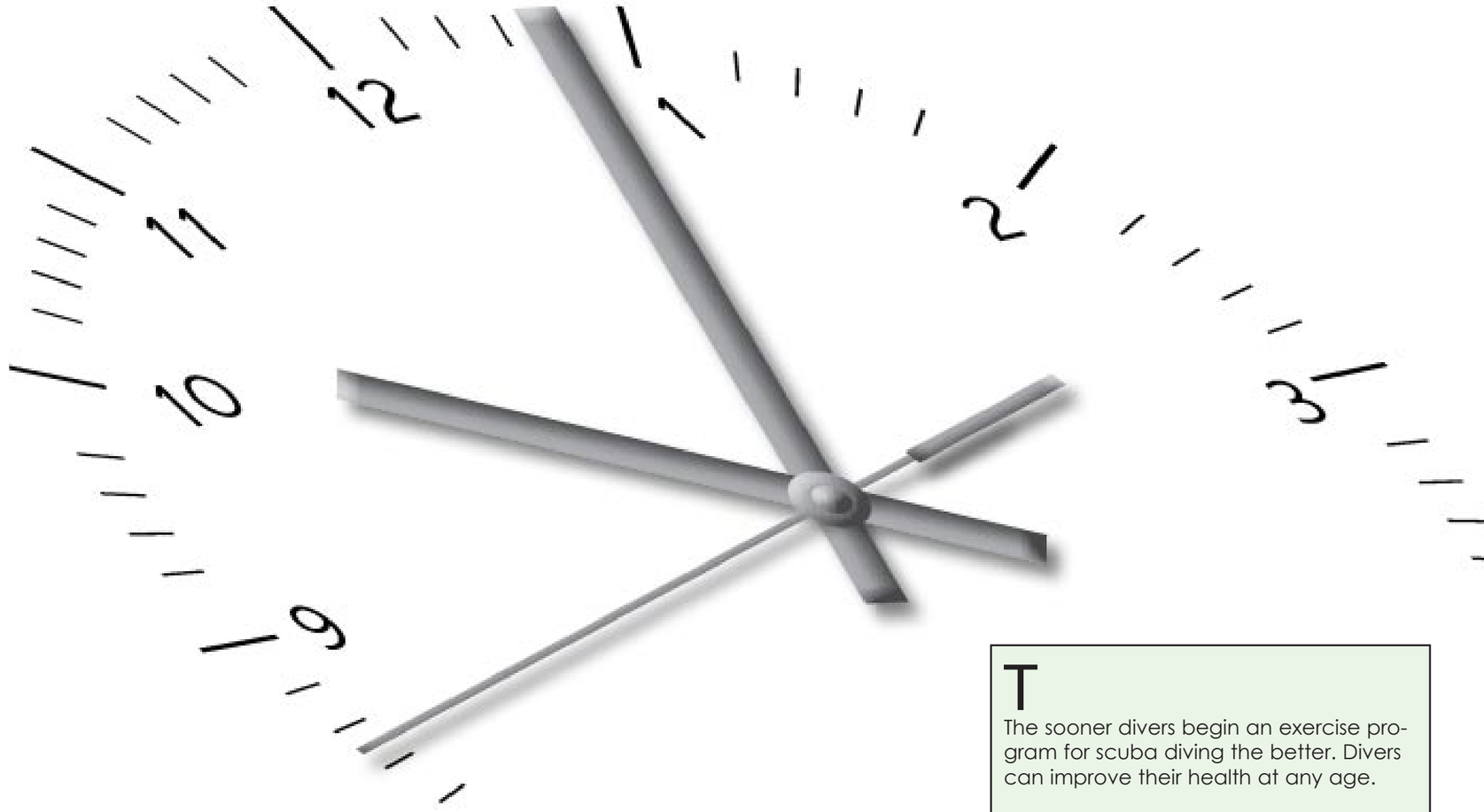




ED.— ALWAYS CONSULT A PHYSICIAN FIRST BEFORE BEGINNING ANY EXERCISE OR FITNESS PROGRAM.

The Clock

— Extend dive time with physical fitness



Text and photos courtesy of Gretchen M. Ashton, CFT, SFT, SFN, NBFE. Founder of ScubaFit®

Tick tock tick tock. Have you ever heard someone say, "There goes 15 minutes of my life I will never get back?" While there are many different philosophies and applications of time, most divers don't want to waste it. Instead, divers carefully invest some of their precious time, energy and money planning and preparing for their ideal SCUBA experience.

It is not surprising that one of the earliest and most accurate methods of measuring time is the water clock. In fact, divers seem to have their own built-in water clocks pouring over dive logs, recording time in and time out of the water, bottom time and surface intervals, and adding up the flow of minutes as a measure of experience. Underwater photographers devote hours of their time dedicated to freeze-framing that perfect fluid moment. Even professionals that have spent years of their lives exploring the oceans of the world still can't get enough. Racing the clock or watching the clock, divers simply want more dive time.

Participating in daily exercise is an investment of time divers can make for themselves that comes with big payoffs. Physical fitness improves the health of divers, which can extend dive time and add years to the diver's lifespan.

A diver certified at 20 years of age has the potential for more than 50 years of scuba diving. During this diving lifespan many biological changes will occur. Beginning in early adulthood all body systems begin to lose capacity; muscle strength decreases, cardiovascular capacity diminishes, and body composition changes. Clearly, illness should not be confused with aging however, changes in the body due to aging are of great concern when combined with illness, injury or a sedentary lifestyle.

There are many theories of aging, but only physical activity is wholly agreed to reverse the effects of aging. As with diving and any activity, there are risks associated with exercising. Fortunately the benefits of physical fitness far outweigh the risks associated with exercise and greatly reduce the risks associated with diving. As the body ages, workouts can be modified to minimize risk and maximize results. Exercise is the great equalizer. A fitness lifestyle may extend biological health by as much as 20 years.

More efficient use of air is perhaps the most significant benefit of exercise that can extend dive time. Physiological adaptations as a result of exercise increase aerobic capacity, improve the ability of muscle cells to utilize oxygen, enhance the body's ability to transport oxygenated blood to the muscle cells and carbon dioxide away from the cells, strengthen and train the heart to pump more blood, and metabolize stored body fat as a primary source of energy helping to maintain healthy body composition.

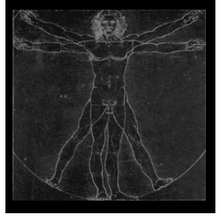
Physical fitness for diving increases endurance and reduces fatigue, facilitates carrying less weight, improves mental acuity, reduces the risk of decompression sickness (DCS), improves agility on boats and uneven terrain, improves comfort and movement on the surface and underwater, improves fin-kick efficiency and overall diving performance.

T
The sooner divers begin an exercise program for scuba diving the better. Divers can improve their health at any age.

I
Interval training, using a timer instead of counting repetitions, is a great way to adapt a workout to enhance diving performance.

M
Make an appointment to workout. Train at the same time every day and vary the length of the exercise session.

E
Exercise at least four times each week for diving. Sixty (60) minutes of physical activity is recommended for everyone every day.



The Clock
—starting position

A balanced exercise program incorporates resistance training for strength, aerobic training for cardiovascular fitness, stretching for improved flexibility and injury prevention, and good nutrition.

The Clock is an advanced exercise requiring good leg strength, torso stability and flexibility in the torso, hips and shoulders. Beginners may wish to practice the Split Stance Squat to develop a foundation before progressing to The Clock. Review and follow the biomechanics, form, breathing, and precautions of the Split Stance Squat.

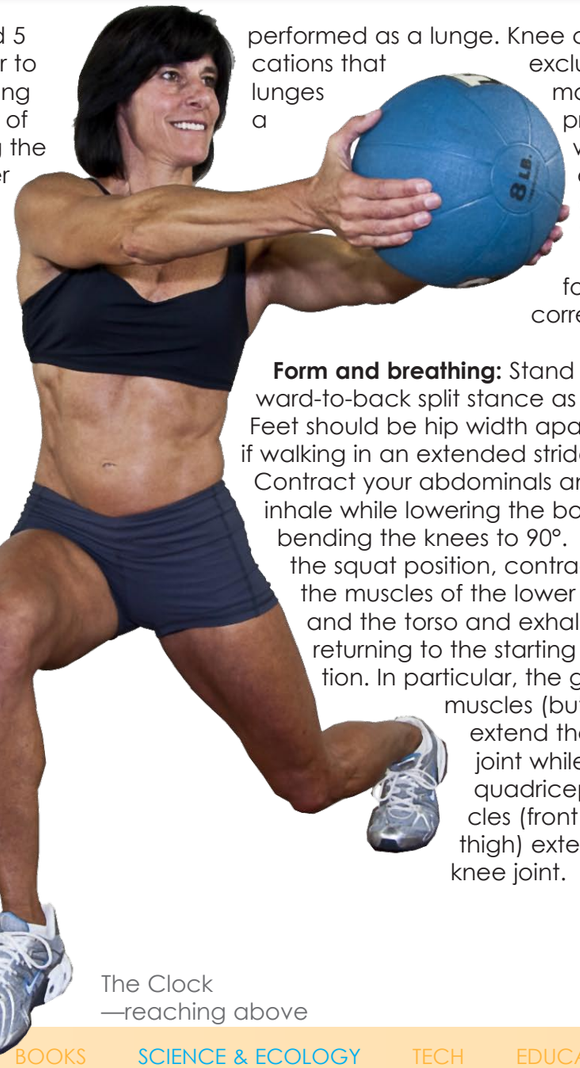
Equipment: A weighted medicine ball adds challenge to the exercise and assists the rotation of the torso. The exercise may be performed without weight with the hands clasped together.

Getting started: Imagine two clocks aligned with each other one below the feet and another above the head. Stand in the center of the clocks in a split front-to-back stance with the right foot forward, feet about hip width apart and 12 o'clock directly in front. Hold a weighted medicine ball between both hands with fully extended arms. Drop into a lowered Split Stance Squat position and remain in this lowered stance throughout the exercise.

Form and breathing: To begin, inhale while reaching down and across the front knee pointing the medicine ball toward 1 on the imaginary clock below. Slowly begin to exhale and with controlled motion rotate the torso sweeping arms like the hands on a clock to 7 o'clock above. When turning the torso at the waist work to keep the hips pointing forward. Keep eyes on the ball at all times turning the neck and head to keep them in line with the spine. Resist the urge to stand up. Continue the exercise by inhaling while sweeping the arms back down to 1 o'clock below. Repeat for one minute and return to the standing position. Now switch legs front-to-back so that the left knee is forward. Perform the exercise for the other side of the body reaching across the left knee down and toward 11 o'clock below. Then sweep the arms diagonally up toward 5 o'clock above. Remember to inhale at the start and during the downward movement of the exercise. Exhale during the upward sweep. Remember to keep the arms fully extended throughout the range of motion.

The Split Stance Squat is a great exercise for strengthening the legs and stabilizing the core. Maintaining balance and coordination during this exercise engages the abdominals, back, hips, buttocks, legs and mind.

Beginners: Hold onto a chair or railing to practice this exercise. Initially, body weight may be enough of a challenge. In time adding additional weight and standing free from support moves this exercise to its advanced form. This exercise is NOT performed as a lunge. Knee complications that may not exclude lunges a problem with this exercise when performed correctly.



The Clock
—reaching above

Form and breathing: Stand in a forward-to-back split stance as shown. Feet should be hip width apart as if walking in an extended stride. Contract your abdominals and inhale while lowering the body by bending the knees to 90°. From the squat position, contract all the muscles of the lower body and the torso and exhale while returning to the starting position. In particular, the gluteal muscles (buttocks) extend the hip joint while the quadriceps muscles (front of the thigh) extend the knee joint.

Repetitions: Depending on individual strength and endurance perform the exercise between ten and 25 repetitions with each leg. Repeat two to four times on each leg.

Precautions: Keep the front knee behind the toes, ideally over the ankle. Do not lock-out the knees or look down. The back knee (as much as possible) should align directly below the hip allowing for a 90° bend at the ankle. Work to adjust the stance so that the back knee aligns directly below the hip with as close to a right angle at the ankle as possible. If the position is not perfect, a slight adjustment of the upper body may bring it into alignment. If it doesn't, return to the starting position and adjust the starting stance front-to-back for proper alignment.

Gretchen M. Ashton is registered with the National Board of Fitness Examiners. An advanced diver, International Sports Sciences Association Elite Trainer, and world champion athlete, Ashton developed the ScubaFit® program and the comprehensive FitDiver® program, which includes the first mobile app for scuba diver fitness. Ashton is the co-author of the PADI ScubaFit Diver Distinctive Specialty course. For more information, visit: ***Scubafit.com***

Norway

Gulen

Text and photos by Christian Skauge

THIS PAGE: Scenes from the wreck of the *SS Frankenwald*

Cold water diving will never be the same after a visit to Gulen situated north of Bergen on the Norwegian west coast. Here, history meets present day, the deep ocean meets kelp forest and the gargantuan meets the miniscule.

Whatever you want to see underwater, chances are good that you will find it at the Gulen Dive Resort. The area at the mouth of the Sognefjord is as rich in marine splendour as it is beautiful above the surface. The world's longest fjord, it cuts some 220 kilometres into the Norwegian west coast and an area of great strategic importance during World War II. Consequently, the area is strewn with spectacular wrecks of freighters and warships and in terms of rusty WWII action, few places in the world can compete. A week at Gulen leaves one with the chance of being properly "wrecked".

Norway's best wreck

One of Gulen's signature dives is the 122 meter long German freighter *SS Frankenwald*. Practically a cliché, the *Frankenwald* is a virtual window into history, a piece of WWII memorabilia found nowhere else. Laid bare by corrosion, the deck slopes from 24 to 34 meters toward the bow of the ship. Even though bottom time is decent, many dives are required to properly explore the superstructure, cargo holds and the interior. Weighing in at 5,032 tons, the grand old lady wreck is extremely well-preserved, offering so many different dives that people come back year after year.

The stern rests on the sandy bottom 44 meters and almost resembles a submarine conning tower when viewed from behind. After spending as much time as possible on the wreck, divers can ascend to the ship's spectacular aft mast for a safety stop. Rising from 20 to 7 meters, the structure is entirely encased with anemones and teeming with critters and little fish. Several years ago, the *Frankenwald* was voted best wreck in Norway by

Wreck of the *Parat*

Divers at Sail Rock

the readers of Norwegian dive magazine *Dykking*. And rightly so! Hovering motionless above the *Frankenwald* in good visibility is an out-of-this-world experience not to be missed.

Twin wrecks at Sail Rock

Also not to be missed are the stunning twin wrecks of *SS Ferndale* and *SS Parat*. On 16 December 1944, the 116-meter long freighter *Ferndale* was heading north in the darkness when she ran aground on Sail Rock, 40 minutes north of Gulen Dive Resort. A sitting duck, the Ferndale came under attack from allied aircraft the next morning. In the fierce battle that ensued, the allies lost two Mosquito fighter-bombers, but still managed to sink both *Ferndale* and the salvage vessel *Parat* which had been called in for the rescue.

Today, the *Ferndale* sits upright on a slope ending at a depth of only 8-10 meters. The bow area was salvaged after the war, with only bits and pieces remaining. In stark contrast, the intact midship and stern remain at 34 meters. From this vantage point, one can look down on the *Parat*, resting a meter or so behind *Fernedale*. It is almost a miracle that the large freighter did not crush the small salvage vessel when she sank. The *Parat* is a dive for experienced tech divers, with trimix required between depths of 45 to 60 meters.

After admiring both wrecks, deco and safety stops are done around the spectacular Sail Rock, the sides of which are completely covered with sea plumes, dead men's finger coral, dahlia anemones and sea squirts. The quantity of fish and invertebrates found here is simply astonishing. It is wise to make room for an extra long deco stop if you don't want to miss out on the rock. Some underwater photographers have been known to ignore the wrecks entirely and concentrate on Sail Rock's colourful plethora of marine wildlife. Even with the unique twin wrecks close by, it is a world-class dive in its own right.

Rust for everyone

Gulen Dive Resort takes divers to no less than 15 different wrecks, ranging from the beginner-friendly *Solvang* at 15 meters to the technical deep-dive of *SS Lynx* at 90-100 meters. In between, most divers will find a wreck at suitable depth, be it the *Havda, Bandak, Server, Welheim, Oldenburg, Inger Seks* or the newly discovered minelayer *KNM Uller* at 55 meters. The latter is the only wreck known to have been sunk by Norwegian seaplanes during WWII. Scattered on the bottom beside the beautiful 27 meter long vessel are ominous-looking mines and a cannon elevated towards the surface as if she's still trying to fend off her aggressors.

On the boat ride out, divers are briefed not only on the dive itself, but you will also the often exciting and violent history of the wrecks. At Gulen, history is never more than a few meters below the surface.

WRECK DIVING IN GULEN

SHIP	GRT	LENGTH	SUNK	DEPTH
Frankenwald	5062	122 m	06.01.1940	25-44m
Fernedale	4302	116 m	16.12.1944	8-40m
Parat	135	32 m	16.12.1944	45-60m
Solvang	149	32 m	12.03.1992	8-25m
Bandak	262	38 m	19.02.1949	18-29m
Havda	677	55 m	09.12.1944	16-30m
Inger Seks	4969	116 m	23.04.1945	30-80m
KNM Uller	250	27 m	01.05.1940	55-60m
Server	19864	179,5 m	12.01.2007	2-25m
Mercantil Marica	15000	280 m	21.10.1989	25-50m
Welheim	5455	135 m	27.11.1944	15-70m
Ilse Fritzen	4883	107 m	26.01.1945	45-65m
Bjergfin	648	54 m	25.01.1945	42-55m
Lynx	1366	70 m	19.09.1944	90-100m

CLOCKWISE FROM LEFT: Videographer on house-reef; *Flabellina lineata* nudibrach; Gulen Dive Resort; Jeffrey's goby*; Eledone cirrhosa* octopus

Dive resort

Celebrating its tenth anniversary this fall, the Gulen Dive Resort comes complete with modern RIB dive boats, nitrox and trimix on demand, a great house reef, its own pub, sauna and outdoor hot tub and a friendly and knowledgeable staff. Dive courses are offered from Open Water to Divemaster and many dive shops and clubs use the resort for their own courses. Rebreather-friendly, the resort is able to handle large groups of technical divers, as well as hosting photography and marine biology workshops every year. The post-dive Norwegian speciality waffles served at the dive shop are a good example of the effort that goes into catering for the divers and their needs.

Visitors stay in up-to-date, clean and cosy twin rooms and can swap dive stories in the spacious living room and kitchen area. A special area is dedicated to laptops, chargers and camera gear. Editing and admiring pictures taken during the day is a popular past-time in the evenings. Most divers choose to tend to their own meals and enjoy the luxury of complete flexibility, while others prefer the all-inclusive treatment. Almost anything is possible at Gulen Dive Resort; just let owners Monica Bakkeli and Ørjan Sandnes know what you want, and they will most likely be able to provide it. If arriving by air from Bergen, group transfers can be arranged from the airport.

Nudibranchs galore

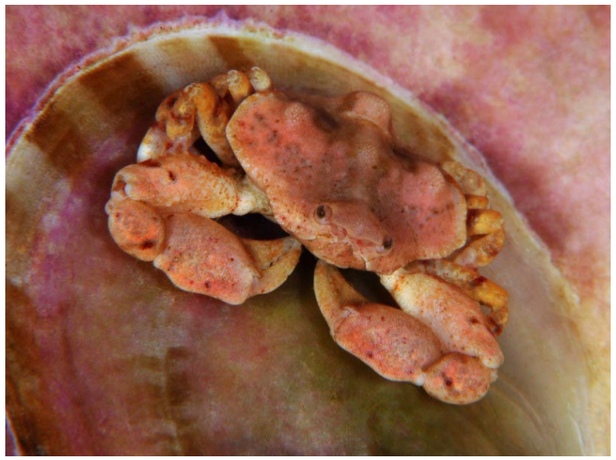
Gulen Dive Resort offers much more than great wreck diving. The house reef is world-famous for its high number of nudibranch species. Every year at the end of March, people gather for the annual Nudibranch Safari, with scientists from the university in Trondheim teaching participants all about these exquisite creatures.

All the diving is done locally to ensure maximum time under water as well as in the classroom. Although Norway boasts close to a hundred nudibranch species, only two thirds can be found at diveable depths. At the Gulen house reef, more than 50 species have been found in just the last two years, attracting divers from all over Scandinavia.

Aliens of the deep

If you are looking for even more exotic and unique marine life experiences,

come to Gulen at the end of January. At this time,the mysterious deep-sea helmet jellyfish *Periphylla periphylla* comes to the surface to mate, an event



CLOCKWISE FROM LEFT: Sea spider, *Nymphon gracile;* Thornback ray, *Raja clavata;* Bryer's nut crab, *Ebalia tumefacta;* Crown or helmet jellyfish, *Periphylla periphylla;* Two-spotted clingfish, *Diplecogaster bimaculata*

that can only be witnessed in very few locations the worldwide. These strange creatures normally live from several hundred to thousands of meters deep in the ocean, but in the middle of the night during winter, divers can witness hundreds if not thousands of them with the bottom 300 meters below. The jellyfish grow to almost a meter across when their 12 tentacles are spread out.

Like blood-red wheels drifting in the pitch-black water, the Periphylla has been around for some 650 million years, with scientists only recently beginning to unlock their secrets. Many visiting divers count these dives among the best they have ever had.

Sharks and rays

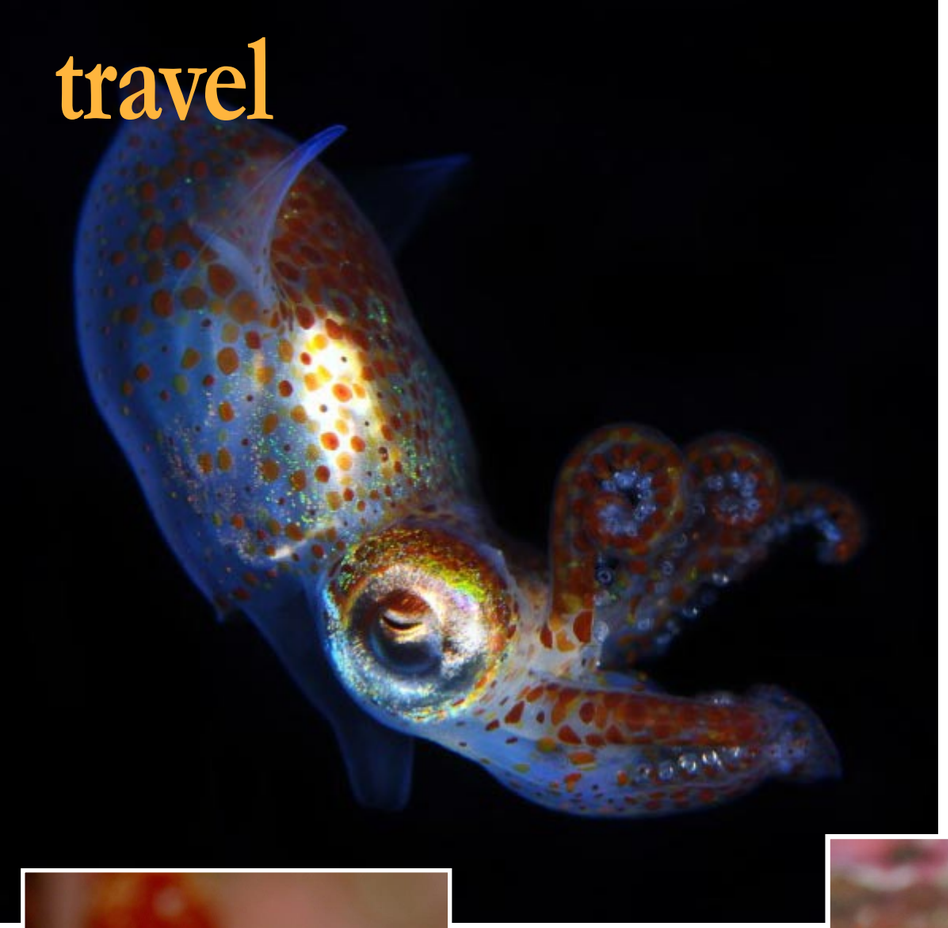
Elasmobranch and cephalopod lovers will also find rare treats in the Gulen area. Although Norwegian waters are not exactly shark-infested, the summer months of June and July offer opportunities to see congregations of dogfish at some of the deeper wrecks at the mouth of the Sognefjord. They have even been spotted several times on the house reef, much to the astonishment of divers expecting nudibranchs and crustaceans. (Naturally, with the wrong lens on the camera!) I have myself been surprised by 1.2-meter-long sharks swimming close by to investigate what I am doing. The calmness and elegant grace of these apex predators never cease to amaze me.

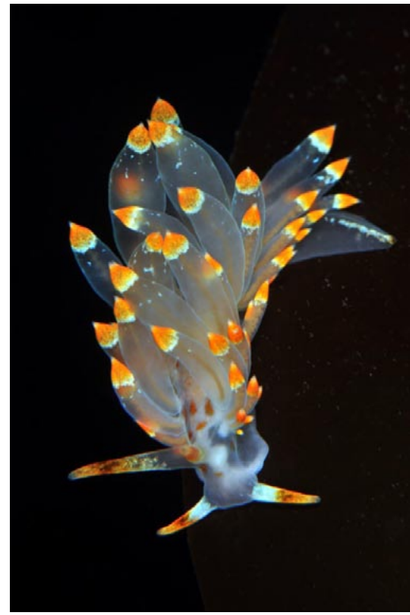
More cartilage can be found at Stingray City, so dubbed because of the near 100 percent success rate at finding thorny rays on the sandy bottom. These flat bottom feeders grow up to about a meter in length, and are normally not very camera shy. Depths of 14-18 meters ensure long dives even for the less experienced and smiles will be in abundance upon leaving the water.

Stunning house reef

During the fall, things start to noticeably change off the Norwegian coast and Gulen is no exception. As the days grow shorter and evenings darker, thousands of strange creatures begin to appear at nights on the house reef. Covered in spiky protrusions or algae camouflage, an army of crustaceans begin their march towards domination. With snapping claws and glowing eyes punctuating the darkness, camouflage crabs, nut crabs, swimming crabs, spider crabs, stone crabs, hermit crabs, squat lobsters, different shrimp and sea spiders crawl and creep.

At 30+ meters on the house





Gulen

CLOCKWISE FROM TOP LEFT: Common Bobtail squid; Diver on wreck of *Bandak*; *Eubranchus farrani* nudibranch; *Limacia clavigera* nudibranch; *Diaphoradoris luteocincta* nudibranch; Liljeborgs shrimp

reef, really lucky divers may encounter stone crabs seeking shelter under the big, pink sea anemones as they wait to shed their spiky carapace when they are moult. The anemones also house whole families of bright red Spirontocaris shrimp, using the stinging tentacles for shelter like clownfish.

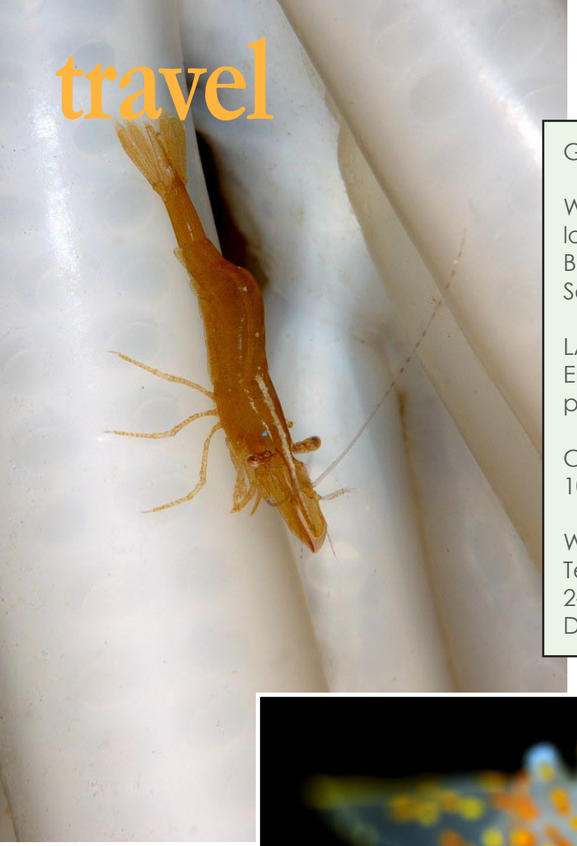
At night, little squid emerge from the fine-grained sand at the house reef's shallow depths. Patient divers can see them hunt, feed and maybe even mate, ensuring that the following year's divers can experience these delicate creatures as they flutter gently in the dark.

The house reef also features rare gobies lingering in the sand and super-cute clingfish guarding their eggs deposited inside empty seashells. Squid's eggs are often found on the kelp during springtime and lobsters, meter-long wolffish and large monkfish are frequent visitors. Even rare deep-sea sponges and stony coral have been found here, along with several species of nudibranchs never before seen in Norwegian waters. A macro heaven, the house reef is renowned among Scandinavian underwater photographers. Many award-winning images have been shot here with more to come in the future.

Just off the house reef, some 200 meters from the resort pier, another signature dive awaits the visiting divers: The Troll Wall. This magnificent drop-off starts well above the surface and plummets to 45 meters and deeper, and one feels quite small next to the towering mass of granite. The wall is full of large pink and little white starry-looking anemones, and shallower the kelp harbours lumpfish guarding their eggs and thousands of wrasse going about their business. If one does not venture too deep, it is even possible to swim all the way back to the pier where the evenings attractions are waiting—barbecue in the summer, hot-tub and a pint in the pub all year round.

New adventures

Sitting near the very end of the warm flow of the Gulf Stream, Gulen is part of an ever-changing marine ecosystem that never ceases to amaze. The seasonal changes make every visit special and the marine life is unique each time. Spring brings excellent opportunities to discover colourful nudibranchs



GULEN FACTS

WHERE: Gulen Dive Resort is located two hours north of Bergen, at the mouth of the Sognefjord.

LANGUAGE: Norwegian, but English is spoken by most people.

CURRENCY: Norwegian Kroner, 100 NOK = 13 Euro or 18 USD

WATER TEMPERATURE: Temperature range between 2-4ºC during the winter months. Definitely drysuit territory, lots of warm undergarments are also required. In late summer, water temperatures can reach 17-18ºC at the surface, but will still be cool at depth.

DIVING: Excellent for novice divers, intermediate and experienced technical divers alike. Gulen Dive Resort offer dives of all kinds for all divers.

FLIGHTS: Getting to Norway by plane is easy and convenient with international connections in Bergen and Oslo. Gulen Dive Resort offer group transfers from the airport. ■

LEFT TO RIGHT: Chameleon prawn, *Hippolyte varians; Polycera quadrilineata* nudibranch; Gulen Dive Resort is located in Sognefjord, as located on global map and map of Norway

and see how the ecosystem prepares to go into high gear for mating season in the beginning of the summer. The following warmer months offer an abundance of algae, fish and plenty of action in the sea. During the the fall, crustaceans and cephalopods are the main players. When winter knocks, it is time to put on extra undergarments and explore the fabulous WWII wrecks for which Gulen is justly famous.

These are just a few of the highlights to be experienced during a visit to the Gulen Dive Resort. Depending on the time of year, they offer drift dives, awesome kelp forests, pick-your-own-clams, a fabulous house reef, world-class wreck diving and an assembly of marine life most people wouldn't think possible outside the tropics. No article could ever have room for all the experiences on offer. Whenever you visit, a different adventure awaits. ■

Christian Skauge is the current Nordic Champion of underwater photography, and has won several national and international photo contests. He has previously worked as editor for the Norwegian dive magazine Dykking. *To see more of Christian's images, please visit www.scubapixel.com.*

media

Underwater Photography

Want to learn more about underwater photography? Check out this new book by Colorado native and American freelance fine art photographer, Trent Burkholder—avid diver, underwater enthusiast and world traveller. This easy-to-read and informative guide covers the technical, mechanical, and compositional points of underwater photography that will help you produce top quality images. Find 120 exquisite color photographs and 18 instructional illustrations explaining described techniques. Burkholder also describes specific diving techniques that can help aspiring photographers attain those underwater Kodak moments we love so much. Learn how to handle and maintain your equipment, as well as how to choose the best equipment for your needs from the many types available on the market. In addition, you can learn about the pioneers of underwater exploration, photography, and oceanography. Get inspired.

Hardcover: 160 pages
Publisher: Schiffer Publishing Ltd
Date: 28 Jan 2013
ISBN-10: 0764342347
ISBN-13: 978-0764342349

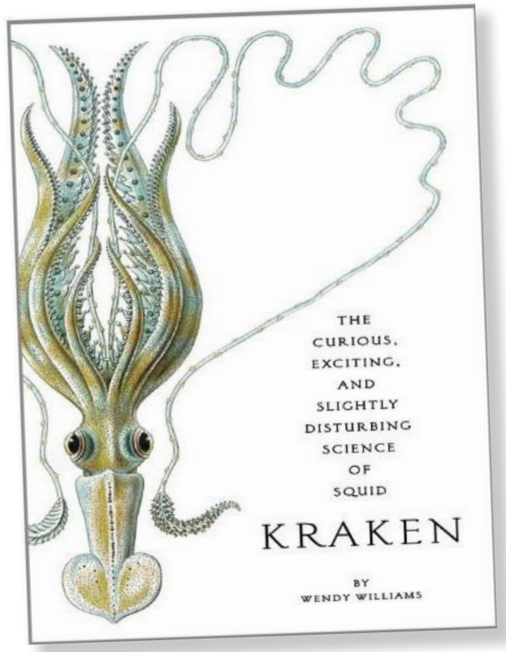
Indonesia's Global Treasures

Winner of the International Prize for Best Book of the Year at the World Underwater Pictures Festival (Festival Mondial de l'Image Sous Marine), Michael AW's *Indonesia's Global Treasures* captures the rich diversity, essence and opulance of the Coral Triangle—the world's center of marine protected areas. It took 12 expeditions for the Singaporian born author of 29 books on the sea to complete. Emphasizing the importance of protecting the natural treasures found in this region of the planet, it is the first book to celebrate the incredible beauty of seven underwater wonders found in the Indonesian Archipelago. This 180-page high-quality fine art production volume printed on acid-free paper, aims to inspire and raise awareness and appreciation for the Earth's fragile and threatened underwater ecosystems, which need to be preserved and protected for our children and future generations. It serves as a warning that if we do not alter the course of human-induced climate change, pollution and over-fishing, the coral reefs will be destroyed and species will become extinct. Part proceeds go to Ocean Geographic SOS (Save Our Sea) Fund. Price: AU$80.00 plus postage. **www.michaelaw.com/2012/GT.htm**

Fishy Calendar

Alaska artist Ray Troll slaps dive humor down in his new tongue-in-cheek calendar sure to bring a grin to the most avid underwater explorer. His street-smart sensibility comes out in the quirky, aquatic images he creates which are often inspired by the latest scientific discoveries, bringing a bit of whacky whit to the world of ichthyology.

Publisher: Taku Graphics, LLC
Date: 2013
ISBN-10: 0984631828
ISBN-13: 978-0984631827



Kraken

Thirty-year science writer Wendy Williams takes us on a wild ride in search of the enigmatic and charismatic squid. The traditional name for huge sea monsters, Kraken, is aptly applied to this most curious of creatures with tentacles, some of which can truly be larger than life, and have over the centuries both awed and terrified. In this narrative book, the author covers squid science, including the unique abilities of squid, such as camouflage and bioluminescence, as well as questions about what intelligence is, and some of the other equally intriguing cephalopods, like octopus and cuttlefish. An entertaining read.

Hardcover: 224 pages
Publisher: Abrams Image
Date: 1 March 2011
ISBN-10: 0810984652
ISBN-13: 978-0810984653

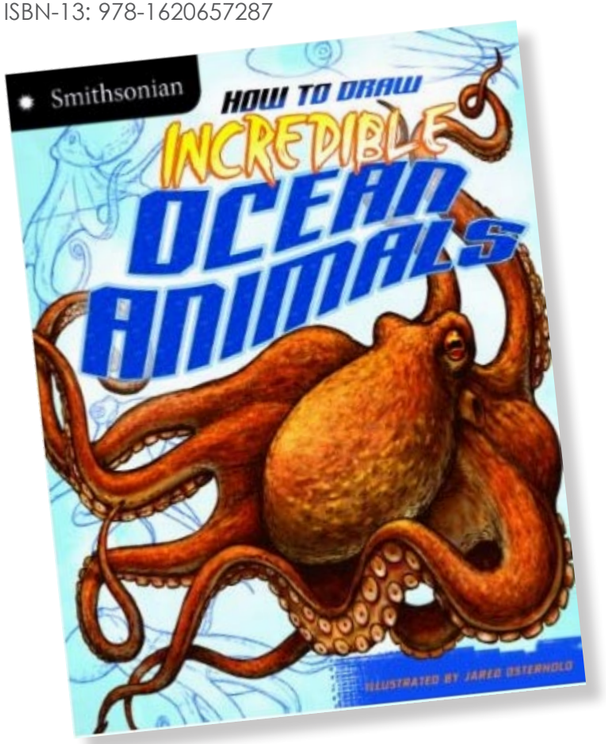
media

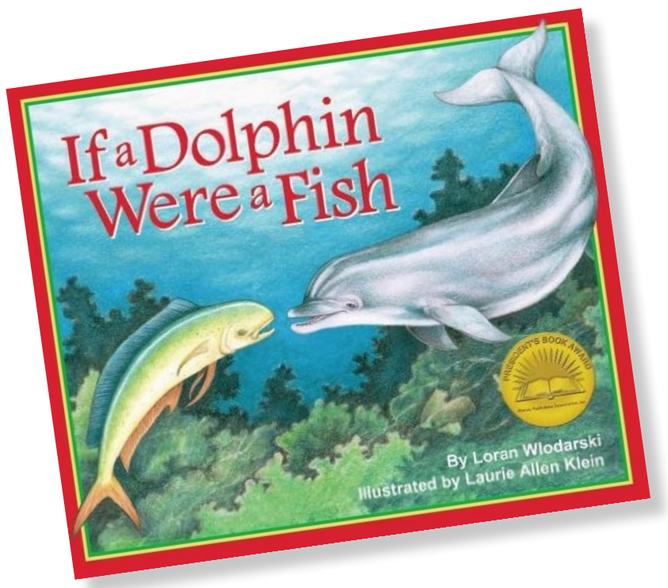
New books for the kids!

Draw Ocean Animals!

Always wanted to know how to draw a jellyfish? Well here's your chance. With just a few steps, you can draw these tentacled creatures as well as other cool marine animals from manatees to octopus and more! So grab some paper and pens, crayons and ink. It's easy with the help of illustrator Jared Osterhold and author Kristen McCurry, writer and editor for Capstone Press and mother of twins who also love books. Part of the Smithsonian Drawing Books series.

Paperback: 64 pages
Publisher: Capstone Press
Date: 1 February 2013
ISBN-10: 1620657287
ISBN-13: 978-1620657287





If a Dolphin Were a Fish

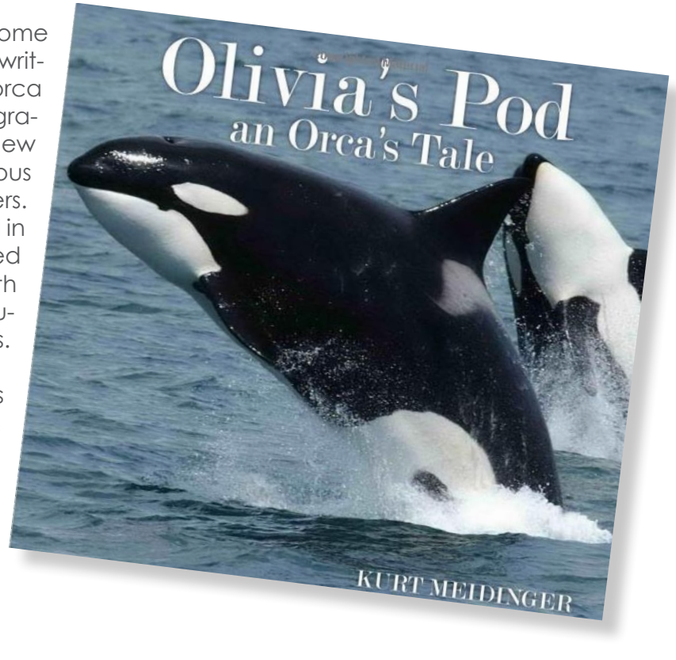
Imagine you're a fish or a sea turtle or a shark or an octopus, maybe a pelican or a manatee. Well, that's what a dolphin named Delfina does in this book. Kids will be found laughing at the incredible morphing illustrations by Laurie Allen Klein while they learn about the actual differences between these sea creatures and the species classes from which they come. So good is this book, it won a Foreign Press Association President's Book Award. The author, Florida-based science writer Loran Wlodarski, has written six books for SeaWorld and has been published in sources like *Grolier's Encyclopedia for Children* and *The Marine Mammal Encyclopedia*. At SeaWorld's Education Department, Wlodarski had the chance to raise some of the animals including newly hatched sharks, turtles, macaws, iguanas and tropical fish, so we can assume he has a green thumb when it comes to weird and wonderful critters—and lived to tell the tale.

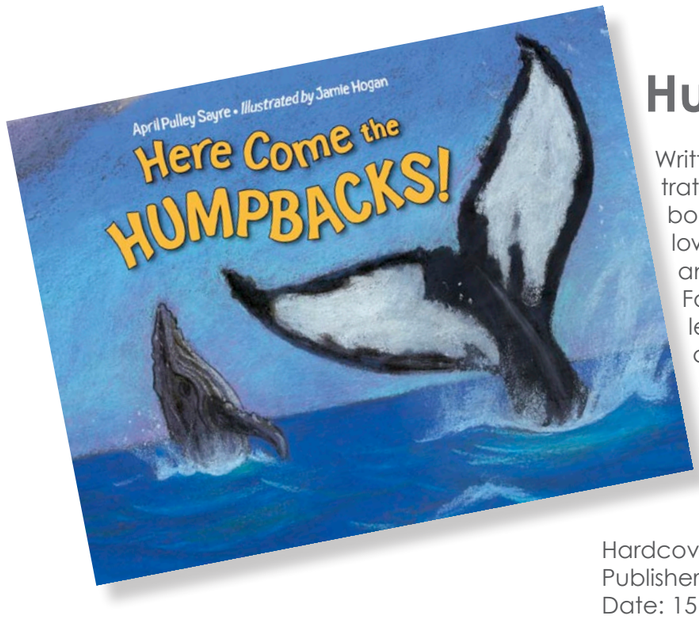
Paperback: 32 pages
Publisher: Sylvan Dell Publishing
Date: 10 February 2013
ISBN-10: 1607188619
ISBN-13: 978-1607188612

Learn About Orcas

Teach your kids about these awesome cetaceans with this delightful book written from the perspective of a young orca named Olivia. With excellent photography, American author and native New Yorker, Kurt Meidinger, weaves a curious tale sure to captivate young readers. Currently teaching elementary school in Yucaipa, California, Meidinger started writing books to help his students with science ideas and academic vocabulary, which met the state standards.

Paperback: 38 pages
Publisher: G8Press
Date: 14 December 2012
ISBN-10: 061572261X
ISBN-13: 978-0615722610





Humpbacks!

Written by April Pulley Sayre and illustrated by Jamie Hogan, this colorful book with sumptuous drawings follows a mother humpback whale and her calf while they travel. Follow their great migration and learn how they face dangers along the way. Award-winning author, Sayre, has written over 55 natural history books for children and adults, many of which have been translated into French, Dutch, Japanese and Korean.

Hardcover: 272 pages
Publisher: Beacon Press
Date: 15 January 2013
ISBN-10: 0807014354
ISBN-13: 978-0807014356

Offshore wind farms to mind the whales

Offshore wind developers and environmental groups in the United States have agreed on a plan to protect one of the world's most endangered species. The companies will observe stricter rules to protect the North Atlantic right whale, which regularly migrates south along the Atlantic coast.

The agreement "helps ensure these Atlantic offshore wind industry leaders can develop while protecting critically endangered right whales", said Justin Allegro of the National Wildlife Federation. Limiting work during certain seasons, slowing down boats, reducing sound disturbances in the ocean, and having spotters look for whales are part of agreed-upon mitigation measures.

With less than 400 in existence, North Atlantic right whales are among the most endangered whales in the world. They are protected under the U.S. Endangered Species Act of 1973 and the Marine Mammal Protection Act of 1972. Vessel strikes and entanglement in fixed fishing gear are the two greatest threats to the whales' recovery.

An estimated 300 right whales live in the North Atlantic Ocean. They migrate between feeding grounds in the Gulf of Maine and their winter calving areas off Georgia and Florida, an ocean area with heavy shipping traffic.

Orcas at risk too

In British Columbia, Canada, scientists are also concerned proposed tidal turbines in Blackney Passage near the entrance to Johnstone Strait would put killer whales at risk.

At issue is not just the possibility of slow-moving turbines in the narrow passage used by whales to travel through to Johnstone Strait, but the investigative stage, said Paul Spong, director of the OrcaLab, a Hanson Island whale research station.

"One of the devices which might be used is like sonar with high-frequency noise," he said. ■

SOURCE: NEW JERSEY ONLINE

(File photo) Offshore wind turbines near Copenhagen

Whales roll 360 degrees in order to orientate themselves for a surprise attack. Extra turning effort rewards whales with enormous meals

Blue whales utilize underwater acrobatics to attack prey from below

Results of a study published in the Royal Society journal, *Biology Letters,* revealed blue whales execute extraordinary spins beneath the waves to access large patches of krill. They discovered the whales roll 360 degrees to orientate themselves for a surprise attack.

Dr Jeremy Goldbogen and colleagues from the Cascadia Research Collective in the U.S. state of Washington recorded the whales' surprising maneuverability, suggesting the extra effort of turning rewarded the mammals with enormous meals.

"Despite being the largest animals to have ever lived, blue whales still show an impressive capacity to perform complex maneuvers that are required to efficiently exploit patches of krill," said Goldbogen.

To understand how the whales capture prey, Goldbogen and his team tagged a group of animals off the coast of southern California. Using suction cups to safely attach acoustic recording tags without harming the animals, the team were able to track the whales' movements with underwater microphones.

"As the blue whale approaches the krill patch, the whale uses its flippers and flukes to spin 180 degrees so that the body and jaws are just beneath the krill patch," explained Goldbogen. "At about 180 degrees, the mouth just begins to open so that the blue whale can engulf the krill patch from below," he added.

As the blue whale engulfs the prey-laden water, it continues to roll in the same direction and completes a full 360 roll and becomes horizontal again ready to target and attack the next krill patch.

The researchers recorded video footage of the acrobatics utilizing a video camera worn by another animal to capture natural behaviour.

"We did not expect to see these types of maneuvers in blue whales and it was truly extraordinary to discover," said Goldbogen.

Previous research identified similar behaviour in other rorqual whale species such as humpbacks, but these animals rarely exceeded 150-degree turns. In the smaller whale species, the ability to twist and turn was attributed to long fins and tail flukes.

In addition, it is theorized this behaviour also optimizes the animals' vision. "As in all cetaceans, [blue whales'] eyes are positioned laterally, and thus rolling the body should enhance panoramic vision in multiple dimensions," the study reported.

Goldbogen said that the results would fuel further research into the complex behaviour of whales, especially regarding predator-prey interactions.

"This extraordinary ability is only a glimpse into the diverse repertoire of maneuvering behaviours performed by foraging animals," he said. "Future tagging work has the potential to reveal many more unique insights into the daily lives of animals in their natural environment." ■

Legal group challenges manatee's endangered status

A Conservative legal group is asking the U.S, federal government to strip the manatee of endangered species status. California-based Pacific Legal Foundation has filed a petition with the U.S. Fish and Wildlife Service stating federal boat speed restrictions harm fishing and tourism industries on King's Bay where manatees assemble for the winter.

Federal officials have been considering downgrading the manatee's status for some time. According to the petition, a 2007 federal review concluded manatee population numbers had increased sufficiently to downgrade the species from endangered to threatened. As no action was taken, the petition states a change in the manatees' status is necessary to maintain regulatory credibility.

"We believe in protecting a sound and healthy environment, and we also believe that the federal government must follow its own rules," said Steve Lamb, vice president of Save Crystal River. "That's why we're petitioning the government to abide by its findings on the manatee."

Alan DeSerio, the Pacific Legal Foundation's managing attorney would like to eliminate the manatee from the protected species list altogether. "Given the rebound of the manatee in Florida, eventually the population could no longer qualify for being threatened," he said.

The downgrading process is expected to commence in late spring or early summer of 2013, according to. "The whole reason why we would reclassify manatees is because these conservation measures are working," Underwood said. Still, any action would not roll back any of the restrictions opposed by Save Crystal River, the group of Citrus County business owners.

In January 2011, aerial surveys conducted by state wildlife officials counted 4,835 manatees, compared to 5,076 in 2010 and 3,802 in 2009. Despite increasing numbers, manatee advocates argue threats to the marine mammal's survival continue.

"Watercraft deaths are staying at the highest levels," said Pat Rose, a manatee biologist who is executive director of the Save the Manatee Club. In 2011, state wildlife officials blamed extreme cold and boat collisions for the majority of that year's 440 confirmed manatee deaths. ■

SOURCE: ASSOCIATED PRESS

The Mesoamerican Barrier Reef

— *Xcalak, Mexico*

Text and photos by Farhat Jah

A long sandy track runs beside the sea, backed by small houses. A row of dirty pangas, local fibreglass skiffs, sit along the beach. A dog wanders sedately past an old but functional shipping beacon. A few children ride by on their tiny cycles and a military truck grumbles down the sand with a barrel of fuel in it. This is the village of Xcalak, the last settlement before the start of what was once British Honduras, now called the nation of Belize, which lies six miles to the south. Fishing has been the life of the community of Xcalak for over a century. In the first half of the 20th century, Xcalak was a prosperous town. A thriving coconut and fishing business created wealth and attracted traders. Shops, a cinema, an ice factory an electric generation plant and numerous other facilities helped the place to thrive. But in 1955, Hurricane Janet devastated the town. Many people lost their lives, and many of the business owning families who had inhabited the town, moved inland away from the risk.

Divers enter a cenote in the barrier reef and run into a school of silversides

Divers (above) explore the barrier reef tunnels and swim-throughs; Diver with school of Atlantic spadefish (top right)

Xcalak means *twins* in Mayan. This was the name given to the two cuts (passages) that lie in front of the village. These passages gave the villagers access to the sea.

The Bacalar Chico River provides access to the giant Chetumal Bay. This bay, which lies behind the town, makes Xcalak a peninsula, with a swamp to the north, Belize seven miles to the south, the Caribbean Sea on one side, and the bay on the other.

Two hundred fifty people live in Xcalak, and it is today what it was before the early 20th century boom—a sleepy fishing village with a few local shops, a small concrete jetty, a harbour master and a park office. The Mexican Marines have a small base a mile north of the Belize border, and a tiny post within the town.

A lighthouse stands on the sand to the south of town blinking a warning to passing ships. The Chinchorro Bank sits 20 miles off shore, part of the Mesoamerican Barrier Reef System—a salutary home to many a ship whose master failed to read his charts.

Since my youth, I was told about the Great Barrier Reef in Australia. Twenty years ago, I was lucky enough to learn to dive on it. Now, a generation later, I find myself on its shorter cousin. The Mesoamerican Barrier Reef stretches 600 miles from the coast of Honduras up to Mexico.

Diving

As our panga (an open fishing boat) sped out through the reef cut, I felt a certain affinity with this barrier reef. It reminded me of my first diving experiences. And yet, the Mesoamerican Barrier Reef was so different.

Seconds after Captain Moi opened the throttle to full, he backed off the power, and we arrived at our dive site. Bobbing around 500 metres from land, we were on the barrier reef. Sea grass waved visibly on one side of the reef. We had stopped over 60 feet of clear blue water and finger-like reef formations. We were about to dive, and yet I could clearly see mangroves. Compare this to the Australian Great Barrier Reef where mangroves are located 20 miles away.

A Spanish architect on permanent sabbatical was our guide. Named Jesus, he tolerated my diving habits. I fell back into the water, making a large splash.

Dramatic view of the Mesoamerican Barrier Reef off Xcalak

Xcalak

I grabbed my camera and finned down to 40 feet. The water was warm at 27°C, and I had exactly enough weight to keep my aluminium cylinder down. I did not need to add air to my BCD, but I did need to kick down. A school of spadefish sat in the slight current and waited. I swam gently up to them, flashing my camera. I was using an old Patima G11 housing that had seen better days. Thanks to some thieves, it now housed a G12, which while not ideal, seemed to work. After a bit of fiddling, I shot again. The boat came back overhead, and the last diver, Jesus, dropped into the water. I looked above me and saw dive buddies, Cisca and i-Mike Alt, descending with a delightful retired American scientist called Cathy.

Some spadefish circled me in a mesmerising manner. I wandered off to look at them. The 40ft deep water did not cause me any stress. The others took to looking at their own piece of reef and staring at a school of hubbs. Jesus rounded us up like sheep and gave me a direction to head toward. A pipefish popped his head out of the sand, and I snapped his photo. He ducked back inside his hole.

We rounded the corner of one of the fingers, and I stared at the green plants that covered the rock. At first, they seemed colourless, but upon further inspection, the plants played home to gobies, lobsters and small yellow snapper.

Jesus motioned us forward excitedly and pointed. I looked through the blue into the white sand between the reef fingers. A large black stingray shuffled sand from under itself. As I approached, it saw me and swam lazily away. My camera just captured its movement, and then the ray settled nicely in the rock "alley" next door. Its stinger was gone. "Eaten," gestured Jesus using underwater sign language. I wondered what would be big enough and immune enough to bite off a stinger that size—"Only a shark," I muttered through my regulator.

The barrier reef

At first glance, the reef was not an eye stopping, red coral affair. It was made up of walls, coral heads, cuts and spits that resembled fingers. The water was clear, and the scenery pretty, but the reef seemed brown. I wondered if there was any coral at all. But when I got closer, I saw the soft whips and hard brain coral, which shone in the light of my torch—red and green—surrounded by sponges and hundreds of soft waving fan corals. Each

CLOCKWISE FROM FAR LEFT:
Moray eel on reef; Blenny hiding in hole; Diver hovers over waving fan corals; Tiny goby on brain coral

Xcalak

bother the other divers on their exit. When we exited, we did so through another thin chimney that was full of silversides. Dive buddy, Mike, kicked up the dust, but still the view was clear.

We returned to do our safety stop with a few minutes before decompression. We climbed on board, and Jesus gave a command to the captain. He powered off along the reef itself and then entered a cut, or passage, in the reef. The Mexicans call this an *entrada*. Our boat sailed between the coral heads and then swung to the left and continued inside the reef at a sedate pace.

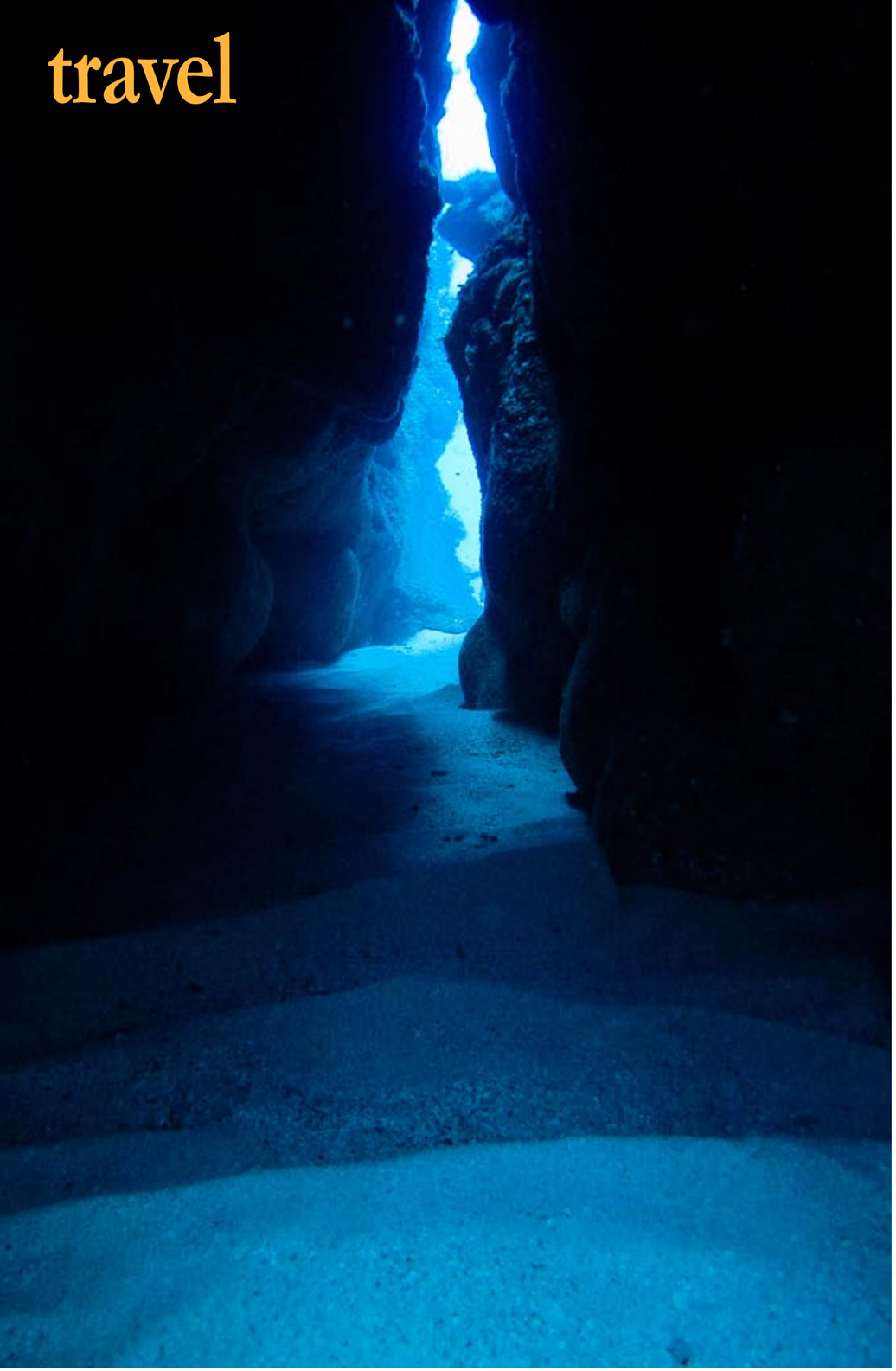
Entering the mangroves, we slowed to a crawl.

had a beautiful red base. And then, while admiring these corals, a large school of porkfish slid by, circling me for a few minutes until they decided to move on.

Beyond the reef, small turtles scuttled by. A lone barracuda sat in the water staring at me. My flash fired, and the barracuda did not move. Slowly, ever so slowly, it turned sideways toward me, only three feet away, and eyeballed me. Then, without a care in the world, it wandered off.

The Mesoamerican Barrier Reef is very different from the Indian Ocean, which is near where I live. There were few nudibranches. There was an infestation of lionfish, and table coral, or *Acropora,* was thin on the ground. And yet we saw dugongs, huge schools of snapper and silversides.

At La Chimenea, we dived a cenote within the barrier reef itself. Entering from the outside of the wall at 91 feet, we swam though a large tunnel. The top of the cenote had fallen through, making for an eerie cave with a pile of rubble in the centre. But the hole in the top lit the centre of the cavern with a delightful blue haze. The clear water revealed a fat barracuda sitting close to the ceiling and a school of bigeye jacks, which approached and swirled around me before choosing to



Steep walls line eerie swim-throughs and tunnels in the barrier reef

School of jacks on reef

The captain dropped us in a small bay 20 yards wide. A passage within the mangroves led to the left and right.

"This is where we see dugongs," said Jesus. "Oh and this," he pointed to the southern trees inches from his fingers, "is Belize, and this," he pointed five yards to the north, "is Mexico."

"This is the border," Jesus said. "Sure, dive boats from both sides come here for tea and water between dives."

Properly degassed, we entered the tunnels of Alexandros playground. It was a series of long swim-throughs nearby the collapsed cenote. It was famous for its large schools of tarpon that swirl around minding their own business. This time, though, the large menacing fish came at us in the restricted space of the tunnel—my heart fluttered slightly as the four-foot-long fish bared their teeth—and then they were over us. Gone.

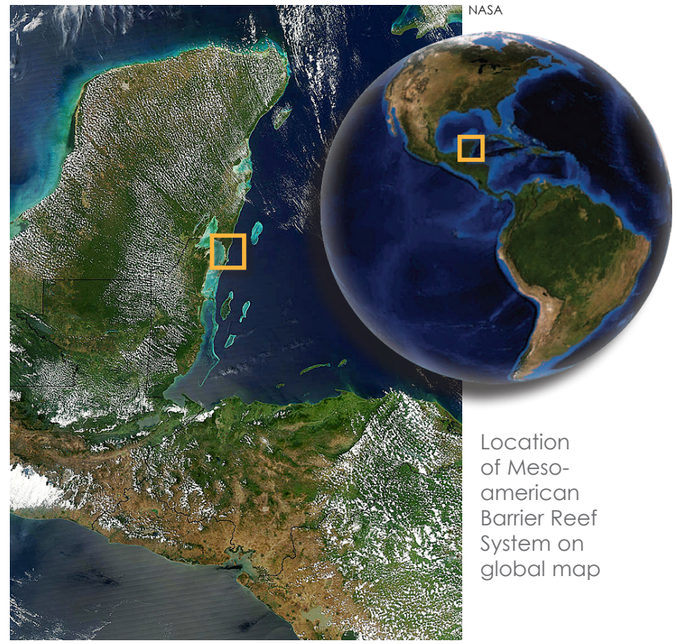
We swam through a final tunnel and popped out onto the reef wall. Strangely, this was the most vibrant section. The outside and the top of the wall contained some of the most intricate gobies—orange and yellow—along with the now obligatory barracuda and yellow snapper. I dropped down to 70 feet and swam along the lines of soft waving whip corals.

Fellow diver Cisca spotted a green moray eel. It was huge and sat at 50 feet. Fully outside its hole, the serpent-like creature looked menacing, as a cleaner shrimp took the muck from its mouth. I kept my distance and let the camera flash. The moray looked at me, and I waited a few seconds before firing again. Then my gas was low, and time was short.

We ascended as a trio, and I twisted the bezel on my Momentum dive watch to set the first stop. The deco chamber was a long drive away, so I did a long double depth safety stop. On the stop, I noticed the hard coral formations, which sat on top of the reef at 15-20 feet.

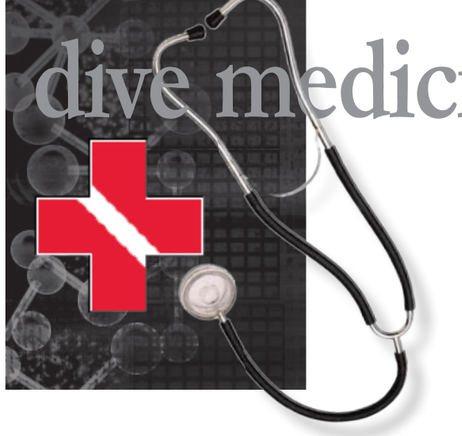
As we surfaced, Moi, the captain, was waiting. He manoeuvred the panga expertly and hauled our equipment over the side. A current was running, but he was not fazed. Soon, we were all in the boat and speeding back to base for coffee and a shower. ■

Farhat Jah is an underwater photographer based in Pemba, Tanzania. He leads specialist bush walking safaris and operates a dive resort on the island of Pemba. See: ***www.swahilidivers.com***



Location of Meso-american Barrier Reef System on global map

Location of Xcalak, Mexico, on satellite map of Yukatan Peninsula



Text Neal W. Pollock[1], PhD and Michael R. Dardeau[2] MS.
1: DIVERS ALERT NETWORK, DURHAM, NC; 2: DAUPHIN ISLAND SEA LAB, DAUPHIN ISLAND, AL

Introduction by Rosemary E Lunn. Images courtesy of Brett Seymour, National Park Services and Vallorie J. Hodges, Oregon Coast Aquarium.

Why is scientific diving safer?

Review of decompression illness in 10 years of scientific diving

BRETT SEYMOUR

Scientific diving appears to be one of the safer forms of diving, a recent study of incidences of decompression illness over ten years has found. This safety seems to be facilitated by a combination of relatively high levels of training and oversight, the predominance of shallow, no-decompression diving and, possibly, low peer or institutional pressure to complete dives under less than optimal circumstances.

A paper has just been published in *Diving and Hyperbaric Medicine* reviewing decompression illness (DCI) in ten years of scientific diving. A team of four members of the American Academy of Underwater Science (AAUS) Board of Directors analyzed a decade of diving records (January 1998–December 2007) submitted by AAUS member organizations.

One of the authors, diving physiologist Dr Neal W Pollock, said that whilst the AAUS (www.aaus.org) was not capturing data from all scientific dives conducted globally, this report was a reasonable snapshot of what is happening in the scientific diving community.

The paper concluded that it does appear that scientific diving is one of the safer forms of diving. This is likely due to a number of factors including:

- Low peer or institutional pressure to complete dives in less than perfect conditions
- The majority of the dives being shallow, no-decompression profiles
- Relatively high levels of training and ongoing supervision

The following is a summary of the paper, *Review of decompression illness in ten years of scientific diving.*

Scientific diving is conducted as part of a scientific research or educational activity under the auspices of a scientific diving program. Scientific dives are conducted worldwide using a wide range of modalities to address a wide range of goals. The incidence rates for decompression illness (DCI) in scientific diving are generally held to be low when compared to estimates for commercial and military diving communities, but the published data are limited. The American Academy of Underwater Sciences (AAUS) represents organizational members, primarily but not exclusively U.S.-based, involved in scientific diving. AAUS members submit annual summaries of dives and any incidents, making AAUS a major source of data on scientific diving in North America. This article is based on a paper evaluating AAUS records that was published in the scientific literature. Additional details, statistics and complete references are available in the source paper.

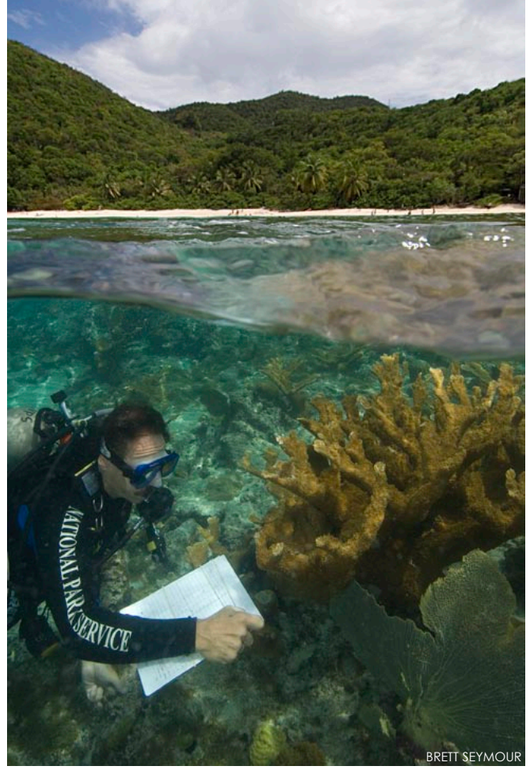
Methods

The study reviewed ten years of diving records reported by AAUS organizational members, from

1998 through 2007. The research was approved by the Divers Alert Network institutional review board. All submitted incident reports were reviewed by a panel and classified by injury. The goal was to investigate the incidence of DCI. Contentious or incompletely documented cases were further investigated through interviews with involved persons. Ambiguous cases were considered to be cases of DCI for the computation of incidence rates. The rates are based on person-dives, that is, as individual exposures even when diving is typically conducted in teams of two or more.

Results

The number of person-dives tallied annually ranged from 68,598 to 126,831. The ten-year study period captured 1,019,159 person-dives and 102 incidents



occurring in conjunction with these exposures. Ultimately, 33 of the incidents were classified as DCI, 25 with clear symptoms and eight with ambiguous symptoms. Recompression therapy was reported to be successful in 28 of the 33 DCI cases; 19 with a single treatment and nine with multiple treatments.[1]

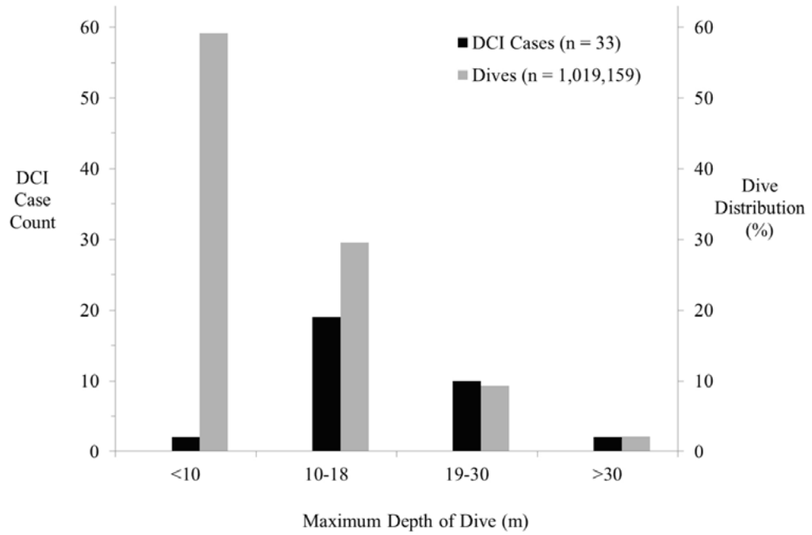


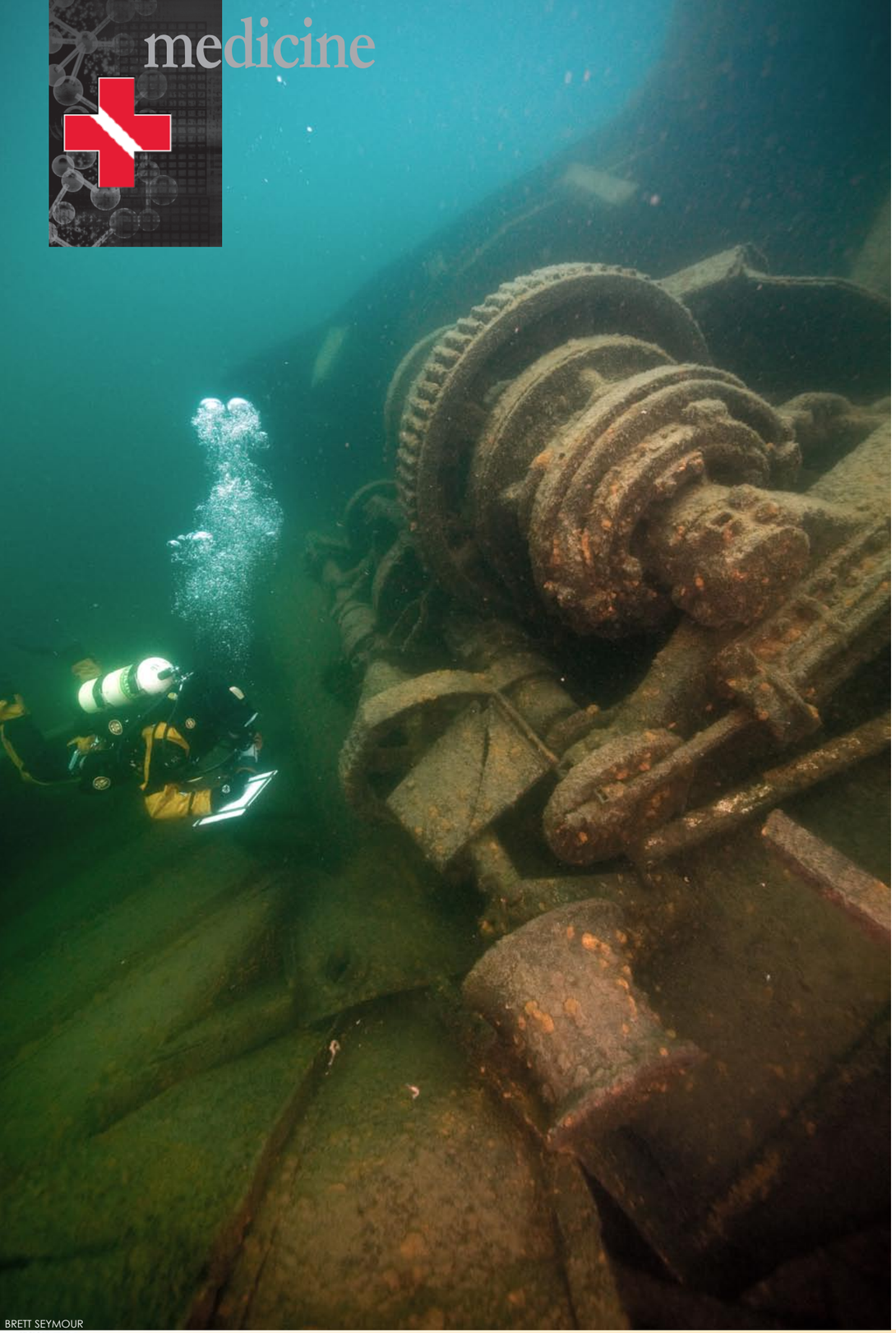
Figure 1

The 33 DCI cases yielded a DCI incidence rate of 0.324 per 10,000 person-dives. The distribution of maximum depth for all reported dives and for those followed by reports of DCI are found in Figure 1.

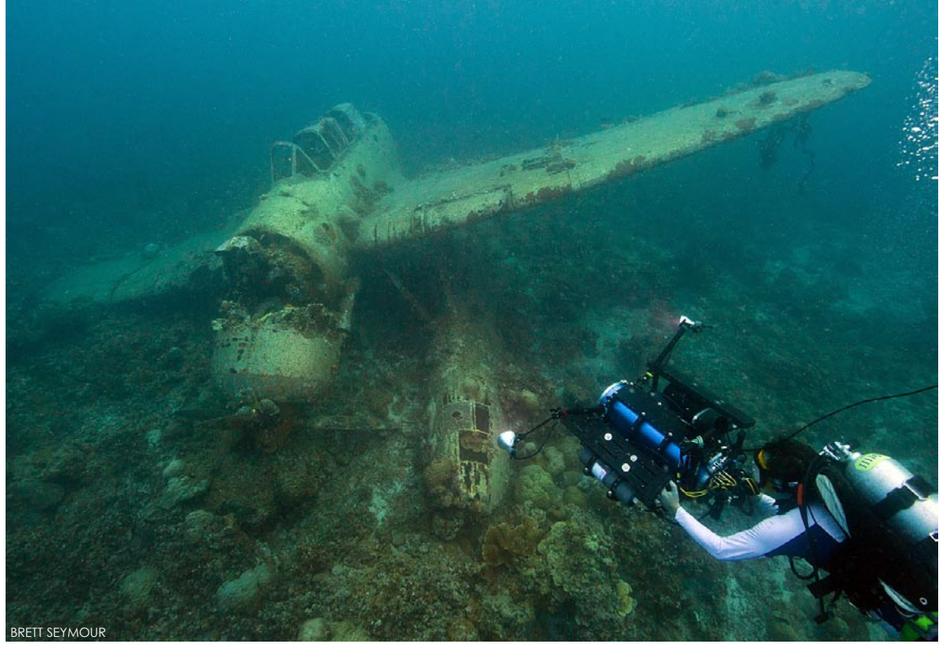
Discussion

DCI is a relatively rare event, requiring long term study to capture a substantial number of cases. DAN's Project Dive Exploration provides such a long term study, yielding estimates of DCI incidence rates in the recreational community between 2.0–4.0/10,000 person-dives. DCS rates among divemasters and instructors have been estimated at 12.7-15.2/10,000 person-dives. Shallow no-decompression dives among navy divers has produced DCS incidence rates of 2.9/10,000 person-dives. The DCS incidence rate in commercial decompression diving has been reported to be as high as 35.3/10,000 person-dives. The estimate ranges for the other diving disciplines were higher than found for the AAUS scientific diving.

Supervision of scientific diving activity includes oversight at community, organizational and team levels. At a community level, AAUS consensual standards



BRETT SEYMOUR



BRETT SEYMOUR

THIS PAGE: Scientific diving is conducted as part of a scientific research or educational activity under the auspices of a scientific diving program

DCI

for scientific diving require periodic medical examination, recurrent training in diving accident management and documentation of diving proficiency. At the organizational level, Diving Control Boards set institutional policy and Diving Safety Officers review and approve dive plans, often providing direct on-site supervision of dives. At the team level, individual divers, trained in dive accident management and advanced diving techniques specific to their scientific diving tasks, ultimately have the responsibility to terminate any dive they consider unsafe. A good safety record is expected for scientific diving given the layers of oversight and, hopefully, a prioritization of safety over operational completion.

There are several limitations to risk estimate studies. Risk estimate efforts typically suffer from a lack of information on the total number of dives conducted, the so-called denominator of the equation. This problem is largely absent in the study of scientific diving described here since both the injuries and all dive counts were regularly reported.

There is also the possibility of under-reporting adverse events. However, since there is no punitive action associated with reporting incidents, accuracy is favored.

Misdiagnosis is another potential issue, but one that was reduced by the review panel using all information available after the fact.

Fair representation of the community is another issue of any study. The AAUS partially addressed this by representing a diverse and substantial number of dives, but it is important to acknowledge that there are many agencies and organizations conducting scientific diving that do not report diving activity to AAUS.

Despite the limitations of this study and many others evaluating diving risk, it does appear that scientific diving represents one of the safer forms of diving. This safety may be facilitated by a combination of relatively high levels of training and oversight, the predominance of shallow, no-decompression diving and, possibly, low peer or institutional pressure to complete dives under less than optimal circumstances.

Additional research to compare the decompression stress of actual exposures, the pressure to conduct dives, reporting practices, and other variables that exist between the diving sub-fields could provide useful insights to understand the real risks. ■

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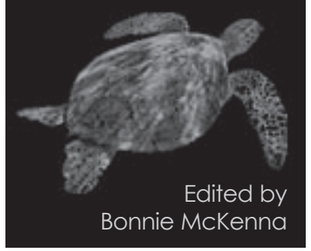
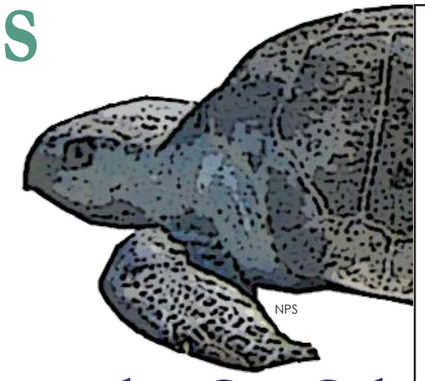
VALLORIE J. HODGES

turtle tales





Hypothermic sea turtles rescued on Cape Cod

Sea turtles, mostly large loggerheads and green sea turtles become stranded from early November through December off the northeastern coast of the United States. Volunteers from the Massachusetts Audubon Sanctuary stake out the coast each year in order to same them.

Despite the fact that sea turtles are cold-blooded, they are susceptible to infections at low body temperatures. The aquarium takes the reptiles and warms them up five degrees a day until their body temperature reaches slightly more than 70 degrees. Almost 90 turtles have been rescued so far this season.

Kemp's ridley sea turtles frequently strand on the shores of Cape Cod in Massachusetts in late autumn in a state of 'cold-stunning' exhibiting low body temperature and related clinical issues. Stranded turtles are transported to the New England Aquarium for treatment and rehabilitation.

A recent study tested the hypothesis that cold-stunned sea turtles might exhibit high corticosterone (stress hormone) or low thyroxine (which is often affected by temperature), or both. The monitoring of both hormones may be useful for assessing recovery and readiness for release. ■


U.S. FISH AND WILDLIFE SERVICE

Sea turtle slaughter in Fiji

Turtles continue to be slaughtered despite protective measures with some villagers unnecessarily seeking approval to eat the turtles during functions.

Fisheries officer Ului Tuinamata said the number of sea turtles is dropping rapidly, and some are on the verge of extinction. Some people are slaughtering turtles for trivial events.

Slaughtering of sea turtles is illegal and is only approved for traditional functions. Applications go to the Minister for Primary Industries for approval. The permits take 14 days.

"People need to realize that our turtle numbers are rapidly dropping and to appreciate the value of these creatures including the vari voce (sea wrasse) and dairo (bechde-mer). They should think of the future and contribute to their sustainability," said Tuinamata.

Tuinamata also said that there was a need to establish an active network of villagers to monitor the sea turtles. ■

Orientation of migrating leatherback turtles relates to ocean currents

During their offshore movements, leatherback sea turtles associate frequently with ocean currents and mesoscale oceanographic features such as eddies, and their movements are often in accordance with the current flow.

To investigate how individual turtles oriented their ground and water related movements in relation to currents encountered on their journeys, oceanographic techniques were used to estimate the direction and intensity of ocean currents along the course of 15 leatherback turtles during their long-distance movements in the Indian and Atlantic Oceans.

For turtles in the North Atlantic, the ground related movements largely derived from the turtles' active swimming, while in the Indian Ocean currents contributed substantially to the observed movements. The same pattern was shown when distinct parts of the routes corresponding to foraging bouts and travelling segments were considered separately.

These findings substantiate previous observations of leatherback movements, by revealing that turtles were not simply drifting passively, but rather swam during most of their journeys. Our analysis did not provide any indication that leatherbacks were able to detect the current drift they were exposed to, further highlighting the navigational challenges they face in their oceanic wanderings. ■

ROGER WOLLSTADT / CREATIVE COMMONS

Cayman Turtle Farm under scrutiny

The Cayman Turtle Farm (CTF) is under intense scrutiny from the World Society for the Protection of Animals (WSPA) a London-based international organization dedicated to the welfare and elimination of animal cruelty. The Sea Turtle Conservancy has also criticized the Cayman Turtle Farm for the same lack of welfare for the sea turtles at the farm.

Since the allegations, an independent review of the CTF by four invited vets and scientists was initiated and took place in December 2012 to find out if standards of care are being met by the center. Their report is due at the end of January 2013.

WSPA has cited the turtle farm for not meeting the welfare needs of animals under their care and for being a threat to the wild turtle population.

The report states that various diseases that were observed are attributed to high stress loads, sub-optimal welfare conditions and poor water hygiene associated with commercial farming. In terms of water quality, the report states that enclosures at the farm are not cleaned properly, leading to contamination of the living environment through uneaten food and body waste.

The turtles are being fed a diet of food pellets shifting the animals from being omnivores in the juvenile stage to becoming herbivores as an adult.

It was also noted that visitors of all ages can handle the turtles as part of the tourism experience triggering stress responses that lead to significant injury to the turtles.

Overcrowding was also noted, with too many turtles occupying the same space and not having enough room to express their natural behavior.

It should also be noted, the Cayman Turtle Farm's business also includes the harvesting of turtle meat.

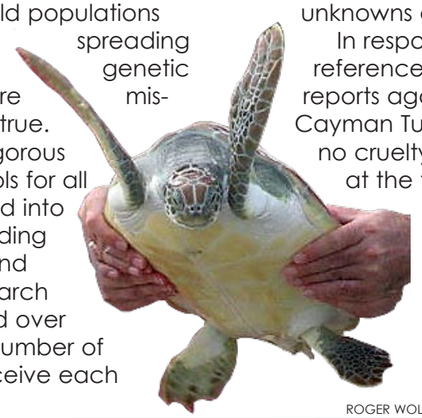
The CTF has responded to the allegations that the turtle releases endanger wild populations by potentially spreading disease and genetic abnormalities are misleading and untrue.

CTF follows rigorous release protocols for all animals released into the wild. According to CTF, "We stand by the 150 research papers released over the years, the number of requests we receive each year for educational internships and research partnerships, the ongoing research partnerships we have in place, our release of more than 31,000 turtles into the wild, and the collated evidence of increased numbers of turtles returning to the Cayman Islands to nest."

This year has been a record year for turtles nesting on Cayman island beaches. It has also been a positive nesting season for the CTF with more than 41,000 eggs being laid at the facility with an extremely high hatch-out rate.

The CTF remains committed to the future release of turtles into the wild to maintain and increase the wild population and to foster ongoing research into the unknowns about sea turtles.

In response to the STC's reference to the WSPCA's reports against the Cayman Turtle Farm, there is no cruelty to the animals at the farm. Animal husbandry is carried out according to all international accepted humane standards. ■



ROGER WOLLSTADT / CREATIVE COMMONS

Sea turtle protection device plans shelved by NOAA

The National Oceanic and Atmospheric Administration are withdrawing plans that would have forced shrimpers in the bays and marshes of the Gulf of Mexico to install "turtle excluder devices" or TEDs.

The information suggests that the conservation benefit does not justify the burden this rule would place on the industry.

The rules had been set to take place this spring (2013). Gulf of Mexico shrimpers said the requirement could push them out of business. The change would have affected 2,600 fishermen, including 2,300 vessels in Louisiana.

In the past two years, more than 1,100 dead sea turtles have been found in Louisiana, Mississippi and Alabama waters. Federal scientists estimate 28,000 sea turtles are caught each year in nets.

The Center for Biological Diversity, a national conservation group criticized the decision saying further delay will cause unnecessary turtle deaths. The agency's failure to protect these species is tragic.

TEDs have been required for larger shrimp vessels that work in federal waters, but not in state waters with shallower areas and smaller turtles.

Instead of devices, fishermen are supposed to lift their nets out of the water every once in a while to help trapped turtles breath and escape. NOAA officials say they have trouble with compliance and difficulties in enforcement.

Fishermen have long resisted moves to force the use of TEDs saying there is little evidence that they are responsible for the spike in turtle deaths and the cost of the devices could destroy the industry. ■

NOAA

Sea turtle escapes net with TED

Genetic turtle tags reveal mother and daughter nesting at the same time

"It's something we never anticipated," said Matthew Godfrey a North Carolina Wildlife Resources Commission biologist in regards to the unexpected findings during genetic tagging of sea turtles the prevalence of mother and daughter nesting at the same time.

The average age of maturity for a loggerhead sea turtle is 30 years. If a mother and daughter are nesting at the same time, the mother must be 60 years old. The higher than expected prevalence of siblings nesting in the same area was also surprising. With only one out of 1,000 sea turtles surviving to adulthood, it seems unlikely that two siblings would survive and nest in the same region. This finding suggests that genetic factors may play a role in deciding which turtles survive.

The national recovery plan for loggerhead turtles, for the region, set the goal of 2,000 nests per season. Currently, the average is around 750 nests. Godfrey said to reach the goal of 2,000 officials are hoping to see a two percent increase in nests found during the next 40 years.

One of the most telling indicators of the species improving is the number of nesting females. However, with so much coast line and few volunteers, it is impossible to find all the nests.

Since 2009, the project has sampled 2,954 nests and identified 828 nesting female loggerheads. It has determined that the average number of nests per season, per female is three nests and the internesting interval is about 15 days. ■

NPS

Baby loggerhead sea turtle

JIM HELLEMN

Jim Hellemn

Return to Bloody Bay Wall

Text by Matthew Meier
Images by Jim Hellemn, Jason Belport, Jeff Caroli, D. Finnin, Courtney Platt

In 1999, underwater photographer Jim Hellemn travelled to Little Cayman Island and photographed a large section of the Bloody Bay Wall in an effort to create a life size reproduction of the coral reef. This "Portrait of a Coral Reef", as dubbed by National Geographic in their October 2001 issue, measured 20 feet high and over 60 feet wide. The final image was comprised of over 280 individual photographs, which were manually stitched together over the course of nearly six months to construct this massive underwater landscape.

The Bloody Bay Wall is located northwest of Little Cayman Island and starts just 20 feet below the surface. The one mile long wall has dozens of dive sites and a sheer vertical face dropping down thousands of feet. Colorful marine life, sponges, corals and sea fans create a visual spectacle that is difficult to portray in a single traditional photograph.

Hellemn chose this site with the intent to better depict the magnitude and beauty he saw while diving there and also for technical considerations, like having a flat plane for controlling depth of field, distortion and perspective, when stitching the images together. The section of reef Hellemn photographed was between approximately 70 and 90 feet in depth and roughly 68 feet wide.

In the summer of 2010, Hellemn returned to Little Cayman with the goal of photographing the same section of the Bloody Bay Wall and constructing another life size image, from which researchers could study the changes to the reef. In addition, as part of a project with the National Science Foundation, the same section of wall was photographed yet again, with special lighting, to record biofluorescence emitted from the coral reef.

Dr Carrie Manfrino and other researchers at Kean University in the U.S. state of New Jersey are studying the image produced from this Return project, and they will present a quantitative analysis of the two images as part of their ten-year study on coral health in Little Cayman.

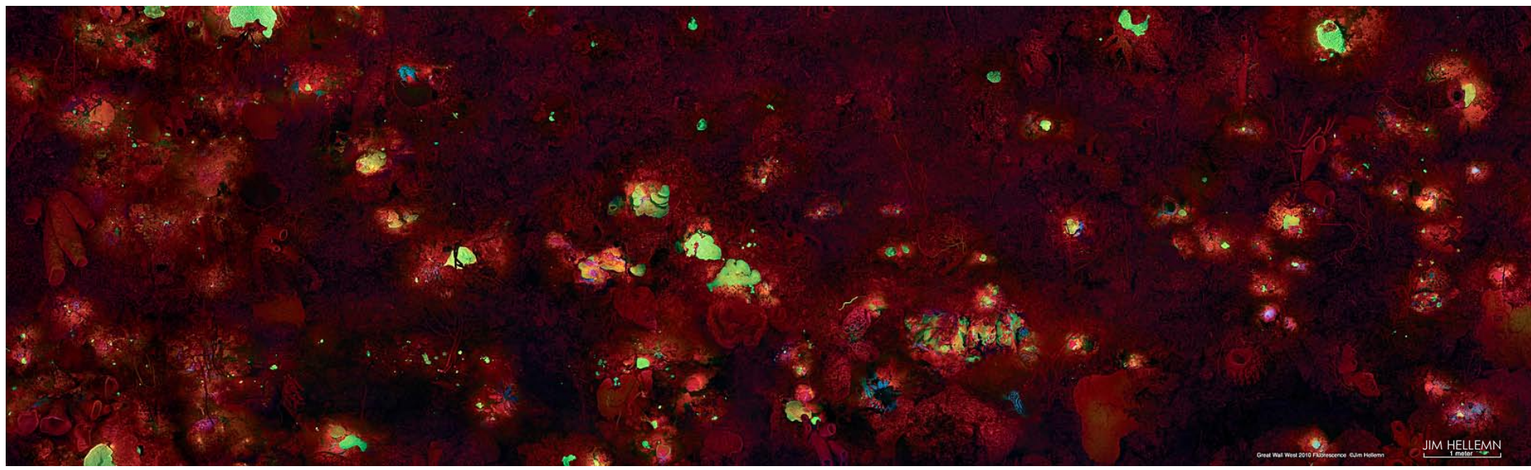
One obvious, major change that occurred over the ten-year span was the introduction of lionfish into Caribbean waters. This Indo-Pacific invasive species has no natural predators in these waters, and their numbers are increasing problematically.

Technical challenges

The technical challenges to create such an image underwater are immense and required months of preplanning, testing and innovation. Lens choice, depth of field and lighting all had to be considered. Proper resolu-

COURTNEY PLATT

Jim Hellemn underwater with his camera rig; Fluorescing corals (top left)



Hellemn underwater with his camera rig (above); 1999 original Bloody Bay Wall image (top right); 2010 Return to Bloody Bay Wall image (right); 2010 Bloody Bay Wall image with green fluorescent corals and red fluorescent algae (lower right)

tion to achieve a life size image had to be maintained. Distortion and perspective also had to be accounted for and corrected.

Stitching software did not exist in 1999, so all of the digital compositing had to be done by hand. Not to mention, that the first image was created using film, so each dive was limited to 36 exposures, which then had to be drum scanned to generate the high resolution digital files needed.

Today, on dry land, it is possible to set up a tripod and shoot as many photos as you wish, left to right, up and down, before importing those photos into stitching software that will automatically generate an enormous panoramic image. Underwater, the physical properties of light traveling through water make this impossible.

Even if it were feasible to simultaneously light up a 20 by 60 foot section of reef and photograph it from one central point, the vibrant colors would fade to greens and blues as you moved away from the lens. This is due to the fact that red, orange and yellow wavelengths of light are absorbed in water and are significantly degraded even after just ten feet. Focus is also diminished with distance underwater as light waves are disrupted by the fine particles floating in the water column. It is therefore necessary to get close to your subject and shoot with a wide-angle lens for best color rendition and sharp focus.

These factors, along with other technical considerations discovered in the testing process, limited each individual photograph to an area of coverage only four to five feet across. An elaborate grid of images was then required to properly cover the entire area. Even with today's technology, the perspective problems created from shooting each object on the reef from so many different angles necessitated the final image be manually stitched together.

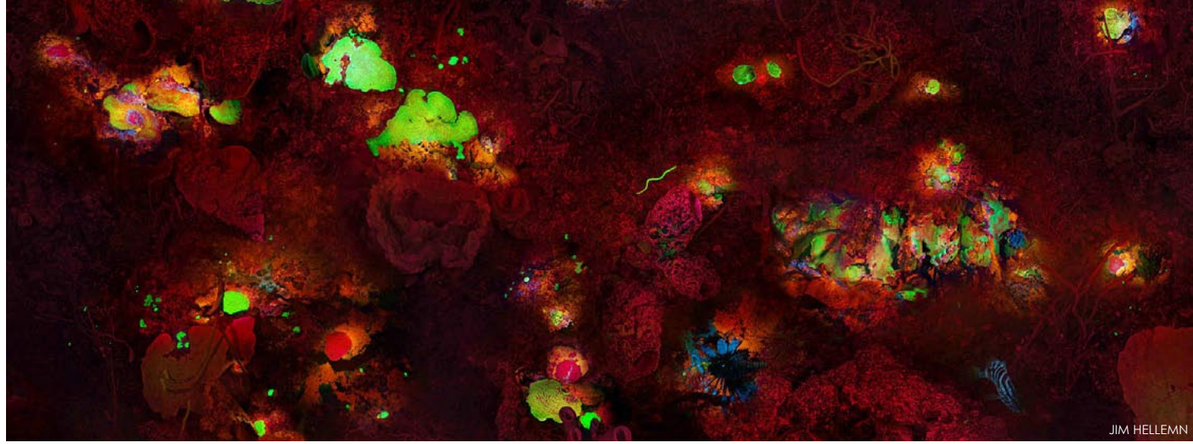
Images

The individual photos from the Return trip were captured over three weeks of shooting in July and August of 2010. The final image generated measured 82,875 by 25,350 pixels and was 11.7 GB in size. Nearly 400 hours of labor were required to complete the digital compositing process needed to create this enormous image.

Hellemn and his team developed an elaborate camera rig for the Return project in order to meet their needs for even lighting, a fixed camera to subject distance and ease of use. The platform measured approximately four feet by five feet by three feet high, weighed 110 pounds and yet was weightless in water. The frame was fabricated out of hollow aluminum square tubing and filled with hydrostatic foam. Additional floats were

JEFF CORALI

Jim Hellemn with his gear


JIM HELLEMN

The limited edition print of the *Great Wall West Coral Fluorescence*

strategically used around the platform to achieve neutral buoyancy and balance. The camera to subject distance was maintained with a fixed bar out in front of the rig and also provided a gray scale and color reference, used in post processing, at the bottom of each frame.

A Canon 5D Mk II digital camera with a 17-40 mm f/4.0 lens was used in a Nexus underwater housing. Modified soft boxes were mounted on either side of the camera for even illumination and each contained three Ikelite 400 strobes to generate enough light for the desired depth of field. Eight SeaBotix thrusters, controlled by a microprocessor built into a dive scooter, stabilized the platform and allowed the operator to hold position in the water with a touch of a button.

Bioflourescence

The biofluorescence component of the Return trip was part of continued research started in 2004 by David Gruber, Ph.D, from Baruch College in New York City. Gruber had used Hellemn's original Bloody Bay Wall image as a baseline for his study of biofluorescent proteins in corals. In addition, The National Science Foundation provided grant funding as part of a project to create an educational exhibit to communicate science to the public.

Special filters were used over the strobes to narrow the full spectrum white light down to a very narrow wavelength of pure blue light. This wavelength of light caused specific corals to fluoresce green, while various algae on the reef emitted red light.

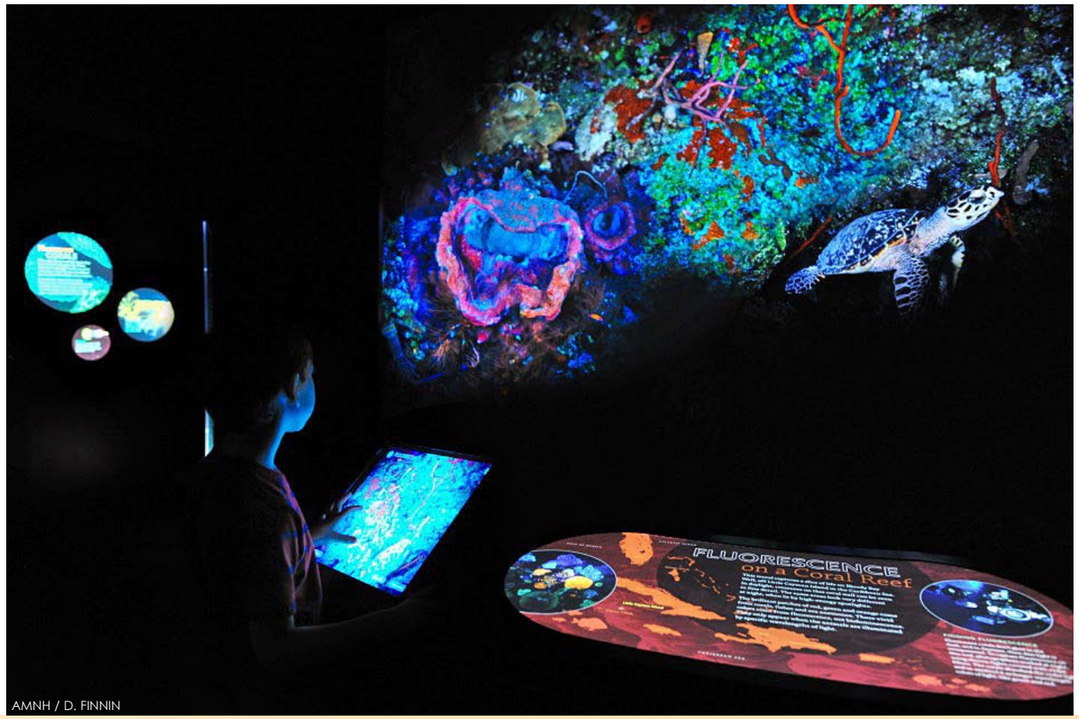
Biofluorescence is a phenomenon where light is emitted by an organism in response to an external trigger, such as a particular wavelength of light. This differs from bioluminescence, which is an organism's own ability to produce light by way of a chemical reaction. Examples of bioluminescence include the well known firefly, while others such as glowworms, anglerfish, flashlight fish and dinoflagellates are perhaps less familiar. Very few organisms in this world have both bioluminescent and biofluorescent properties, and it seems corals are almost exclusively biofluorescent.

The images produced by Hellemn and Gruber are now the centerpiece of the *Creatures of Light* exhibit on display at the American Museum of Natural History in New York City. A 10- by 16-foot, life size section of the Bloody Bay Wall was created to allow visitors to switch between the white light and fluorescent views of the reef, using iPad kiosks to navigate the image.

The exhibit features examples of both biofluorescence and bioluminescence existing in the natural world. Immersed in darkness and surrounded by soothing music, visitors leave the outside world behind as they explore elaborate displays featuring organisms from above and below the surface. The exhibit opened in March 2012 and has been sold out every day since. *Creatures of Light* will be on display until January 2013 and then it is scheduled to travel to other museums over the next ten years.

Hellemn continues to produce life size underwater images around the globe. His project called, *Portraits of Biodiversity*, is an effort to photograph all of the world's top ten marine biodiversity hot spots, as identified in a 2002 study released by the Center for Applied Biodiversity Science (CABS) at Conservation International. As part of this project, Hellemn created additional images in the Caribbean, as well as the Philippines and Malaysia in 2008. He is also currently creating a giant kelp forest mosaic with photographs taken in the waters off Southern California. ■

To learn about Hellemn's ongoing projects and view more of his work, please visit his website at: ***Portraitofacoralreef.com****. See the American Museum of Natural History at:* ***Amnh.org***



AMNH / D. FINNIN

AMNH *Creatures of Light* exhibit

FINE ART PRINT

In order to help create awareness of coral reef conservation, a limited edition print, *Great Wall West Coral Fluorescence,* by Jim Hellemn is being offered. The Central Caribbean Marine Institute is given part of the revenue from all sales of the print. The donations aid this non-profit organization in their efforts to help sustain and understand the marine ecosystems surrounding the Cayman Islands.

The print comes in four different sizes—18x48in, 26x70in, 33x90in and a dramatic, large format of 40x110in. In every size, the visual resolution and the vivid color of the print is stunning and reveals even the smallest details of the marine life. Mounted to a thin, rigid aluminum substrate, this elegant archival giclée print is protected with a super-gloss UV laminate and is backed with a one-inch aluminum frame, which is hidden from the viewer, so that the image seems to float off the wall. To order, visit: **Portraitofacoralreef.com/GWWCoralFluorescence.shtml** ■

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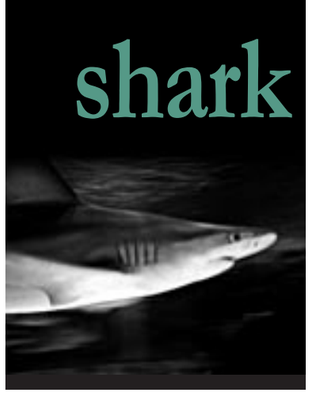


When Sharks Really Attack

Text and images
by Ila France Porcher

Anyone who has faced an gitated shark has felt the power of communication through bodylanguage. The response is so immediate and so physical, that emotion, expressing through body language, is revealed as an important medium of pre-vocal communication among animals.

I had some curious experiences with blackfin reef sharks (*Carcharhinus melanopterus*) while observing them in Tahiti's lagoons, where they were easy to watch in two meters of water, and sneaked for years through the lagoons and depths off the island to learn what they do when no one is looking. Finally, I conducted a seven-year ethological study. Of all of the startling things that happened, one of the strangest began to unfold after three years had passed.

Shark encounters

The resident sharks had always met my kayak, and when I slid underwater, three of the females—Martha, Madonna and Bratworst—would glide up to my face one after another, turning away just before touching me.

Then one evening, they all did it! Underwater, I found the entire community of three dozen sharks converging on me at high speed and was instantly in a mass of flying torpedoes that whipped around my body. To distract them, I finned hard to push some fish scraps out of the kayak and felt my instep slam one of them with all of my force.

Expecting her to turn and slash, I peered underwater to scrutinize the situation. Martha was curving down to the food, showing no reaction to having been kicked. She had glided between my legs, as I finned upward. Carrellina shot up to my face and away again, and I pushed in the rest of their scraps.

Yet, in spite of the initial excitement, the sharks only picked and circled through the area, departing as night fell. No others came to the food left lying on the sand.

Carrellina was an exceptionally bold shark who visited annually from December to April—she had just rejoined us. It was her influence, along with the heightening excitement of the breeding season, that seemed to have triggered the unprecedented rush by the sharks.

A week later, they shot up to me again in high excitement when I appeared underwater. They fed, then began darting up to my face, and going to the boat to sniff it. Holes in the well of the hollow craft where their food was kept were plugged on the way out, but when the scraps went overboard the plugs loosened, so if I held any back, they could smell it.

As night fell, the sharks patrolled watchfully instead of leaving and often rose behind the kayak to sniff it.

The seed of change had been planted when one of them had fallen ill. I had waited each evening in a whirl of sharks with the sick one's medication hidden in a chunk of food. Though the others had had their weekly feeding session, they began to behave, with increasing conviction, as if they thought I had food I was not giving them—as if I was being tricky.

Finding patterns

I had wanted to find out what they were like, not only as animals, but as individuals. Yet, until I had begun the weekly feeding sessions, I had remained the suspicious alien in their world. This gesture of benevolence had gained their trust and allowed me to see what I had been unable to observe before—what they were doing when no one was watching. Because around me they began to behave as if no one was watching!

Yet, never had a pattern been established in which they had a regular meal at my weekly sessions. They often missed sessions or came too late to eat, and sometimes the scraps, which contained little real nourishment, were not even eaten. By the time of this story, I had identified most of the sharks who used the lagoon, and could recognize 300 individuals on sight.

Weeks passed while I watched the sharks' evolving behaviour with

Shark Attack

puzzlement. Infrequent visitors joined the resident sharks in swarming up to me, and then made repeated charges by themselves. Fast charges by the shy older female visitors were unprecedented. Carrellina was joined in her bad behaviour by several females who, like her, were in their first year of reproduction—I began thinking of them as "the juvenile delinquents".

Then one night, the sharks' relentless circling reached new heights of tension. They repeatedly charged while Carrellina orbited my head, and her buddy Chevron passed me again and again. I dared not move a muscle for fear of triggering a mass charge, and faced each shark, scarcely breathing, as she swam up to my face. Finally, when they circled away, I flew to the kayak, leaped in and tossed in the tuna heads I had brought for the nurse sharks. The lagoon boiled, as the sharks pounced in darkened waters that obscured the wild melee beneath.

Just three days later, I was unexpectedly given some fish scraps and returned, accompanied by a young seabird I had rescued. Carrellina and her gang undulated around the boat, as I prepared. The bird alighted on the shark-food, stared down at the sharks and flew. She glided low over the surface, and the sea actually quivered, as the fish startled. So I failed to see how it happened, that just at that moment, the sharks attacked the boat!

The heavy weight of the loaded kayak with me on it was bashed with shocking force first one way and then the other, as they slammed it from multiple directions. Somehow, they had acted in synchrony. The surface was solid with sharks emerging at high speed, twisting and bashing the kayak, while more replaced those shooting away. Then, they leaped out of the water to snatch at the food behind me. All around me in the air, their jaws were loudly snapping shut, and one got a good bite of a scrap that overhung the water.

The heavy blows came mostly from beneath, and it was hard to turn in the narrow craft to see behind me, where the sharks surged out to snatch at the scraps. Carrellina passed repeatedly at high speed. She had been the instigator, and among those I was able to identify were the juvenile delinquents.

Instead of sliding in, I began throwing the food to them, hoping they would calm down and feed. But even after I finished, Chevron shot up to slam the kayak over and over again.

When she went into search mode, I slid underwater. Golden sunlight flickered over the coral, and the graceful sharks soaring through. Each snatched up a scrap and accelerated to shake out a bite, while the falling piece was caught up by one in pursuit. Several visitors were among them, adding to the excitement, and none paid attention to me, as I drifted, writing down their names.

Shark rage

Their attack confirmed that I had been right about their subjective state when they had circled me so tensely three days before. The way Chevron had repeatedly torpedoed the kayak after I had fed them suggested that she was finally venting intense feelings of shark-anger or rage. The desire for food was not the motivation for slamming the kayak; it was their anger toward me.

At home I found that some of the kayak's straps had been cut, punctured and sliced by their sharp little teeth.

I went with dread to the next shark session. There was a slight bump, as I prepared, then silence. But before I could feed them, Carrellina slammed the kayak hard, and the rest joined in.

They began to leap out of the sea while I twisted in the narrow craft to grasp the slippery scraps from behind me, and throw them. Watching and listening to their jaws snapping shut with loud clapping sounds, it was obvious that in a kayak, it was not easy to keep all of one's body out of the edible zones. I had thrown in quite a bit of food when Martha suddenly broke through the surface beside my right elbow and snapped her jaws closed on a trailing scrap. The power of the movement was shocking. She had come so close to catching my arm in her teeth.

For the very first time, I didn't want to get into the water, roiling with blood and sharks. But eventually I slid in. The same sharks I had known for so long were whirling, feeding in the site, and I began to wonder whether their actions were due more to impatience to get the food by themselves, than rage this time.

Indeed, I theorized, they were like excited children helping themselves to birthday cake without waiting to be served. Once their spontaneous attack had begun on the boat, they had found that their food was right there, so on the next leap, they targeted it. Could this latest incident be the confirmation of a new foraging method? The species normally does not breach, look above the surface, nor feed above the surface, so their behaviour was all the more remarkable, and actually reminiscent of a cultural development!

New foraging methods

To be sure, I verified that the behaviour of the sharks attending the commercial shark feeding dives had not changed—only among my sharks had the change in behaviour occurred.

By the next session I had decided that they would no longer be rewarded for their bad behaviour with food raining down. Instead, I would photograph their new foraging behaviour and time it. When they stopped their bashing and leaping, I would feed them.

But no sharks met me, and underwater I found a peaceful gathering of mostly juveniles and males. As night fell, I was floating a treat to Martha when Madonna zoomed around a coral, and

they collided, hard, head-on, within arm's length. Madonna turned to me, I put a gentle hand on her head, and she soared over my shoulder. It was a good example of how absolutely unpredictable things could happen.

Each session was different, but Carrellina and the juvenile delinquents were usually in attendance, leading ragged lines of sharks up to me and orbiting my head. Formerly shy sharks began to charge me at unacceptable velocities. There seemed to be no escaping the conclusion that the next step in the long, long string of events leading up to the present moment, was that it would be me, instead of the kayak, that was attacked. Carrellina or Chevron would make the first move and be instantly joined by everyone else.

Emotional nature

The news reports "shark attacks" whenever an incident occurs, yet these attacks involve biting, usually in an act of sensing, or eating behaviour in sharks. Eating is not the same as attacking, which implies aggression. Never had I heard of a group of sharks knocking someone senseless in an unanimous, angry attack.

I had reported cognitive behaviour by sharks and learned that such an ancient line of animals was considered incapable of cognition, so knew that no one would believe that sharks could feel as well as think. Yet, I was seeing evidence that sharks did feel emotions—they shared them and they acted on them. Their emotions had been dictating much of what had happened at our sessions for several weeks.

Further, though my species is far removed in evolutionary time from theirs, I could understand the sharks' body language. The intimacy that had developed during hundreds of hours spent alone with them, involved feelings. I was still two years from the moment when Carrellina slammed the boat, and the juvenile delinquents undulated against it and raised their heads from the water to be caressed, rather than joining her. But the sharks' emotional nature had shown itself.

Sharks observe us

Weeks passed, and the mating season drew to a close. The times that they had attacked the boat began to seem incidental. I clung to the hope that things would soon be back to normal, but at each session there was some reason not to return, at that moment, to my earlier routine of pushing the food into the water with the sharks all around me.

Then one evening, Carrellina and her gang were coiling around the kayak as I threw in the food and suddenly came straight up through the water toward me and began slamming the boat with the same power as before and leaping out, though their food was in the water!

Underwater, Carrellina flew to meet me. She did not leave me alone throughout the session, and her repeated charges made it difficult to watch or follow any other shark. When she came to the end of her repertoire, she just circled around my head. She came at me from different directions, and since she was smaller than the large females I had always been closest to, her speed was alarming. I tried holding the kayak between us and banging on it, but that had no effect on her, nor did it make much sense now that the sharks had begun attacking it. Splashing my hand on the surface in front of her nose had no effect. I was afraid to push her away physically because she was so swift, and she dodged faster than the eye could follow.

April ended and Martha left to mate. I brought a treat for her to a feeding session when she was due back, and when the excitement faded she came to me.

So I decided to get her treat, as she circled away. But at that moment, she came shooting back. So, I waited. A few minutes later, however, the same thing happened. When she accelerated back four times in 15 minutes when I decided to get her treat, I was mystified. So the next time I decided to go, I watched what happened closely. First, I looked around and moved my hands. Then I glanced above the surface to see where the kayak was—it shifted constantly in the wind and current, so I checked for the direction in which to swim. And these subtle signals brought Martha back. She was observing me!

I got the plastic bag and opened it. The water pressed the plastic tightly against the food, so I had to hold it open while blood and fluids poured out, and shake it to waft the food out for the shark. Martha came in without accelerating, and coiled through the water in front of me, taking the pieces one after another and paying no attention to the plastic nor the movements of my hands.

them when they were finned, entitled *My Sunset Rendezvous : Crisis in Tahiti.*

Martha had mated, and the reproductive season was over. The waters had cooled, and the sharks' behaviour would settle down, I was sure. Yet, one evening I was cruising around with my escort of fish, and found that a tuna head had been swept under a coral. So, I moved it 30 centimetres back out.

A big blackfin who had left long before soared in, grabbed it, and shook it. Instantaneously, several tons of nurse sharks converged on this tiny scrap, while my forty blackfins shot into the site and dove onto the fish head. Then they orbited at top speed as the nurse sharks rose vertically, tails thrashing the surface

Shark intelligence

Many such incidents demonstrated the sharks' ability to concentrate on something if they cognited (thought) that it could benefit them. Their intelligence is the theme of the book I wrote about in their urgent efforts to scrape out a crumb. I drifted backward, aghast at the turmoil caused by just that one movement of the scrap from under the coral. It had been lying there ignored, all during the session!

shark tales

The shadowy green waters were shot through with speeding blackfins, orbiting the nurse sharks like stars around a black hole. There were so many present that there was not enough space; multitudes were zooming by as if I weren't there. I retreated and watched in awe, as the shadows of night obscured the scene.

Escalation

Not long after that, I arrived with difficulty in high winds for the Saturday feeding session, and threw the food into wild waters that rushed over the kayak. Then, I slid in.

As I fell through the water, several sharks appeared at my side with more coming beyond, obviously assuming that I was food descending. But when they saw it was me, they adjusted their trajectory.

I found myself in a fairly deep region where two three-meter nurse sharks undulated in midwater, and the soaring blackfins appeared and vanished in the cloudy light. A large nurse shark was vertical, presenting a weird centrepiece as it flung its enormous tail around and flailed its fins. In most places, the water was not deep enough for such a huge fish to balance vertically. Everyone was unnaturally excited.

I drifted, watching, beginning to manoeuvre for a photograph as several sharks tore a large scrap apart.

Suddenly, Bratworst, Madonna, and Martha left the feeding area and swept up toward me. The gesture was so swift, so full of conviction, that I instinctively lowered the camera. They came in triangular formation, as they had in our first moment of meeting more than three years before. Bratworst was in front. Normally, I faced the shark until she turned away, but Bratworst didn't turn. And the approach was far too fast. As she flew under my hands, I hit her on the back of her head. It was amazingly hard!

Like lightning she turned at right angles and shot away, and Madonna was soaring in. I raised my knees between her and my chest, and finned water into her nose, but she just dodged slightly and kept coming! I finned harder, and finally she turned away. Martha was beside her, and I pushed her away—she continued in the new direction in which I had pointed her. Back in triangle formation, tails waving, the three disappeared into the whirling sharks.

I swam away, realizing that I couldn't leave in the boat because of the wind! But when I came sneaking back, Martha zoomed up to me and Bratworst circled. Many residents joined her. The large nurse sharks were still vertical at the vortex of a tornado of blackfins.

Trembling, as one shark after another flew up to my face or tightly circled, I wrote down all of their names. Most such excited sessions concerned many visitors, but this time, I had only 38 names, the names of all of my sharks.

They could not have been upset because there was not enough food—there had been plenty; my three favourites would have caught it as it fell through the surface. So why had those sharks, the most familiar with me, spontaneously left the feeding in triangular formation to assault me?

While I was sure that they had not intended to bite me, it did appear that they would have rammed me if I had not defended myself. Bratworst, a large, high-powered missile driving straight into my solar plexus would have been crippling. With Madonna and Martha right behind, their action could have become a general attack like the one made on my kayak, given the mood of the sharks and the speed at which they can suddenly move.

The sharks' behaviour was not returning to normal. The breeding season had ended more than a month before, and the water was markedly colder, but at this session, more sharks than ever had been charging and harassing me at a level of excitement that was higher than I had ever seen it. The problem had not been restricted to the incidental gesture of Martha, Madonna and Bratworst.

Like a tangle of string too big to trace all the strands, I could not unravel the different influences, the many events involving different individuals that had precipitated the situation. Nor could I discern why my favourite three sharks had acted as they had. But because of their gesture, I changed the location of my feeding sessions, and restricted future visits to unexpected ones without food.

Communication without harm

Yet in spite of my long-term intimacy with the sharks, never had I been bitten. *C. melanopterus* was the only species I had intimately known that had never hurt me, either through accident or a fit of pique, no matter what had happened; even my dog sometimes took my hand in her teeth along with a cookie. The sharks did not bite each other and seemed to have an inhibition against biting companion animals, while mammalian behaviour is so often the opposite.

While studying the sharks alone, I was always trying to understand their behaviour. There was no one to ask, only the sharks to look to for understanding. In the end, what was remarkable was that understanding was possible across the species barrier. That I could sense their subjective states and predict that their behaviour was evolving in a particular direction indicated that they had communicated across the species barrier. Emotion, via its expression as body language, appears to be an important form of communication in multi-species communities. ■

A native of British Columbia, Canada, Ila France Porcher spent much of her life as a wildlife artist. While in Polynesia, Porcher formed connections with sharks and witnessed the atrocities happening to them. These experiences inspired her to write the book, My Sunset Rendezvous.

French Polynesia bans shark fishing

In a decision hailed by environmental groups, the government of French Polynesia has banned shark fishing in its waters, creating the world's largest shark sanctuary. Especially significant is the inclusion of the mako, the last shark not protected in its waters, on the list of fish banned from capture or trade in its vast territorial zone in the South Pacific.

The proposal was announced at the annual meeting of the Western and Central Pacific Fisheries Commission meeting in Manila, where nations also agreed to take steps to protect whale sharks from tuna nets.

"At more than 4.7m km² of ocean, this designation doubles the size of the area already protected by all six existing shark sanctuaries," said Josh Reichert, head of the Pew Environment Group. But, he said, "Sharks are threatened throughout much of the world's oceans, and there is a great need to protect them before they slip below levels from which they may never recover."

According to the conservation group of the World Wildlife Fund (WWF), about 73 million sharks are killed every year. The majority is killed only for their fins, a practice that has threatened a third of all shark species with extinction.

The United States banned finning in its waters in 2000, with several states banning the trade in shark fins. The European Union (EU) has had a finning ban since 2003, but has endorsed even tighter shark fishing rules obliging fishermen to bring sharks to port intact. The total ban on endangered deepwater shark fishing would be maintained for an additional two years applying to both E.U. waters and E.U. boats in international waters. ■

SOURCE: PEWENVIRONMENT.ORG

Healthy natural river systems help keep bull sharks away from man-made canals

In Queensland, Australia, a tracking project of the Nerang River and the Gold Coast canal system it feeds has shown that sharks have a preference for natural waterways. Twenty-four newborn and juvenile sharks were tracked over three years by researchers from Griffith University who discovered that the sharks were more inclined to remain in the river, with only some making excursions into adjoining canals.

The larger sharks tracked in the study ranged a bit further and occasionally ventured into canals closer to the river mouth.

The study suggests that maintaining the Nerang River system will ensure the shark population isn't forced into the canals in greater numbers.

"These findings—that juvenile bull sharks have a significant preference for less modified river habitats over the residential canals—points to a strong imperative for conserving those natural habitats," said Joe Lee, deputy director, Australian Rivers Institute. ■


WIKIMEDIA COMMONS

World's largest shark sanctuary created

Cook Islands declared a 1.9 million sq km sanctuary, contiguous with one established last week by neighbouring French Polynesia. Shark fishing and possession or sale of shark products is now banned in an area totalling 6.7 million sq km—almost the size of Australia. The sanctuary is the result of a partnership between the Pew Environment Group and the Pacific Islands Conservation Initiative and the support of many local community and political leaders.

"This is hopeful news for the world's sharks and our efforts to protect them. We are thrilled to see the Cook Islands become part of this global movement during a time when so many shark populations are threatened," said Jill Hepp, director of shark conservation for the Pew Environment Group.

Hundreds of signatures were collected on a local petition, and students submitted letters and drawings bearing the message "Akono Te Mango" (Protect Our Sharks).

The Cook Islands joins Palau, the Maldives, Tokelau, Honduras, the Bahamas, the Marshall Islands and now French Polynesia in establishing shark sanctuaries. They cover a combined area of more than 11.4 million square kilometers (4.4 million square miles) of ocean. ■

SOURCE: PEWENVIRONMENT.ORG


WOLFGANG LEANDER

SCOTT BENNETT

Tourism has no effect on Ningaloo Reef whale sharks, study says

A five-year study has concluded that tourism is not affecting Ningaloo Reef whale sharks. Since 1993, tourist numbers participating in whale shark activities have increased from 1,000 to 17,000, generating about US$6 million per season.

The first multi-year study on the effects of ecotourism on whale shark populations determined that sharks which frequently encounter tourists are just as likely to return to the reef as sharks that have little interaction with humans.

"Our research shows that the code of conduct used by the Department of Environment and Conservation to protect whale sharks is very effective with no detectable impacts of tourists on their aggregation behaviour at Ningaloo across years," said Rob Sanzogni, the report's lead author.

Conservation organization WWF's marine spokesman Paul Gamblin said the report was encouraging and showed the industry was receiving appropriate attention. However, he stressed more had to be done to assist Coral Triangle neighbours such as Indonesia and the Philippines.

"Australia has played an important role but needs to up the ante to protect the whale sharks when they leave our waters," he said. "We need to help support local community tourism projects up there because the whale sharks enter more dangerous waters when they leave Australia," he added.

Despite the positive findings, Gamblin was still concerned about the impact of resources projects in waters near Ningaloo Reef. "It increases our concern about the increasing development of the oil and gas industry which is getting ever closer to Ningaloo, including areas where the whale sharks migrate through," he said.

Researchers hope the report will provide a blueprint for similar work on the impact of ecotourism on other marine megafauna such as manta rays and whales. ■

Edited by
Michael Menduno

10 Tips On Going Pro

Technical diving requires mastery of basic skills e.g. frog kicks are an essential skill in cave diving

Text and photos courtesy of Pascal Bernabé

Becoming a good technical diver means starting with the solid basics. There is no magic! But let's take a look at several things in general...

1. Excellent trim. Your position in the water and the overall buoyancy are very important and even essential elements that influence your fatigue and your gas consumption. Known as "trim," this concept embraces the horizontal position of the diver's body together with perfect buoyancy. You can obtain a correct trim through judicious combination of your equipment configuration and training.

As soon as you acquire a horizontal posture your become much more streamlined, you have less drag, you are more efficient and thus you consume less gas. Your risk of getting short of breath also remarkably diminishes.

The trim is an absolute necessity for diving in overhead environments such as caves or wrecks, where in order to conserve a good visibility it becomes vital not to disturb the silt on the bottom by a clumsy fin kick or a seahorse posture. Having a sound trim also represents a big step towards acceptable or even impeccable frog kick propulsion, modified frog kick that is useful in constrained areas as well as the legendary backward kick that allows you to move backwards and is "a must" for an experienced diver as well as a camera man and a photographer. It is also an important component of team diving and communication.

In order to master all these techniques, do not hesitate to start with Intro to Tech training right from the beginning.

2. Good physical condition. Your body is your first diving tool, and you can influence it by regular exercise (for example, up to 25 percent improvement of endurance). It is important to choose

the activities that you like and that you will practice willingly and with pleasure. Basically, it has to be an endurance activity: walking, cycling, swimming with or without fins, with exercise duration from 30 to 120 minutes. The minimum seems to lie between one hour and 30 minutes and two hours and 30 minutes a week in two to five sessions depending on the activity and its intensity, and up to three or five hours for the most motivated divers. A small portion of resistance and two weekly sessions of gym, isomet-

A better physical condition will also positively affect the quality of the decompression, overall fatigue during and after the dive, consumption and the risk of getting short of the breath.

rics or stretching can help you to enrich this aerobics foundation.

Apart from improving your shape, this combination will render your dives more enjoyable and will increase your security margin in case of any problems. A better physical condition will also positively affect the quality of the decompression, overall fatigue during and after the dive, consumption and the risk of getting short of the breath.

Include a little bit of apnea in your exercises. It's not a question of holding your breath while underwater, but more of incorporating apnea in your training.

Drills on land are as important as drills underwater

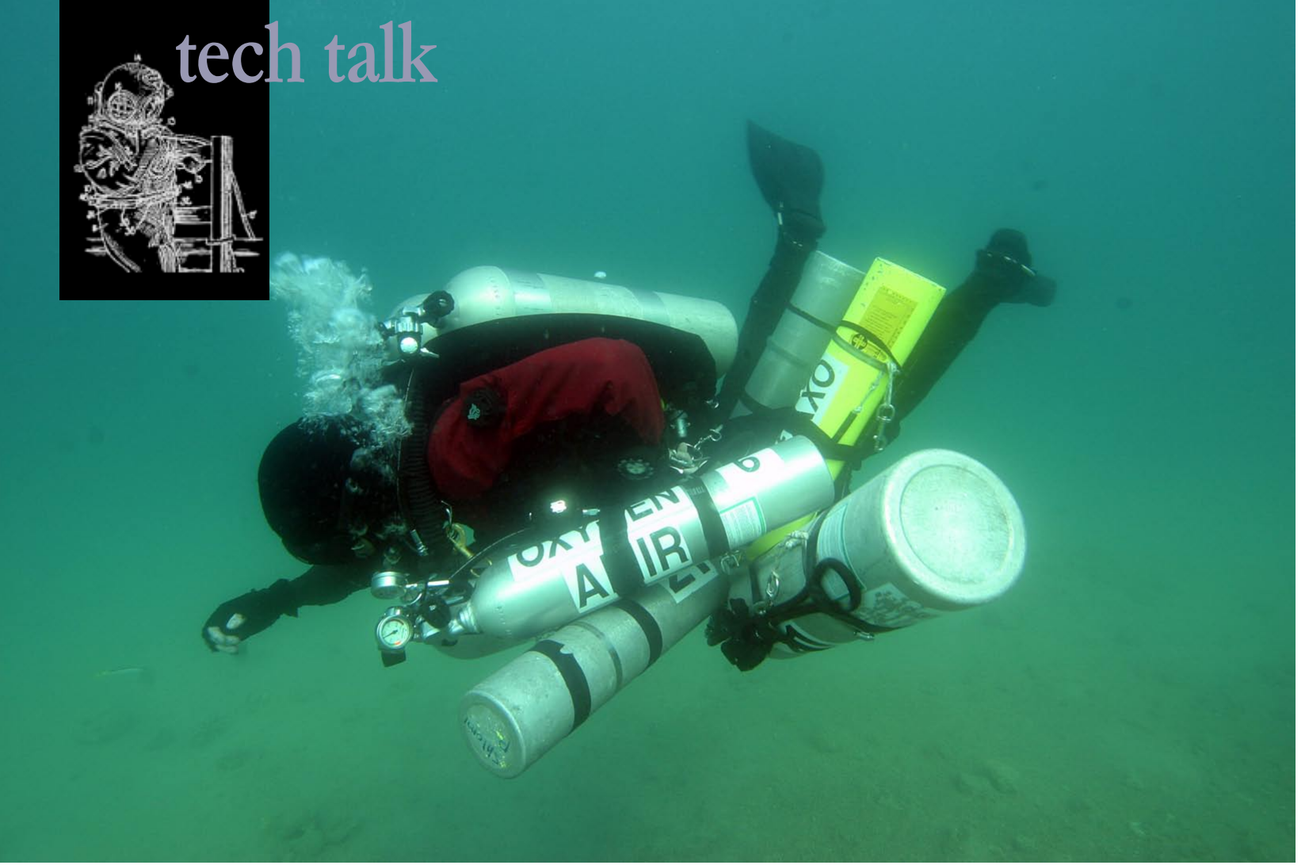
Heavy trim configuration (above) for technical diving

Try to improve your comfort in breath-holding even in the swimming pool, particularly in motion, as well as your amount of time without taking a breath. And then don't forget apnea-based skills and drills during the courses and the training in the natural environments.

Regularly practicing one of the relaxation methods can only add to apnea time improvement, but it is particularly good for stress management and remembering your dive plan with all its emergency procedures.

For example, a classical thing to do is to go after your buddy's mouthpiece at 15-20m, depending on your level. You will quickly grasp the need to stay close in the team. Also, it is a good way to learn your real possibilities for holding your breath in case of out-of-air situations.

Regularly practicing one of the relaxation methods can only add to apnea time improvement, but it is particularly good for stress management and remembering your dive plan with all its emergency procedures.



After many years spent cumulating equipment brought to the water under the tag line of safety, the trend has now turned to the functional minimum. That is to say, the diver should leave all excessive equipment behind, but the diver then has to be much better trained.

CLOCKWISE: Diver on rebreather uses underwater scooter; Technical diver with five stages of air tanks; Diver in training with stages

3. Learn to plan your dives, however modest they are. That means you should always anticipate all solutions for plan deviations, resolving a maximum amount of possible problems as well as the famous "what if's"—i.e. "What do I do if…?"

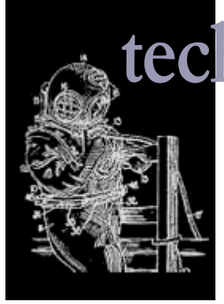
…mastery of skills and automatic reactions also comes from training and practice.

4. Learn to dive in team. This includes team positioning in progressing as well as assisting a team buddy with gas, in all potential situations. In this case, mastery of skills and automatic reactions also comes from training and practice.

5. Choose equipment that is simple, functional, reliable and versatile. When it comes to the configuration of equipment, the fashion calls for simplicity, and it is very good. It has to be clear and set as simple as it can be. After many years spent cumulating equipment brought to the water under the tag line of safety, the trend has now turned to the functional minimum. That is to say, the diver should leave all excessive equipment behind, but the diver then has to be much better trained.

In regards to this notion, the Hogarthian configuration, or its derivatives, have become increasingly widespread. This configuration is based on statistical studies of real risks of an accident and on experience. It favors streamlining, safety and team diving. It is worth mentioning that this configuration is multipurpose and versatile and suits all types of technical diving activities, as well as diving in overhead environments in caves or in wrecks.

Choice of equipment aside, you should be at ease managing it. Adjust all hoses, D-rings and buckles so that gear is not



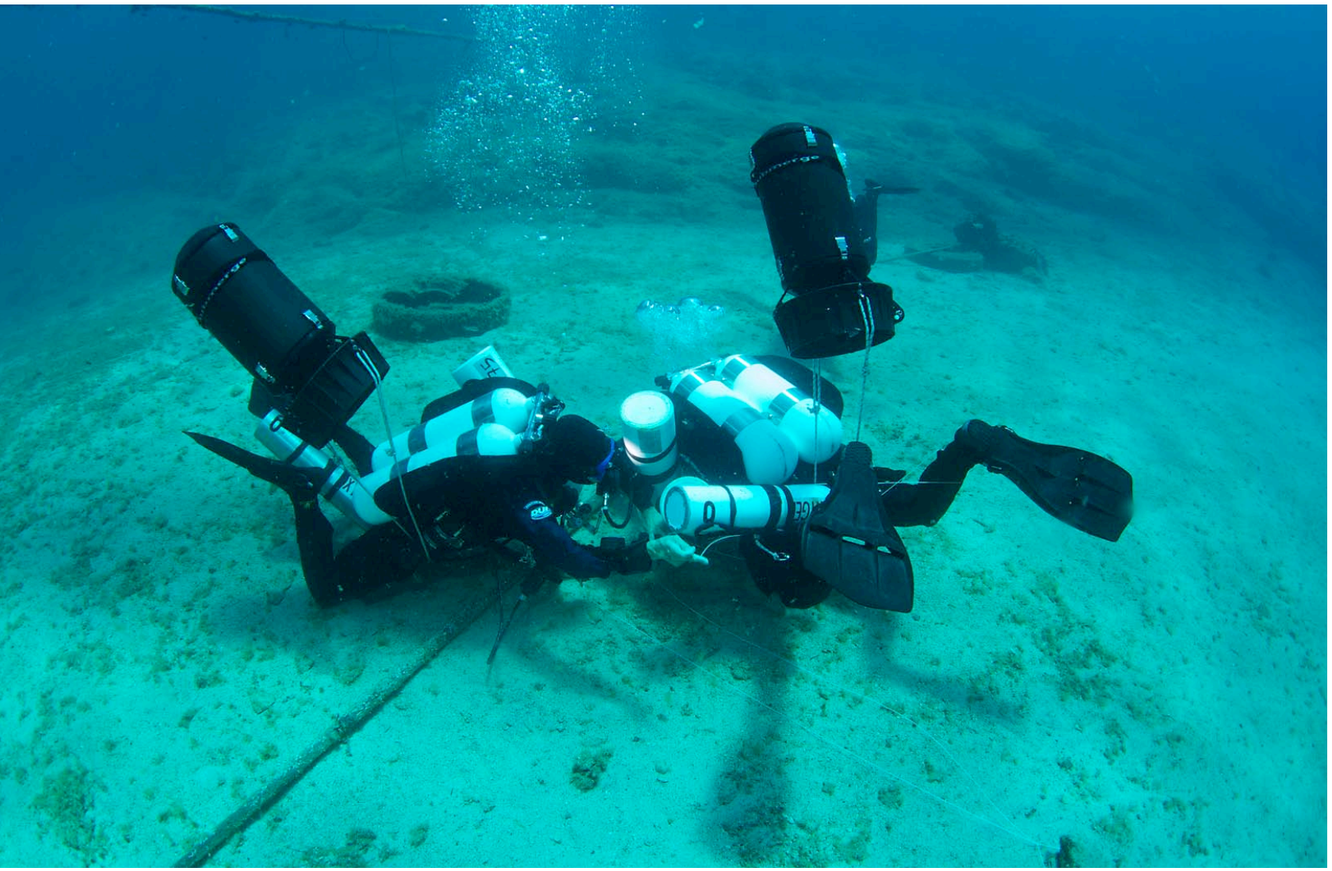
Going Pro

The concept called skills and drills consists in practicing a particular skill until it becomes your second nature.

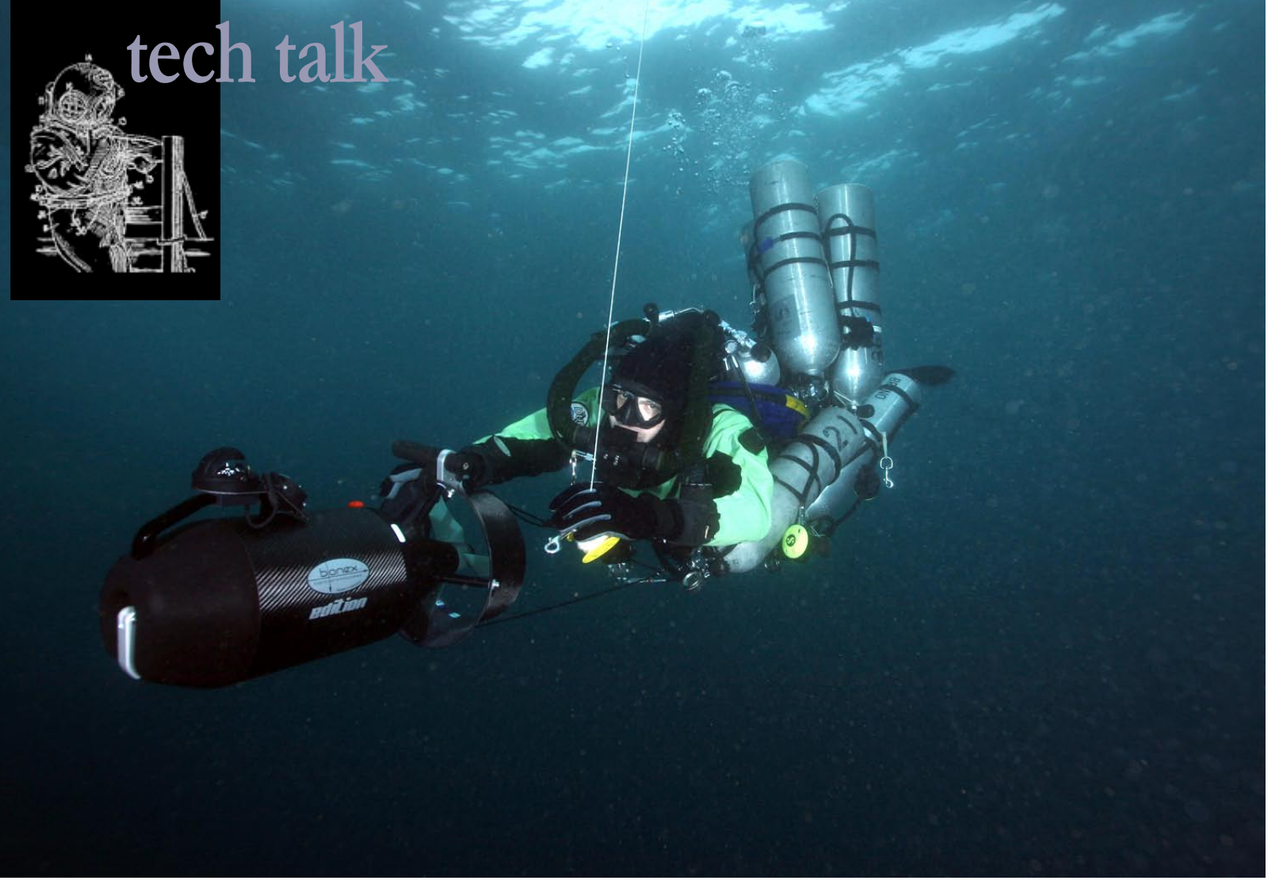
only streamlined but also fits you perfectly. For example, a standard long hose measures 2m, but it may be too short for a husky fellow and too long for a small girl. You should easily reach all your D-rings to attach the necessary accessories without having to look where they are. Placing them 2-3cm higher or lower may facilitate your task a lot. It may seem trivial, but make sure you are able to attain your valves whenever you start diving with a twinset that is new to you.

6. Automate your reactions. According to statistics for overhead diving, the main causes for accidents are lack of training, practice or experience. More regular experience, training and practice mean more accurate and rapid reactions, which lead naturally to the economy of gas. It is the same with finning—less stress invariably results in reduced consumption.

The concept called *skills and drills* consists in practicing a particular skill until it becomes your second nature. The same exercises can be performed individually or practiced with a buddy or even in a team (communication, assistance, etc). In this respect, it is very important to duly perform all on land exercises during the courses before practic-



Technical divers with diver propulsion vehicles (DPVs) otherwise known as underwater scooters



Technical diver on Semi-Closed Rebreather (SCR) with four stages and underwater scooter

ing them underwater.

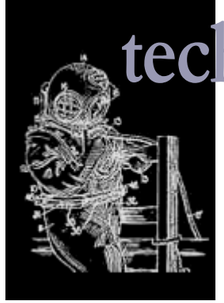
7. There is never too much experience. As soon as you graduate from any tech course, it is very important to continue to gain experience in the field. Only in this way will you start to learn your real capabilities and personal limits. Normally, the course gives you just the overall picture of the activity, but you need much more practice to become proficient in this sphere and to understand all its subtleties. Also, during courses, students often discover some skills pertaining to the chosen activity that need to be improved. The idea is to get more experience.

As soon as you graduate from any tech course, it is very important to continue to gain experience in the field. Only in this way will you start to learn your real capabilities and personal limits.

8. Choose appropriate gas mixes. A few French divers sometimes joke about the restrictions imposed by PADI or SDI who maintain that the deep diving zone begins at 30m. However, this figure is not random. It came from accident statistics. Like in overhead diving, it depends greatly on the diver, his or her training, physical fitness at the given moment and general diving conditions—water temperature, visibility and currents. It is always better to dive with nitrox up to 30m, then with trimix beginning from 30m or 40m.

9. Enjoy diving, have fun and do not force yourself. It may seem obvious, but who has never dived a little bit out of shape and tired just to follow his or her mates or simply because it was expected. This is never a good idea. Doing this in deep diving, however, becomes extremely dangerous. The reasons for many so-called unintentional accidents are dehydration, fatigue and stress.

Tech diving may always remain a bit challenging for you, as challenge is intrinsic to its nature, but it should never turn into a "mission impossible". Listen to yourself and



Versatility, in diving as well as beyond it, makes you perform better and smarter and become more open to new experiences.

dive for pleasure—yours and that of your buddy or team.

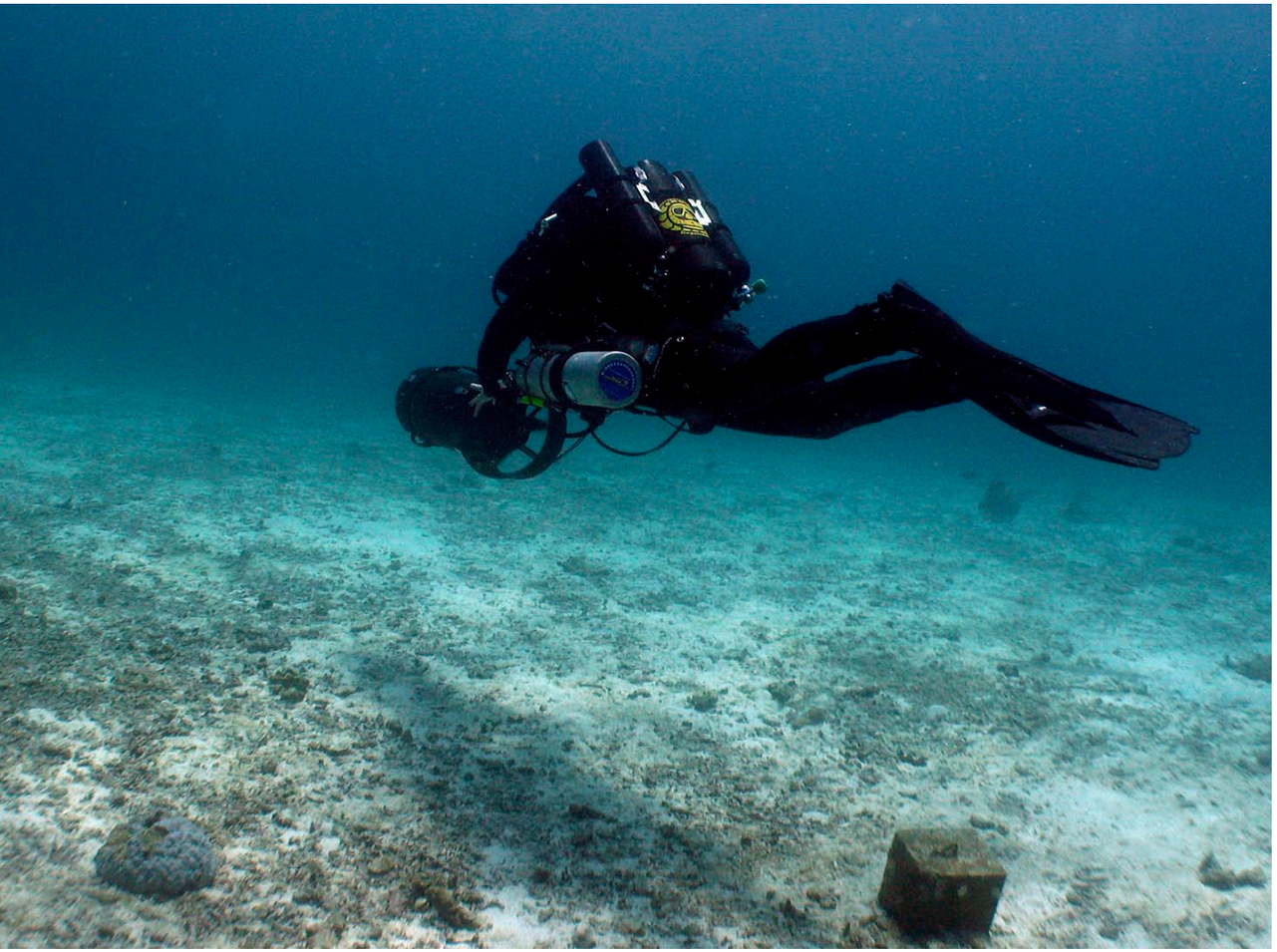
10. Try to gain new experience, become versatile, and make a college try at all aspects of tech diving. For example, let's say, try diving sidemount. It's in fashion nowadays! The tanks are mounted at both sides of the diver, below the shoulders and on the belt instead of on the back of the diver. Thus, you can carry tanks separately to the water, and it is much lighter than a twinset on your back. You can put them into the water without any effort. Two 6-liter tanks can replace one 12-liter tank, with double the safety and an easy access to the valves in case of any problem. And what freedom it is underwater! Pure pleasure.

Or try diving with nitrox—under ice, in caverns, while cave diving. Simply put, it is the mother discipline of tech diving. Test new equipment, dry suits, rebreathers, etc.

Use a propulsion vehicle. Far from being a gadget, it can be very useful in reducing your gas consumption, as it decreases your efforts. It can expand your action range, as it goes much faster than you can with fins, and it can offer you a new feeling underwater, comparable to aerial acrobatics.

By the way, the very first book on scooters by D. Rebikoff was entitled, *Underwater on a Plane*.

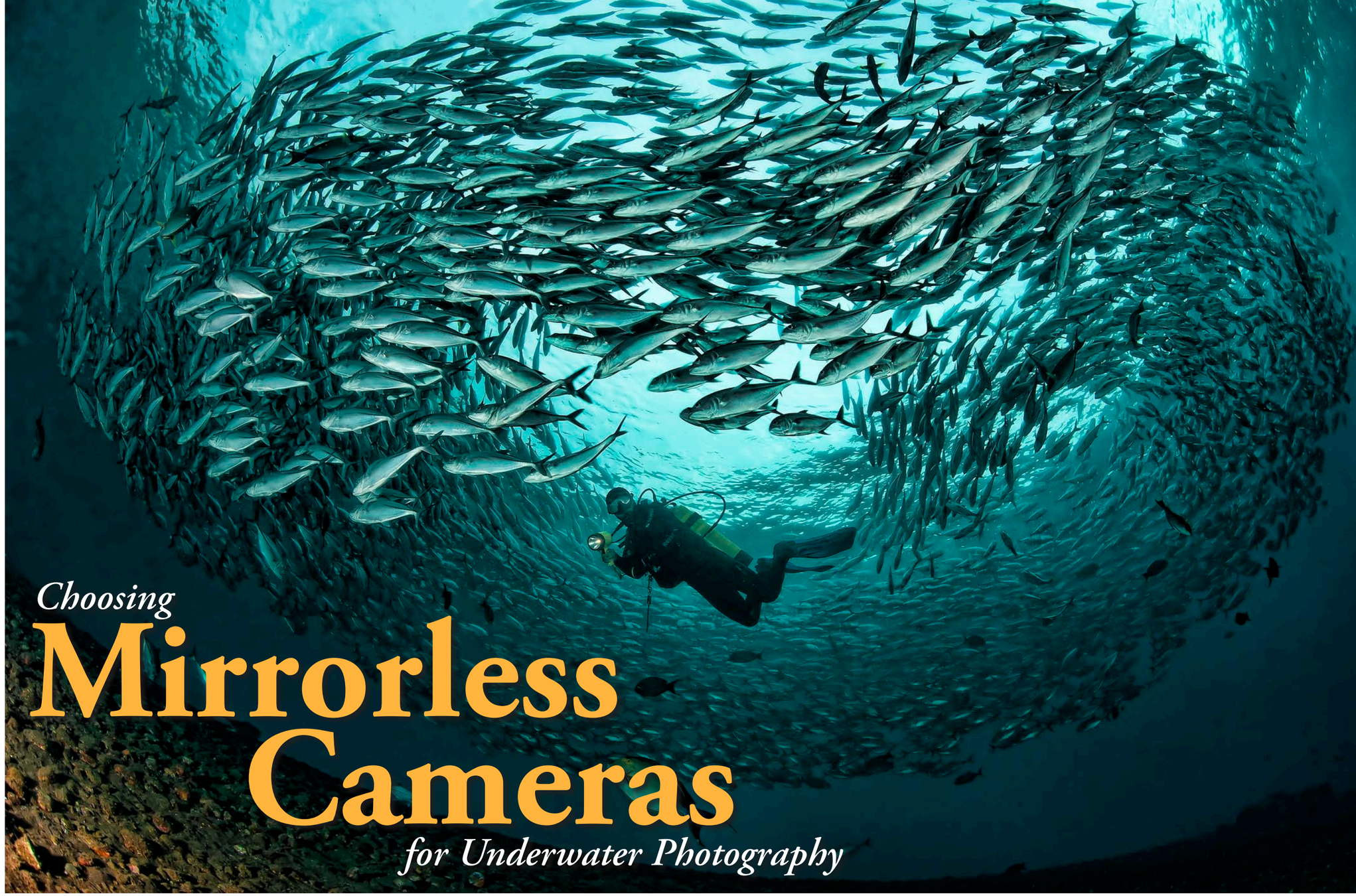
Versatility, in diving as well as beyond it, makes you perform better and smarter and become more open to new experiences. ■



Diver on rebreather with underwater scooter

Pascal Bernabé of France holds the world record depth on a deep dive using self-contained breathing apparatus. He dived to 330m on trimix on 5 June 2005 off Propriano, Corsica.

photo & video



Choosing Mirrorless Cameras for Underwater Photography

Text by Don Silcock

In the previous article, the first in this series on mirrorless cameras for underwater photography, we looked at the basic technology associated with this new genre of equipment. In this second article, we will take a look at the mirrorless cameras and lenses suitable for underwater photography that are currently available as this issue goes to press.

While the number of camera manufacturers with horses in the mirrorless race has now reached critical mass with the recent entrance of Canon and its EOS-M, and the earlier entrance of Nikon with the J1 and V1 cameras, the number of models available has grown even more. However, for underwater photography the choices narrow somewhat and the early entrants in the mirrorless race, Olympus, Panasonic and Sony, are very much in the lead.

This is because of two key factors—the availability of lenses suitable for underwater photography and the availability of housings to put the cameras in. Underwater photographers look for three basic types of lenses—wide-angle, macro and general purpose "hunting" lenses for when the site is unknown.

Mid-range zooms, often the type offered as a kit-lens, will usually fit the bill for the general purpose category and most of the manufacturers have something credible to offer. However, for wide-angle and macro, the choices are more limited and because Olympus, Panasonic and Sony have been in the mirrorless race the longest, they have much better selections of lenses available than the late entrants do.

The Olympus and Panasonic Micro Four Thirds technology has a distinct advantage, because the lenses from one manufacturer are compatible with the other manufacturer's cameras, meaning a much larger overall selection of lenses to choose from. Whereas Sony uses its own format and therefore has less lenses available.

The current camera of choice in the Olympus/Panasonic stable is very much the Olympus OM-D E-M5, which has created a wave of interest generally, and in many ways signifies the coming of age of the Micro Four Thirds standard.

Modeled on the very popular Olympus OM film cameras of the 1970's and 1980's, the OM-D was initially so popular that there was a long waiting list to get one. But even now that the initial glow has faded, it is clear that the OM-D is

Olympus 12-50mm zoom lens (top left); Olympus 60mm macro lens (bottom left); Olympus 9-18mm wide-angle zoom (center); Olympus OM-D mirrorless camera (right); Panasonic 8mm fish-eye lens (bottom right)

Mirrorless

an excellent camera with a nice choice of lenses as described below.

On the Panasonic side of that stable are the GH and GF range of mirrorless cameras plus the GX-1, all of which are very competent but have not really excited underwater photographers like the OM-D has!

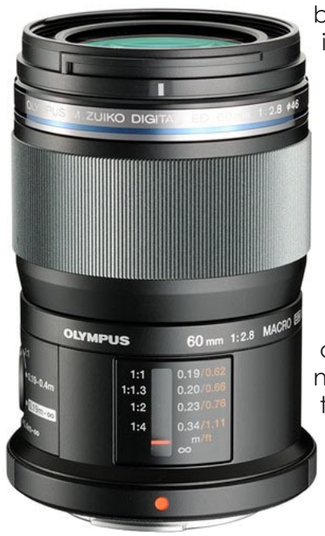
Over with Sony the choices are around the popular NEX 5 and NEX 7 cameras, both of which excel technically because of their large APS-C sensors.

Micro Four Thirds lenses

The choice of lenses currently available for the Micro Four Thirds standard Olympus and Panasonic cameras is quite impressive across both wide-angle and macro, with some nice options for mid-range zooms also.

Panasonic offers the 8mm (16mm equivalent) fish-eye lens that has a bright f3.5 maximum aperture and has a close-focus distance of just 4".

Fish-eyes are a very important lens for underwater photography and some of the best wide-angle images ever taken are done with these extreme perspective lenses.



Panasonic also offers a very nice extreme rectilinear zoom lens, the 7-14mm zoom which is their equivalent of the very highly regarded Nikon 14-24 zoom.

The development of such a flagship lens by Panasonic back in 2009 signaled how serious their commitment to the Micro Four Thirds standard was, and the lens performs very well above water.

However extreme rectilinear lenses – lenses that create straight lines in the corners, rather than bent ones like fish-eyes do - are notoriously difficult to get good results with underwater, because of issues related to the curvature of dome ports.

So just how useful the 7-14mm is underwater is not clear but it does appear that it suffers from softness in the corners just like the Nikon 14-24 does underwater.

Olympus offers a very nice alternative to the 7-14mm for underwater use with their 9-18mm (18-36mm equivalent) zoom lens, which is both small and compact and has a close-focus distance of just 6".

Wide-angle zoom lenses in this range are much easier to get good results out of underwater and the Olympus 9-18mm looks to be a much better choice than the Panasonic 7-14mm for the underwater photographer.

At the macro end of town there are two very nice lenses available for the Micro Four Thirds standard - the Panasonic-Leica 45mm (90mm equivalent) and the Olympus 60mm (120mm equivalent).

Both lenses offer true macro capability with 1:1 reproduction ratios, bright f2.8 maximum apertures, high quality glass and excellent close-focus distances of 6" for the 45mm and 7.4" for the 60mm.

Finally in the mid-range zooms, Olympus has an interesting offering with the 12-50mm zoom which is offered as a kit lens with the OM-D. The lens has a very good range, but like most kit lenses is not a stellar performer optically above water.

But beneath the waves some of those issues don't matter too much and combined with its macro capability at a fixed focal length of 43mm when engaged, means that it is an interesting prospect for underwater photographers.

However, to utilize that macro capability requires a rather expensive port as will be explained in the next article, therefore the 14-42mm kit zooms from both Panasonic and Olympus may be better choices for that general purpose "hunting" lens!

Panasoni 7-14mm rectilinear zoom lens

Sony lenses

The Sony NEX cameras do not have the array of lens choices that the Panasonic and Olympus range do, but there are still a lot of very good underwater photographs being taken with these cameras as subsequent articles in this series will show.

Panasonic--Leica 45mm macro (top left); Sony 10-18mm wide-angle lens (center left); Sony 18-55mm zoom lens (center); Sony NEX mirrorless camera (right); Sony 30mm macro lens (center right)

Currently the two most popular Sony lenses for underwater photography are the 16mm "pancake" style SEL16F28 wide-angle, which is equivalent to 24mm on the NEX cameras.

The difference in crop factor – 1.5x with the Sony NEX cameras, and 2x with the Olympus and Panasonic – is because the Sony uses a larger APS-C sesnor.

The 16mm has a good close-focus distance of 9.4" and most importantly it can be used with Sony's well-regarded and relatively low-cost VCL conversion lenses that screw on to the front of the 16mm lens.

There are two conversion lenses available – the VCL ECU1 which has a factor of 0.75x and changes the 16mm in to a 12mm.

The second is the VPL ECF1 which converts the 16mm Sony in to a fish-eye lens.

Normally, serious photographers shudder slightly at the mention of conversion lenses as they are inherently a compromise and rarely produce really good results.

But Sony has clearly thought this through carefully and put a lot of work in to the design of the 16mm and its conversion lenses as the general buzz from underwater photographers who are using them is very positive.

Sony also has a very interesting 10-18mm (15-27mm equivalent) wide angle zoom with a good f4 maximum aperture and close-focus distance of 9.84".

Sony's macro capability is currently limited to its 30mm (45mm equivalent) lens, which offers 1:1 reproduction, is quite bright at f3.5 and has an excellent close-focus distance of just 3.74".

However its 30mm focal length is quite limiting underwater and many NEX users seem to opt for the 18-55mm (27-82.5mm equivalent) kit-lens which has a close-focus distance of 9.8" and is a good all-round performer.

Used with external diopters such as the Inon 165 or the Subsea +10, the 18-55mm transforms into a pretty credible critter lens.

Sony 16mm pancake lens

Underwater Housings

"Build it and they will come" is the adage the tourist industry often uses when developing a new resort at a key location, and a similar thing applies with underwater housings, with the most likely candidates tempting some of the manufacturers in to committing precious resources to design housings for the leading mirrorless cameras.

However the rapid development of new mirrorless cameras is clearly creating problems for the manufacturers and some are having second thoughts.

Ikelite for example, normally one of the quickest to market, has announced that it will not be producing housings for the OM-D, the Panasonic GF series of the Sony NEX's.

On the other hand, Nauticam has produced several housings for mirrorless cameras and continues to do so at a quite amazing pace.

Selecting a housing and navigating through the complicated port choices available will be covered in the next article

Summary

Mirrorless technology is really carving out a very credible space in underwater photography and the camera manufacturers continue to push the capability envelope.

The current leaders are the Olympus OM-D and the Sony NEX units which are very capable cameras.

The camera manufacturers know they need to fill the gaps in the lens range and will do so over time, plus the entrance of third party lens manufacturers like Sigma is another very positive sign that the mirrorless technology has reached critical mass.

The advent of this new space in underwater photography creates a very cost-effective way to upgrade from point and shoot cameras or downsize from much larger and heavier DSLR's.

But like any emerging technology there are "gotchas" to trip you up and we hope this series of articles will guide you through the maze – stay tuned!

Sony fish-eye convertor

Don Silcock is an underwater photographer and dive writer based in Sydney, Australia. For more information, visit: ***Indopacficimages.com***

Nauticam NA-D600 Housing

Nauticam has announced the release of their new housing for the Nikon D600 full-frame (FX) DSLR camera. While not exactly a huge surprise, as an earlier version of the NA-D600 was on display at DEMA recently, Nauticam continues to excel at getting new housings released at an amazing rate. The final version of the NA-D600 housing is smaller and lighter than existing Nauticam designs, and features dual paddle levers on both left and right hand sides. The left-hand paddle lever controls the video record and AE-L/AF-L functions while the right-hand one controls the playback and ISO functtions. The NA-D600 also has a new design of mode dial control, which allows the mode dial to be locked in position. The housing has fiber optic strobe triggering ports as standard, but is equipped with an accessory port for the addition of an electronic flash trigger bulkhead, HDMI bulkhead or other accessory. The NA-D600 is available from the 20th December at US$3,300. **Nauticamusa.com**

Nauticam announces Sony NEX-5R housing

Nauticam has released their new NA-NEX5R housing for the Sony NEX-5R mirrorless camera. The NA-NEX5R shares many of the features of the Nauticam housing for the previous version of the popular Sony NEX5, but gains a control which provides access to new control dial on the NEX-5R. The new control is accessed on the housing via the left-hand thumb and gives manual control of aperture and shutter speed. Additionally, the camera's new programmable function (Fn) button can also be accessed and hence used for manual while balance or focus mode control. Nauticam has also modified the design of the main O-ring seal and the camera tray on the NA-NEX5R. Nauticam is shipping the NA-NEX5R housing from today. **Nauticam.com**

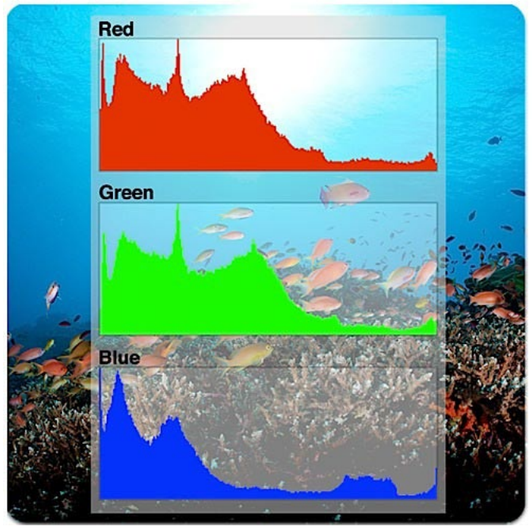
Sea and Sea announces new Nikon D600 housing

Sea and Sea has announced their new housing for the Nikon D600 FX (Full Frame) DSLR camera. The Sea and Sea MSX-D600 is a lightweight and compact design, which provides access to all of the camera's essential controls. The MSX-D600 comes with two fiber optic ports and two additional bulkheads fittings for the possible installation of electronic flash triggering, HDMI or other bulkheads. The housing is supplied with a leak detector as standard and is compatible with Sea and Sea's NX series lens ports. The MDX-D600 will be shipping from mid-January at a U.S. retail price of $3,399.00 or $3,499.00 with a 2-pin wiring harness for electronic strobe triggering. **Seaandsea.com**

Nauticam releases new Canon S110 housing

Nauticam has released its new housing for the Canon Powershot S110 compact camera. The NA-S110 housing features a new rear O-ring sealing system that was first seen on the recent release of their NA-NEX5R housing. The NA-S110 is well featured and most importantly, allows access to both front and rear command dials for manual exposure control. The front of the housing features an M67 thread on its lens port for attachment of wet wide-angle or macro lenses. The housing also has ports for fiber optic strobe triggering. **Nauticamusa.com**

Histograms Explained App



David Fleetham and Marty Snyderman have done it again. Now you can get the inside scoop on the mystifying world of histograms and create images like a professional with this new app, second in the series of Underwater Photography Training Applications. It's easy to use and understand, so you can quickly make improvements to your underwater photography, whether you use a DSLR or a point-and-shoot camera. There are eight fully narrated sections of training material, with photos taken by the Fleetham-Snyderman team, which illustrate histogram functions with corresponding images. Histogram topics covered include luminance, RGB, color channels, adjustments and Bell curve myths. Features include right-to-left, left-to-right swipe technology and chapter quizzes. Get it now at an introductory price of US$4.99 **Appshopper.com**

REVIEW

Mocean Armor - iSea-4

The iPhone has become the camera of choice for many of its users, and it is only natural for water enthusiasts to want to use their iPhone underwater. Mocean Armor has created the iSea-4 housing to allow the iPhone 4 and 4S to shoot either stills or video down to a depth of 200 feet.

The housing is crafted of marine grade aluminum and stainless steel and provides a clear window over the entire phone screen for easy viewing and composing. The phone is protected by a pressure active seal and a tool-less vacuum valve. They added a rectilinear fisheye lens to expand the cameras field of view underwater, and the system also includes a tray, two ergonomic handles and a wrist lanyard for safekeeping.

The iPhone touch screen is not available once in the housing, so the user must decide before the dive whether to shoot stills or video. Once in the housing, a single, mechanical button triggers video recording or still capture through the volume control button.

The lack of touch screen access also means that the phone must stay active throughout its time in the housing. To accomplish this, the phone must have Auto Lock set to Never and be put into airplane mode so the phone does not waste battery life searching for a cell signal. Even with these safe guards, the battery life was drained quickly during my testing. At most, I got two hours of shooting time before needing to completely recharge the phone.

The vacuum seal worked well and was as simple as sipping on a straw to engage. It is a great safety feature, for that added piece of mind while underwater. However, I do wish they had put the valve on the bottom of the housing to eliminate any confusion when hitting the record button.

The housing comes with a standard ¼-20 (6mm) threaded hole for mounting to the tray, a tripod or a ball joint. Adding a ball joint allows for easy mounting on top of a larger underwater housing if you wanted to capture stills and also shoot video with the iPhone. The iSea-4 includes the same threaded holes on top of each handle for adding ball joints, arms and video lights. External lighting will definitely help the video quality of the iPhone at depth.

Overall, I was impressed with the iSea-4 system. It is simple to use, easy to assemble, rugged and stylish.

— Don Silcock

Amanda Richardson

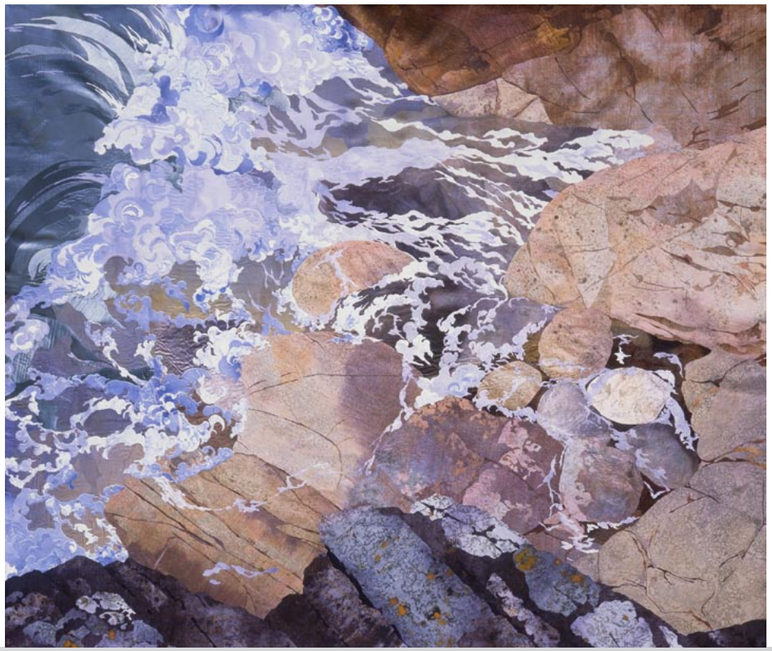
P O R T F O L I O

RIGHT: *Rocks and Wave* by Amanda Richardson. Fabric collage, 46 x 54 inches

LEFT: *Noble Feather Star* by Amanda Richardson. Fabric collage, 49 x 38 inches
PREVIOUS PAGE: *San Juan Invertebrates* by Amanda Richardson. Fabric collage, 53 x 72 inches

Richardson

BELOW: *Triple Wave* by Amanda Richardson. Acrylic and oil pastel on paper, 9.5 x 16 inches



Text edited by Gunild Symes
Photos courtesy of Amanda Richardson

Few fine artists have been able to marry the sensuous nature of luxurious textiles with the luscious diversity of underwater realm as well as Amanda Richardson. Haling from Cornwall in southwest England, Richardson is a pioneer in the combining of fabrics like velvet, silks and satins to create complex and colorful textile collages. Varying in changing light as the coral reefs do under the sea, her brilliant and dynamic works enchant and inspire, bringing tactile sensitivity to scenes of the fragile ecosystems we sea lovers admire and adore.

Parrot Fish
by Amanda Richardson
Fabric collage
46 x 60 inches
(above)

Study in Spines
by Amanda Richardson
Fabric collage
46 x 61 inches
(right)

Richardson

Graduating from Goldsmiths' College in London in 1978 with a bachelor of arts honours degree in fine art textiles, Richardson strives to present fresh experiences for the viewer. Light is important in her works, particularly reflected light, which slides through the shallow depths of coastal waters.

A sense of place

In Richardson's works, there is a strong sense of place. She left Cornwall in 1986 and spent ten years in the Pacific Northwest of the United States. There, on San Juan Island north of the Puget Sound off the state of Washington, she gained insight and inspiration from the dramatic landscapes that surrounded her. From the mountains to the sea, the islands gave her much to explore in nature and in art.

It was here and in further travels beyond—to various places such as Alaska, New Zealand, Tonga, the Cook Islands and Fiji—where Richardson discovered snorkelling and became enchanted by the beauty of the coral reefs.

Richardson said that her artwork has always described the nuances of the natural world. So, it was no surprise that the complex patterns and brilliant colours of the tropical waters she explored in her travels found their way into her artwork.

Upon returning to San Juan, Richardson received a commission from the marine labora-

Sea and Rock by Amanda Richardson. Fabric collage, 64 x 64 inches

tories, at the University of Washington, to create a textile collage inspired by the diverse marine life found around the San Juan Islands. In contrast to the warm tropical waters from which she had just come, the San Juan Islands had deep and cold waters, surrounding what were once ancient mountain tops.

Granite Shore with Waves by Amanda Richardson. Fabric collage, 46 x 31 inches

Queen Angel Fish by Amanda Richardson. Fabric collage, 46 x 61 inches

Connection to the sea

Richardson said that she has always lived near the sea and that the shapes and patterns of water have always played an important part in her art. In particular, were the sculptural forms of waves as they crashed upon the shore. With this theme in mind, she created a series of works, which focused on the movement of waves.

In addition, she gained inspiration from how forces in nature acted upon the terrain and living things. Artworks resulted, which reflected Richarson's fascination with how plants grew in their indigenous environments and how rocks were shaped by water and wind.

Richardson then expanded her subject matter to include creatures in nature such as birds and insects. Richardson said that they are an integral part of her wild garden, a garden which has become part of her working process.

Method

Richardsen described the elaborate process by which each of her textile collages were created. She said that preparation for each work started with the selection of fabrics. These were then hand dyed. Glue was then applied to the reverse side of the fabrics, which held the weave of the material together. This was an important step to do so that the fabrics could be cut into complex shapes. The cut shapes were then built up, layer upon layer, on a backing fabric, until the

Marginate Wrasse by Amanda Richardson
Fabric collage, 46 x 61 inches

Teal Sea and Clouds by Amanda Richardson. Fabric collage, 44.5 x 29 inches

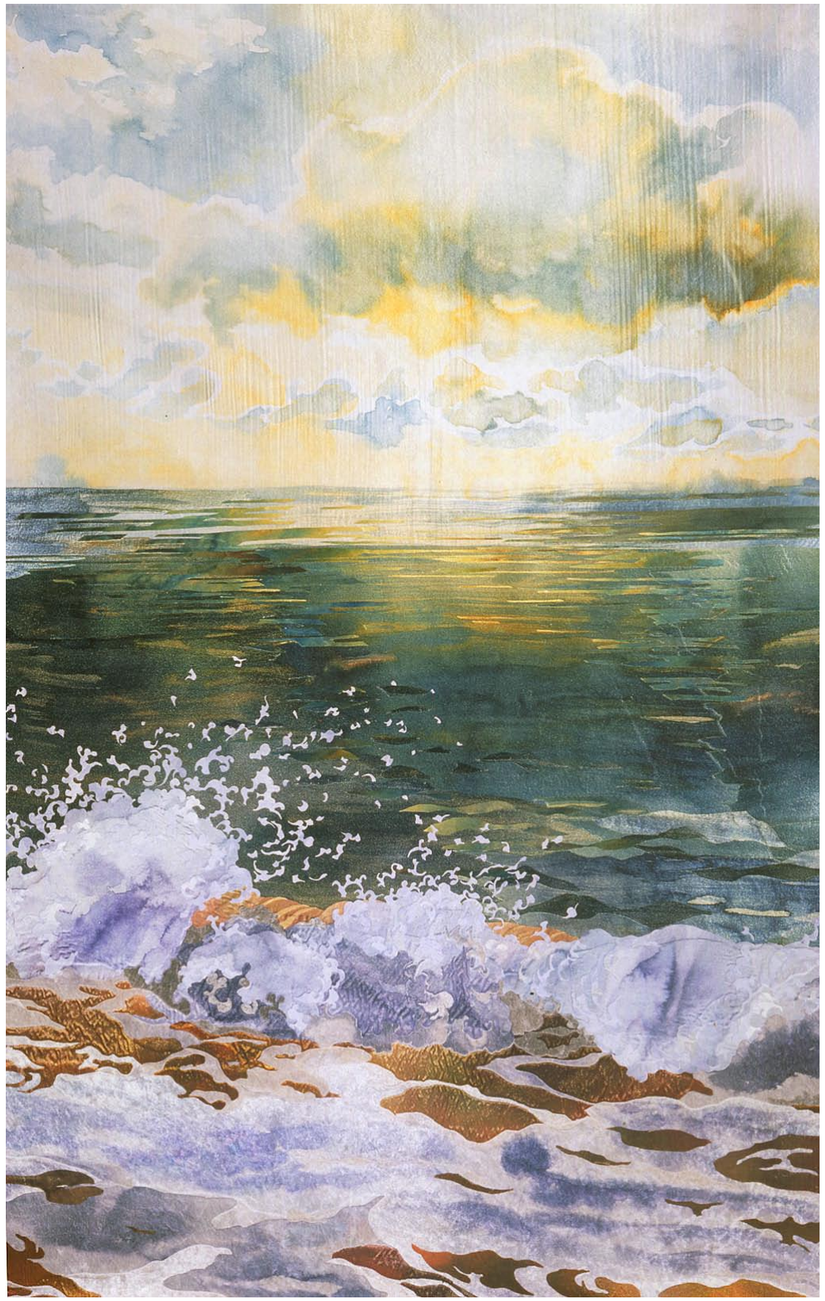


image was complete. Finally, the glue that held the cut fabrics and the collage together was then fixed by steam.

Commissions and exhibitions

Richardson's artworks come in various sizes. She creates pieces that suit domestic interiors as well as large-scale artworks for public buildings. In 1975, Richardson got her first major commission. To celebrate the 400th anniversary of the Bath family at Longleat House, England, the Royal School of Needlework asked her to create a large-scale work. So, she created a large embroidered fabric collage, which measured 9x7ft. Other commissions followed from American corporate clients such as Boeing, the Universities of Alaska and Washington State, the chemical company BASF, Marriott Hotels, Hilton Hotels, and the Waldorf Astoria.

Across America from New York to California, Richardson has held one-man exhibitions, as well as exhibitions in Britain from Cumbria to London and Cornwall. She shows her work on an ongoing basis in several galleries with which she has held long-standing relationships.

You can visit Richardson at her studio in Cornwall or get more information about the artist and her artwork online at: ***www.amandarichardson.co.uk*** ■