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Number 53

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COVER PHOTO: Clown triggerfish with anthias, Maldives,
by Scott Johnson

Giant moray eel, Maldives. Photo by Scott Johnson



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Support the resistance

As this issue goes to press, a U.S. court has declared the Sea Shepherd conservation group to be "pirates" and ordered it to cease aggressive actions against Japanese whalers.

The lawsuit, initiated by a group of Japanese researchers to halt Sea Shepherd, comes after years of clashes at sea. The group, collectively referred to in the judgment as "Cetacean", has long hunted whales in the Southern Ocean for scientific research.

"You don't need a peg leg or an eye patch. When you ram ships, hurl containers of acid, drag metal-reinforced ropes in the water to damage propellers and rudders, launch smoke bombs and flares with hooks, and point high-powered lasers at other ships, you are, without a doubt, a pirate, no matter how high-minded you believe your purpose to be," said Chief Judge Alex Kozinski.

Excuse me, but who are the real pirates here?
The whales do not belong

to the Japanese for them to take, but to us all, and I would very much like 'mine' left alive. They sail their whaling fleet half way round the planet to hunt them under the false pretences of conducting 'scientific research', and as we understand it, only to stockpile most of the meat in warehouses because the demand from consumers is simply not there anymore, and then they use some for pet fodder. It is such a far cry from the Inuit hunters who need meat to survive and only take what is needed to feed the family.

Yoshimasa Hayashi, Japan's fisheries minister, has reaffirmed the country's stance on whaling to the AFP, stating: "So why don't we at least agree to disagree? We have this culture, and you don't have that culture." Well, Bubba, you do come across like a kleptomaniac making excuses for not being able to help it. Get over it. It's pathetic, and it puts you



at odds with the rest of the world. Is your misplaced pride really worth all the animosity?

As for the ruling by the U.S. court, it is our position that while just societies rest on laws that are, at least in theory, carefully formulated to protect the common good and a legal system where disputes can be resolved peacefully, there are also times where the outcomes come into conflict with our conscience, or sense of what is right and what needs to be done.

In our case, while we do not agree with all the methods employed by Sea Shepherd or all the choices they made, we have elected to stand behind the organisation and consider ourselves supporters.

It was not a difficult choice.

—The X-RAY MAG Team



News edited by
Gunild & Peter Symes

from the deep NEWS

New Zealand: New deep sea discoveries

Scientists have reported new findings of deep-sea fish species after a two-week survey in the depths off the Kermadec Islands of New Zealand. Among the findings is a new species of eelpout, a large deep sea cusk eel, new records of a rattail fish in the southwest Pacific and the return of another type of rattail—the cosmopolitan rattail—in New Zealand waters, which hasn't been seen in over a century.



NIWA/UNIVERSITY OF ABERDEEN

Zealand Te Papa Tongarewa, during the seven days of sampling. In addition, a large number of amphipods or marine sand-hoppers were also taken to further previous research in the Kermadec Trench.

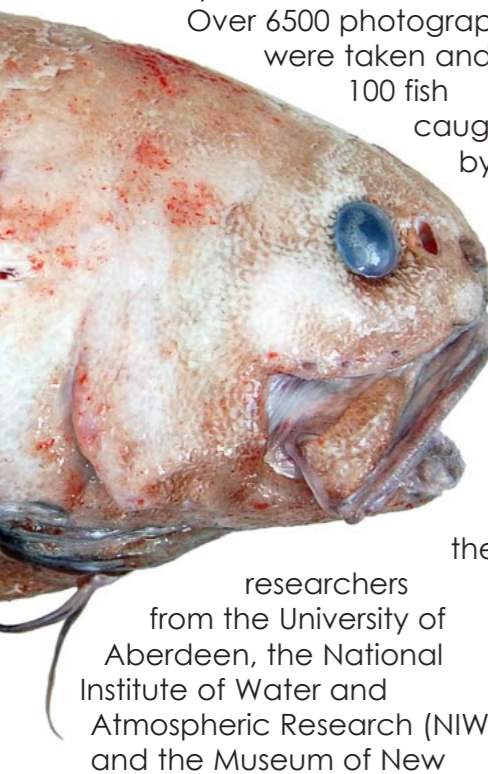
Landers lowered from the RV Kaharoa reached depths of one to six kilometers, well below the layer that light penetrates, on the edge of the Kermadec Trench, which is one of the deepest points on Earth, as it drops more than ten kilometers below sea level.

"The amount of data recovered during the survey was considerable. A lot can be learnt and achieved by using fairly basic equipment in the deep sea," said team leader Dr Alan Jamieson of the University of Aberdeen. "A voyage such as this is testament to how feasible scientific research in the deep sea has become. It is no longer the inaccessible, out of reach, part of the world it once was. The technological

challenges of the past no longer exist, and shouldn't limit our responsibility to learn about and understand the deep sea to help ensure the long term health of the deep oceans, one of the largest environments on earth."

NIWA Principal Scientist Dr Malcolm Clark said that the data collected will help scientists understand biodiversity in the deep sea near New Zealand. He added that researchers will be better able to make assessments on possible risks to the ecosystem posed by global warming and human activities such as mining on the seabed.

The major funding of the research voyage supported by NIWA's Deep-sea Communities project funded by the Ministry of Business, Innovation and Employment came from the Marine Alliance for Science and Technology for Scotland. ■ SOURCE: NIWA/ UNIVERSITY OF ABERDEEN



researchers from the University of Aberdeen, the National Institute of Water and Atmospheric Research (NIWA) and the Museum of New



NIWA/UNIVERSITY OF ABERDEEN

Healthy reefs need a mix of picky eaters

With the use of underwater video cameras, researchers studying fish feeding on South Pacific coral reefs in Fiji have discovered that there are only four species of herbivorous fish that remove the majority of common and potentially hazardous seaweeds off coral, but each of these fish will only eat one type of seaweed. This means that a specific mix of these species is necessary to keep a reef healthy, according to the new study published by the journal Ecology.

The study, which was supported by the National Science Foundation (NSF), the National Institutes of Health (NIH) and the Teasley Endowment to Georgia Tech, focused on macroalgae, or seaweeds, that threaten endangered coral reefs. The harmful seaweeds either produce chemicals toxic to corals or damage corals by smothering or scraping them.



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Adaptation

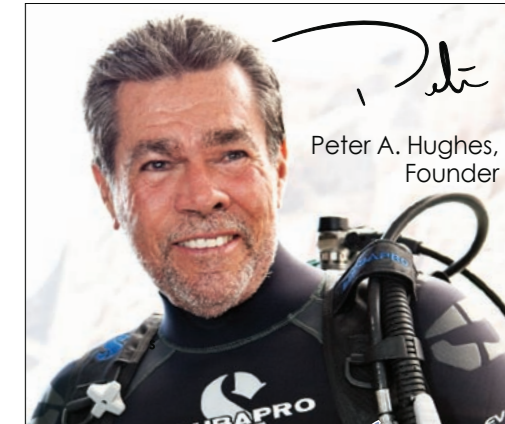
According to the researchers, specific fish have adapted to specific defense strategies of seaweed. They found that two species of unicornfish removed several types of brown algae, a species of parrotfish ate red seaweeds and a rabbitfish consumed a kind of green seaweed

that was very toxic to coral.

"Of the nearly 30 species of bigger herbivores on the reef, there were four that were doing almost all of the feeding on the seven species of seaweeds that we studied. We did not see much overlap in the types of seaweed that each herbivore ate. Therefore, if any one of these four species was removed, that would potentially allow some macroalgae to proliferate," said Mark Hay, a professor in the School of Biology at the Georgia Institute of Technology. "It's not enough to have herbivorous fish on the reef. We need to have the right mix of herbivores."

Rapid decline in coral reefs can follow if seaweed growth is not curbed

by herbivorous fish, said the scientists. Often, where there is overfishing, there is overgrowth of seaweed. No fishing zones or marine protected areas help threatened coral reef ecosystems recover, according to a related study. ■ SOURCE: GEORGIA INSTITUTE OF TECHNOLOGY



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Researchers found this eelpout (above), which is new to science; Cosmopolitan rattail, *Coryphaenoides armatus*, (top left) hasn't been seen in the waters of New Zealand since one was caught by the *HMS Challenger* on a scientific expedition in the 1870s; Mug shot of a deep-sea cusk eel new to New Zealand (left)

Spanish fossil reef reveals oldest spider crabs

Scientists have uncovered the remains of the oldest known spider crabs—dating over 100 million years ago—in a fossil reef in Spain. Discovered in an abandoned quarry in Koskobilo, eight crustacean species new to science were unearthed including the ancient spider crabs as well as some shrimp and lobster.

Two of the spider crab species, *Cretamaja granulata* and *Koskobilius postangustus*, surpass the previous record holder by a wide margin, according to Adiël Klompmaker, author of the study published in the journal *Cretaceous Research* and postdoctoral researcher at the U.S. University of Florida's Museum of Natural History. "The previous oldest one was from France and is some millions of years younger," said Klompmaker.

"So this discovery in Spain is quite impressive and pushes back the origin of spider crabs as known from fossils."

The team of researchers from Spain, the United States and the Netherlands visited the quarry several times between 2008 and 2010 to collect fossils. At this location, they found a large diversity in the decapod population, identifying at least 36 different species dating between 145 million to 66 million years ago. "One of the main results of this research is that decapod crustaceans are really abundant in reefs in the Cretaceous," said Klompmaker. "The presence of corals seemed to promote decapod biodiversity as early as 100 million years ago and may have served as nurseries for speciation." ■ SOURCE: LIVESCIENCE



Today's European spider crab shown swimming in a reserve in the Balearic Islands

NOAA plan addresses coral loss on Maui reef

The U.S. National Oceanic and Atmospheric Association (NOAA) announced a new plan to help reverse the loss of coral cover at the Ka'anapali reef off West Maui, Hawaii. Almost a quarter of the living coral has been lost over 13 years due to damage by pollution, according to NOAA.

Focusing on the Honokowai and Wahikuli watersheds, the plan comprehensively addresses the effects of

coordinator, Tova Callender, told Maui Now that everyone can help revive the Maui reefs: "Simple actions like conserving water, not pouring chemicals down the drain, and keeping debris and soil out of storm drains, can reduce the pollutants flowing into the sea and help our coral reefs."

With a goal of implementing important projects within five years, NOAA stated that several activities are



Satellite image of the island of Maui in Hawaii

runoff pollution on reef health—a first for Hawaii. "A big part of the problem is what is flowing off the land into the sea," said project manager Kathy Chaston of NOAA's Coral Reef Conservation Program. "Our team looked 'mauka'—inland—to identify major pollutant types and their sources, and then developed actions to reduce them."

Proposed actions for government, community members and the private sector are included in the voluntary management plan. West Maui Watershed and Coastal Management

planned to start this year including a workshop to create a rain garden at a local park as well as improvements to agricultural roads, post-fire rehabilitation planning and gulch stabilization, measures supported also in part by other state agencies.

Aside from being beautiful, coral reefs are also vital. They protect coastlines, provide habitats for a myriad of marine species, are nurseries and spawning grounds for fish, provide jobs and income for locals, are a source of food and new medicines, and provide jobs and income for the local economy, according to NOAA. Indeed, Hawaii's coral reefs contribute as much as US\$364 million yearly to the state's economy, according to a 2004 study by Pacific Science journal cited by NOAA officials. ■

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Australia's Great Barrier Reef on list of shame?

A scorecard rating the performance of the Queensland and Australian governments' management of the Great Barrier Reef has been released by a joint assessment team from the Australian Marine Conservation Society (AMCS), WWF-Australia and the Fight for the Reef campaign. The assessment does not look good and could risk the UNESCO World Heritage Status the Great Barrier Reef currently enjoys.

The Australian government was given a deadline last year for devising a plan to make substantial improvements to the management of the Great Barrier Reef by

UNESCO, which stated that failure to do so would put the reef's world heritage status in jeopardy. Well, that deadline has passed, and the Australian government has been put on alert.

"These dismal scores highlight our grave concerns that UNESCO is going to have no option but to recommend the Reef be put on its unenviable 'List of World Heritage in Danger' -- the list of shame," said Richard Leck, WWF's campaign director. "There's a very real risk the Great Barrier Reef could lose its World Heritage status. The impact of that would be felt right throughout Queensland's economy, especially its \$6 billion reef tourism industry. Australia's reputation is on the line."

Contributors to the poor report card include the Queensland government's recent efforts to expedite port development, while weakening coastal protection laws.

"The sheer size and speed of port and associated development along the Reef coast is unprecedented. There's more dredging, more ships and more turtles and coral dying. We also have significant concerns that instead of strengthening legislation to protect the Reef, the Queensland Government has moved to weaken legislation, which flies in the face of the World Heritage Committee's recommendations," said Leck.

An immediate moratorium on further development is being called for by WWF and AMCS until the governments of Queensland and Australia come up with a well-funded, sustainable plan for the future of the Great Barrier Reef. The organisations also want the Australian government to put AU\$500 million into reducing pollution of the reef. ■ SOURCE: WILDLIFEEXTRA.COM



Great Barrier Reef



Shark on Tubbataha Reef in the Philippines

Brouhaha over Tubbataha

In January, the U.S. Navy vessel *USS Guardian* plowed into Tubbataha Reef in the Philippines—a treasured UNESCO World Heritage Site and a mecca for divers. Since the accident, there's been a flurry of responses and reactions. U.S. officials have repeatedly expressed regrets and offered apologies for the incident while swiftly transporting the crew of the vessel out of the region; salvage operations have been initiated by the U.S. Navy; UNESCO has offered to send a team to do an independent assessment of the damage; and newly appointed U.S. Secretary of State John Kerry has made an offer of compensation for reef damages, which opponents in the Philippines say is a way to evade fines under local and international law.

While Kerry promised U.S. cooperation and it's own probe into the incident, the Philippine Department of Transportation and Communication (DOTC) and the Philippine Coast Guard (PCG) are conducting their own comprehensive investigations of the incident.

According to marine park's monitors, 4,000 square meters of the reef have been damaged, surpassing the Coast Guard's earlier estimate of 1,000 square meters.

In addition to compensation for reef damages, the U.S. government is plan-

ning activities to support the reef's recovery including a US\$100,000 grant to a Philippine university for coral restoration research at Tubbataha Reef, according to the U.S. Embassy in Manila. Other activities include cooperation and discussion with local experts on rehabilitation of the reef, surveys to make improvements to the park ranger station and better mapping of the reef.

Explanations?

Questions have been raised as to why the minesweeper was there—in a marine protected area—in the first place. "Faulty navigation chart data" was blamed for the incident by U.S. Navy officials, even though the ship was given warnings from park rangers. According to transportation officials, crewmembers of the *USS Guardian* cannot be held criminally liable, as they have immunity under international law.

Meanwhile, the Philippines DOTC said they want to set up more solar radars and surveillance equipment in Tubbataha Reef in order to prevent another catastrophe like the grounding of the *USS Guardian*. ■

SOURCES: PHILSTAR.COM, MANILA BULLETIN, PHILIPPINE DAILY INQUIRER, MANILASTANDARDTODAY.COM, ABS-CBNNEWS.COM, GMANETWORK.COM



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Russian researchers reach bottom of 'Russian Loch Ness' in first-ever dive in one of the planet's 'Poles of Cold'

Researchers in Russia have dived to the bottom of Lake Labyntyr, one of the coldest lakes on the planet. The dive was recorded by Guinness World Records. Taking place in Oymyakon, a Siberian village in Yakutia called a 'Pole of Cold' because it is one of three places in the world with the coldest air tem-



HANS EGEDE'S SEA SERPENT, 1734

peratures, the ten-man crew from the Russian Geographical Society (RGS) took the plunge in relatively *mild* -45°C (-49°F)—mild for a place that can reach -71°C (-96°F).

The leader of the group, Dmitry Shiller, explained the reason for the dive: "By now almost all the land on Earth has been studied, but terra firma is only 30 percent of the planet. I'm sure there are a lot of secrets under

water, so that's where all of the science will go in the near future."

Indeed, as legend has it, Lake Labyntyr, which is popularly known as the Russian Loch Ness, is thought by some to be inhabited by a cryptid, a lake monster nicknamed "the Labyntyr devil"—a myth furthered by a 1953 sighting by Viktor Tverdokhlebov, the leader of an expedition by the Soviet Academy of Sciences geological unit in Siberia who said he saw "some kind of animal" with a large, dark gray, oval body and possibly a fin, in the water.

While the lake attracts attention for its anomalies, such as freezing more slowly than other local lakes and its large crack which reaches depths of 75-80 meters, Shiller was after more immediate data, taking first-ever footage at the lake bottom as well as samples of water, flora and fauna at depth. Prior to the RGS team's dive, the lake had only been explored by robot and echo sound. While the dive team found no lake monster, they did manage a dive that according to the expedition supervisor, Tatiana Nefyodova, was groundbreaking as "the first ever winter aqualung dive in a cold pole natural body of water". ■ SOURCE: RT.COM



Women scuba divers in Saudi Arabia demand own section of sea

More and more women scuba divers in Saudi Arabia want designated scuba diving areas in the Red Sea in order to get around the obstacles facing them when attempting to get a permit for a dive trip. The Coast Guard will not allow women to dive without a male guardian, or mahram.

Even though diving courses for women only are expensive, it hasn't stopped more Saudi women from participating in the sport. Indeed, it costs SAR 1,500-2,000 (US\$400-533) per diving course over six days, which includes two study days, two diving days in the pool and two diving days in the sea. Courses are only open to individuals 18 and older. These issues keep women from getting into the sport.

Dive instructor Fuad Azmerli said that Saudi women divers have shown commitment to the sport over the last ten years by getting certified abroad. Another instructor, Tamader Baitallmal, said it was hard for women to practice their scuba skills because they don't have their own diving area—a place where they can dive in private, freely and without a male guardian. In addition, most dive

boats require large groups of participants, so Saudi women wanting to go in a private group often have their dive trips cancelled due to not meeting required numbers.

More women dive instructors wanted

Women dive instructors are few, and demand is high, so fees are expensive. "Nonetheless, an increasing number of women

have started taking an interest in the sport," said certified dive instructor Riham Al-Qhadi.

While statistics in Saudi Arabia is not yet available, women divers are on the rise and on the move. "Nothing is impossible. All I have to do is to keep training," said Samar Al-Fatih, a Saudi dive instructor who obtained her certification abroad. She said she was willing to travel to another country in



order to dive without limitations, to such countries as Bahrain or the United Arab Emirates where she said there are marine clubs who arrange dive trips for which members pay a fee, adding that for any avid scuba diver, private pools are just not on par with the real thing—namely, diving in the open ocean.

Getting there can be a problem for women divers, though, as most dive centers are located in remote areas, said Al-Qhadi. However, these remote dive centers that welcome women are the only ones that can offer privacy.

The women dive instructors said it is imperative that clubs and centers dedicated specifically for women divers are developed in Saudi Arabia to provide women divers with the environment they need, especially since there are now many Saudi women divers, who have surpassed the diving skills of men, wanting to work in the sport internationally. ■ SOURCE: ALBAWABA.COM

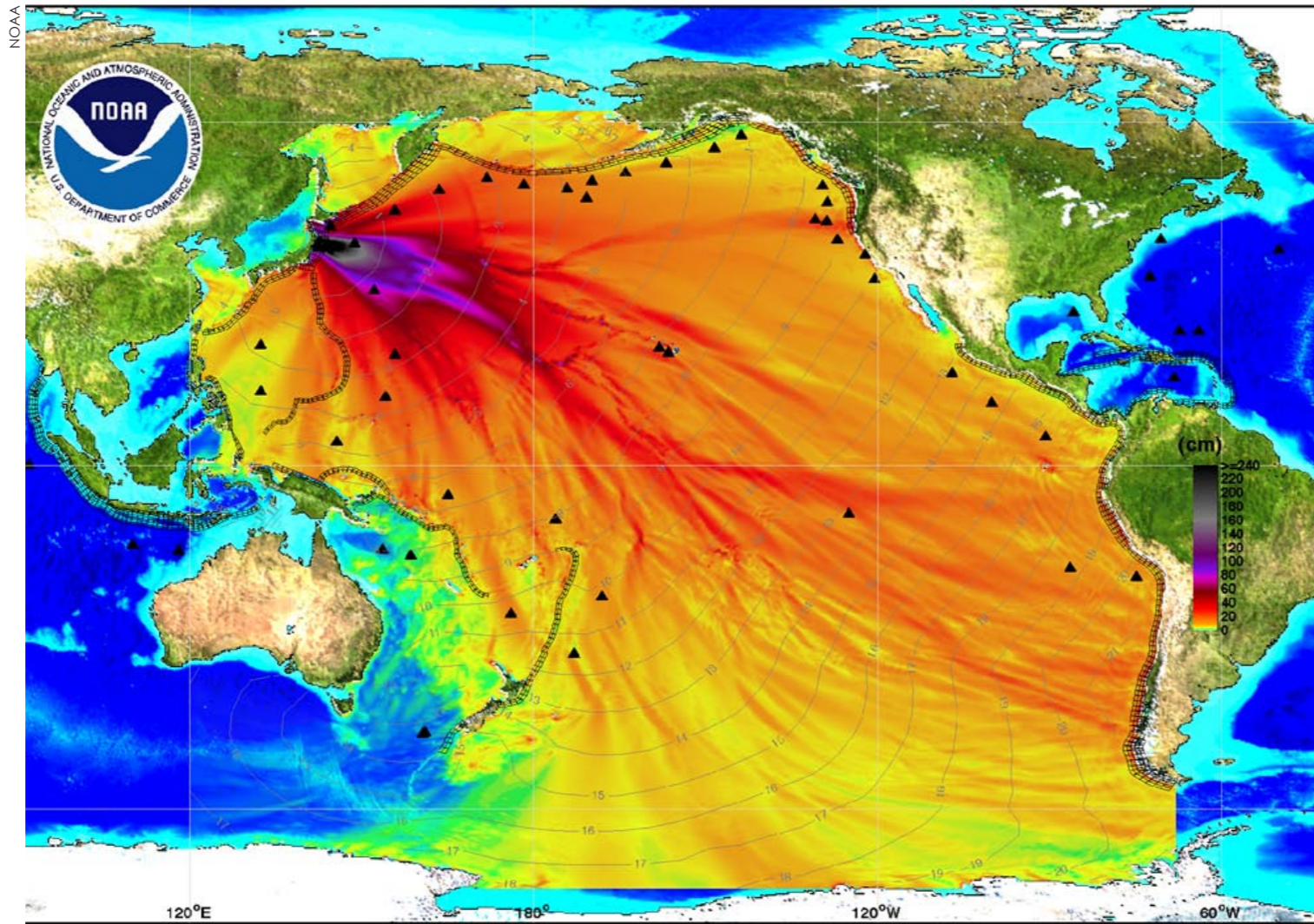
New kind of underwater volcano found

Scientists from New Zealand and Great Britain have discovered a new type of underwater volcano. It ejects lava resembling a mass of foam. This foamy lava then ascends slowly to the surface of the ocean.

It was previously thought that undersea volcanoes were either effusive or explosive, depending on the level of their eruptive force. However, the new discovery describes a new class of volcanic eruption, in which lava is so full of gas bubbles that it becomes buoyant, floating to the surface as an airy foam. The air bubbles are released as the foam rises and the lava then falls to the sea bed, leaving some pumice at the surface.

Named after the Maori god of the sea, the new class of eruption will be called Tangaroa. Led by a team of scientists from Victoria University in New Zealand, the research was done at the Macauley volcano in the Kermadec Islands. It is unrelated to the raft of floating pumice, which was found floating in the Pacific Ocean a bit further north of the site, scientists said. ■

SOURCE: RADIO NEW ZEALAND



On 11 March 2011, an undersea megathrust earthquake took place off the coast of Tōhoku, Japan. It had a magnitude of 9.0 (Mw), reaching underwater depths of about 20 miles (32km). As a result, tsunami waves reaching heights of up to 133 ft (40.5m) were triggered off Tōhoku, which then raced across the Pacific Ocean. It was the most powerful known earthquake to hit Japan—in the top five most powerful earthquakes in the world since written records began in 1900. It moved Honshu 8ft (2.4m) east and shifted the planet on its axis approximately 4-10 inches (10-25cm). The earthquake and tsunami caused the death of 15,853 people, injured 6,013, and left 3,283 missing.

Tsunami created giant underwater dunes off Japan

In March 2011, a giant tsunami hit the northeastern coast of Japan. Today, scientists say that the tsunami may have dramatically changed the topography under the waves in addition to laying waste to everything above ground. They have found evidence of changes on the ocean floor that may affect the marine ecology of Japan.

In an emergency field survey 20 days after the tsunami hit, scientists attempted to find out how much change had occurred to the seafloor and whether or not

it was safe for large ships to enter Kesennuma Bay. This bay, which is located northeast of Sendai, is for the most part, calm, and usually used as a refuge for vessels during storms.

At first, the survey was not done for research purposes. It was done to help rescue and recovery efforts in areas affected by the giant tsunami. However, the findings have given the study a new goal of finding out whether tsunamis can affect the deep in ways previously unknown—by creating underwater dunes,

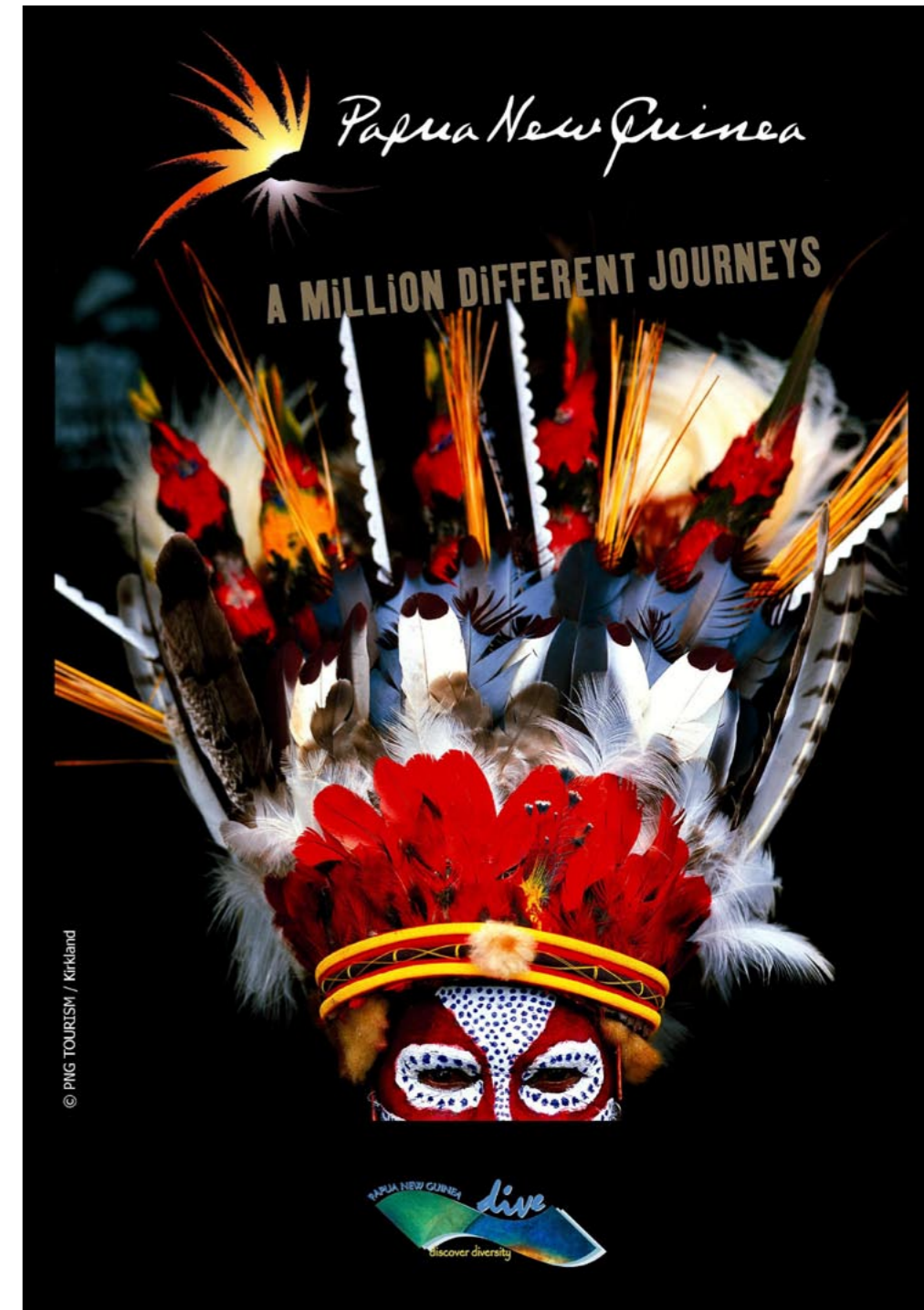
for example.

Indeed, scientists did find huge dunes underwater, which were made by the 2011 tsunami. The findings published in the *Marine Geology* journal in January show that these dunes were a direct result of a large tsunami at work on the topography of the ocean floor. This means that past tsunamis can be studied by examining the seabed.

It also means that the marine ecosystem of Japan has been affected by the dramatic alteration of the underwater

landscape and requires further monitoring.

It is yet unknown precisely how many dunes were created by the 2011 tsunami. However, now scientists can learn more about the strength and frequency of tsunamis by studying their effects on the sea floor. This is especially handy when traces of a tsunami in urban areas are destroyed by people themselves, as they rebuild and reshape the land during the recovery process. ■ SOURCE: JAPAN DAILY PRESS



© PNG TOURISM / Kirkland



Noise makes crabs crabby

Ship noise is the most common source of noise in the aquatic environment.

A team from the Universities of Bristol and Exeter exposed crabs to recordings of ship noise and found it affected their metabolism—indicating elevated stress—and found little evidence that

crabs acclimatise to noise over time.

Repeated exposure to ambient-noise playback led to increased oxygen consumption (probably due to handling stress), whereas repeated exposure to ship-noise playback produced no change in physiological response. ■



Two new species of the gorgonian inhabiting barnacles—*Conopea saotomensis* and *Conopea fidelis* (inset)—have been collected from the area surrounding the historically isolated volcanic islands of São Tomé and Príncipe

Symbiosis between barnacles and gorgonian

Two newly discovered species of gorgonian inhabiting barnacles occur exclusively in a symbiotic relationship with a black coral host.

The newly discovered barnacles are both gorgonian inhabiting.

Observations by the authors suggest that they also demonstrate preference to a particular gorgonian hosts. This peculiar behavior is reflected in

the name of one of the newly described species, *Conopea*

fideli referring to the 'fidelity' of the barnacle towards its host of preference.

Observations suggest that the barnacles might have a unique ability to recognize and choose a specific host of their preference.

The host gorgonians are a particular type of beautiful octocoral, also known as sea fans. Once locating the host, the barnacle then lives in complete symbiosis with the gorgonian, almost fully covered by host tissue.

To date, not all the details

of barnacle larvae settlement and interaction with the gorgonian host are known, but it seems that barnacle larvae are able to choose between the different gorgonians in their search for a host. It is believed to be mediated by pheromones. It has been shown that barnacle larvae can determine where to settle by recognizing pheromone cues from their host. It has also been shown that gorgonians produce barnacle settlement inducers as well as inhibitors. ■

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Anemonefish oxygenate their anemone hosts

As clownfish move around at night, they boost water flow over the anemone and increase its oxygen consumption.

U.S. researchers measured and compared the net dark oxygen uptake of fish-anemone pairs when partners were separate from each other, together as a unit, and together as a unit but separated by a mesh screen that prevented physical contact.

They found that both the fish and anemones consumed 1.4 times more oxygen when they were together than when apart.

Three behaviours

Based on observations, they defined three particular behaviours: fanning, wedging and switching, which Dr Joseph T. Szczebak compared to tossing and turning in bed.

"During fanning, clownfish were motionless among the tentacles, aside from rhythmically flapping their pectoral fins," he said.

"During wedging, the clownfish forcefully wiggle deeper into the anemone's bed of tentacles, causing a flutter of tentacular activity.

"Lastly, during switching, clownfish rapidly changed their orientation within the anemone.

"Anemone oxygen consumption increases with water flow, suggesting that any flow-related side effects of clownfish behaviour will indeed increase anemone breathing rates," Szczebak said. ■

SOURCE: JOURNAL OF EXPERIMENTAL BIOLOGY

Anemonefish behaviour at night appears to oxygenate sea anemone hosts and to augment the metabolism of both partners. At night there is less oxygen available on the reef because photosynthesis ceases once the sun goes down

When clownfish rest in the tentacles of their anemone host, they engage in certain behaviours more often than when they are alone. These behaviours appear to enhance water motion through anemone tentacles.



Maldivian coral islands atolls as seen from a NASA satellite

Maldives pledges entire country to become bioserve by 2017

In response to the call for champions in support of the Aichi Biodiversity Targets, the Republic of Maldives has pledged to become the first nation where the entire country and its Exclusive Economic Zone will be a Biosphere Reserve.

In order to become a UNESCO designated reserve, the nation must adhere to strict guidelines that combine strat-

egies of resource management, conservation, and sustainability.

The Biosphere Reserve's strategy must integrate management of natural resources with conservation and sustainable use. The plan also must seek to ensure equitable distribution of natural resource wealth. Currently, there are 610 biosphere reserves in 117 countries. ■



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Diver swimming between the WWI SMS *Cormoran* and the WWII *Tokai Maru*

The Tale of Two Wrecks of Guam

Text and underwater photos by Brandi Mueller

Guam's Apra Harbor is home to a unique set of sunken warships. It is the only place in the world where a World War I and a World War II wreck sit touching each other underwater, and they can both be dived on one tank. The calm, warm waters of Guam make for easy diving, and both wrecks can be mostly explored above 100ft. The story of how these ships sank is almost as interesting as the dive itself.



German merchant raider, SMS *Comoran*

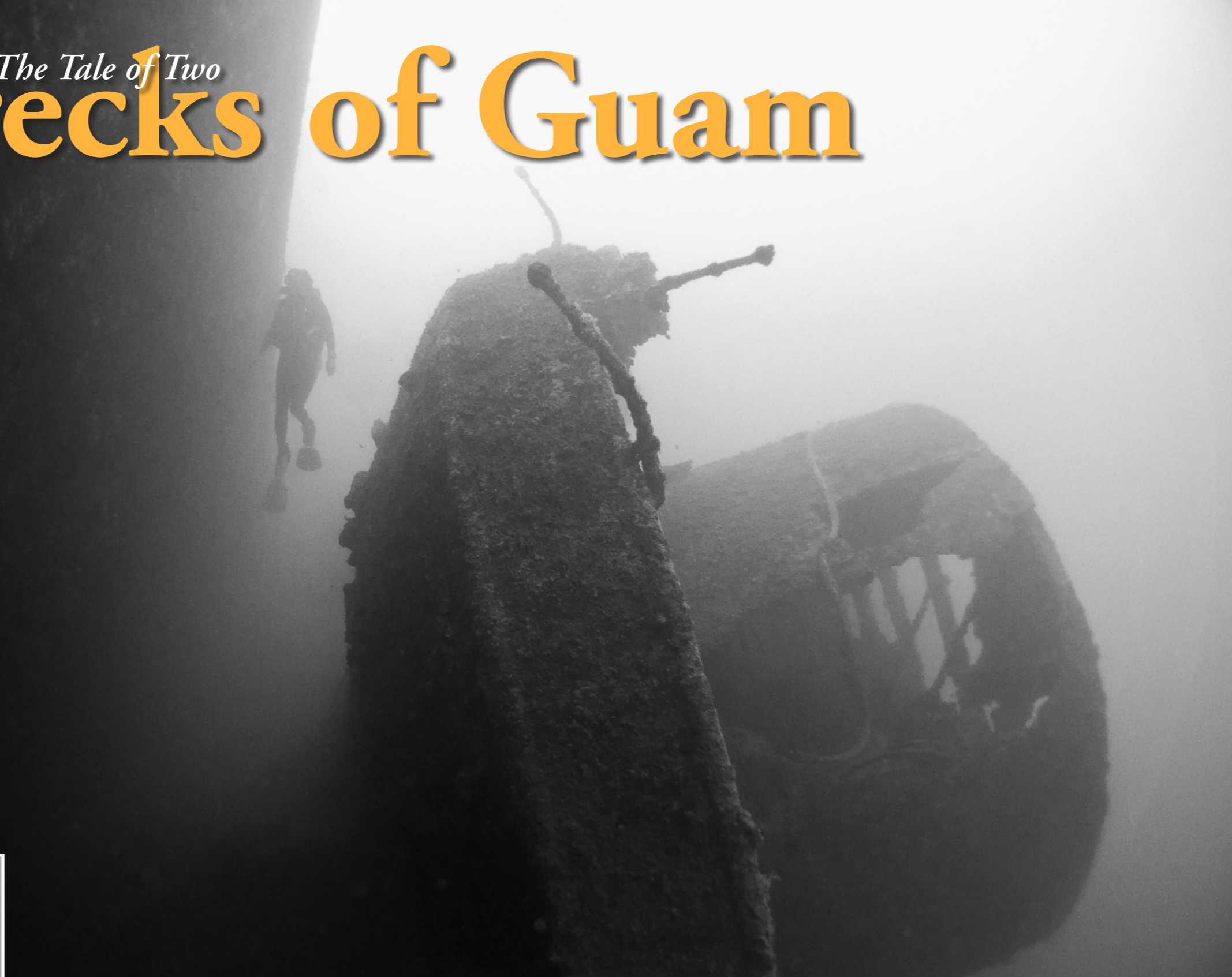
German Captain Adalbert Zuckschwerdt steered his ship, the *SMS Cormoran*, into Guam's Apra Harbor on 14 December 1914. With only 50 tons of coal left in the hold and not much food, he hoped the Americans of this U.S. territory would provide them with much needed supplies to continue their voyage. Although still a neutral party of WWI,

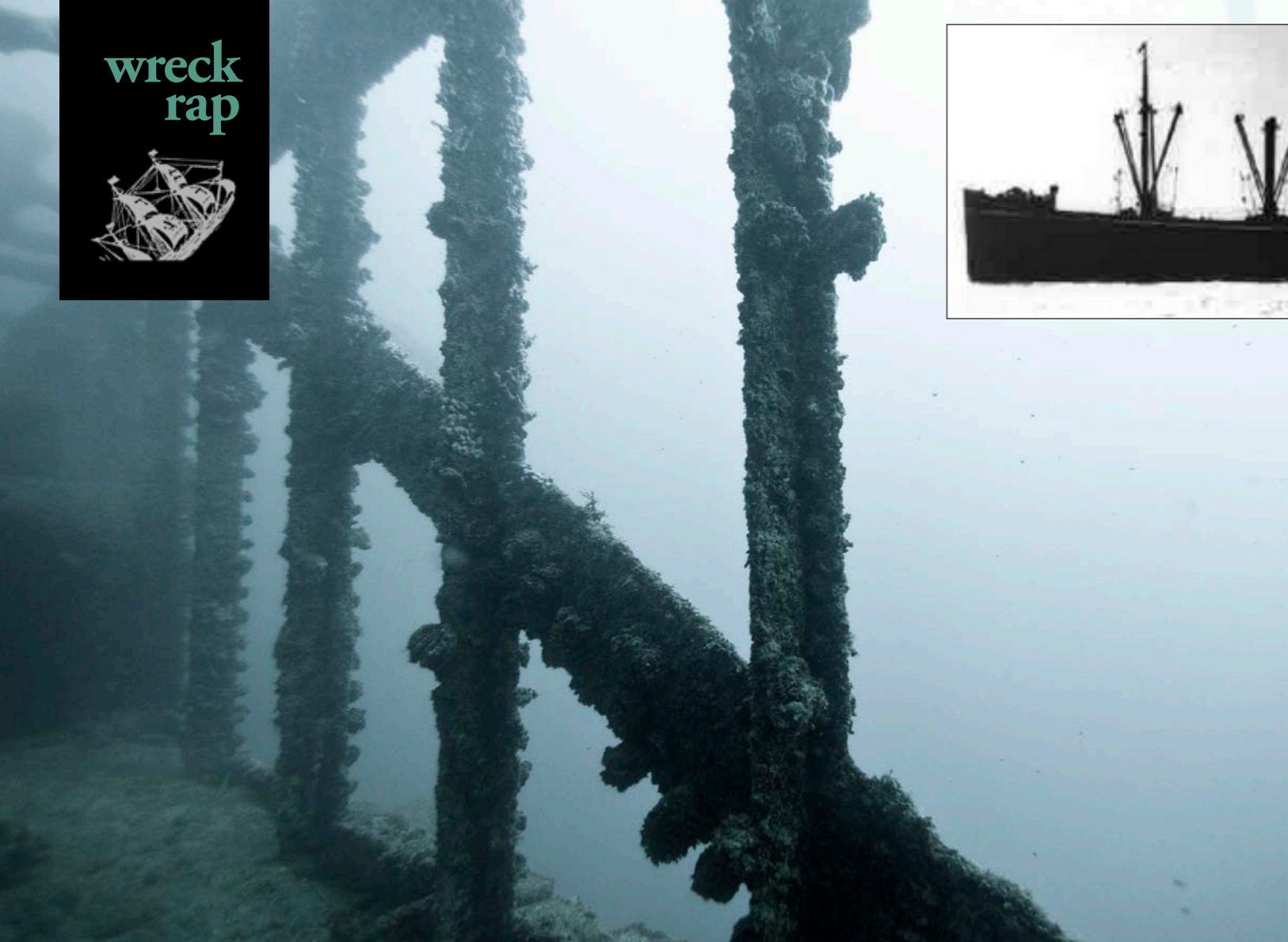
the Americans refused to give an adequate amount of coal to continue their voyage, in part because of their own short supply, thus preventing the vessel from leaving Guam. The ship and her crew stayed in Guam peacefully for over two years, many moving onto land and living as neighbors among the indigenous Chamorros and Americans.

The *Cormoran* started off as the *Rjasan*, built in a German shipyard in 1909. It was a 88-meter (290ft) passenger-cargo freighter built for Russia.

World War I

During World War I, in August 1914, the Russian *Rjasan* was captured by the Germans



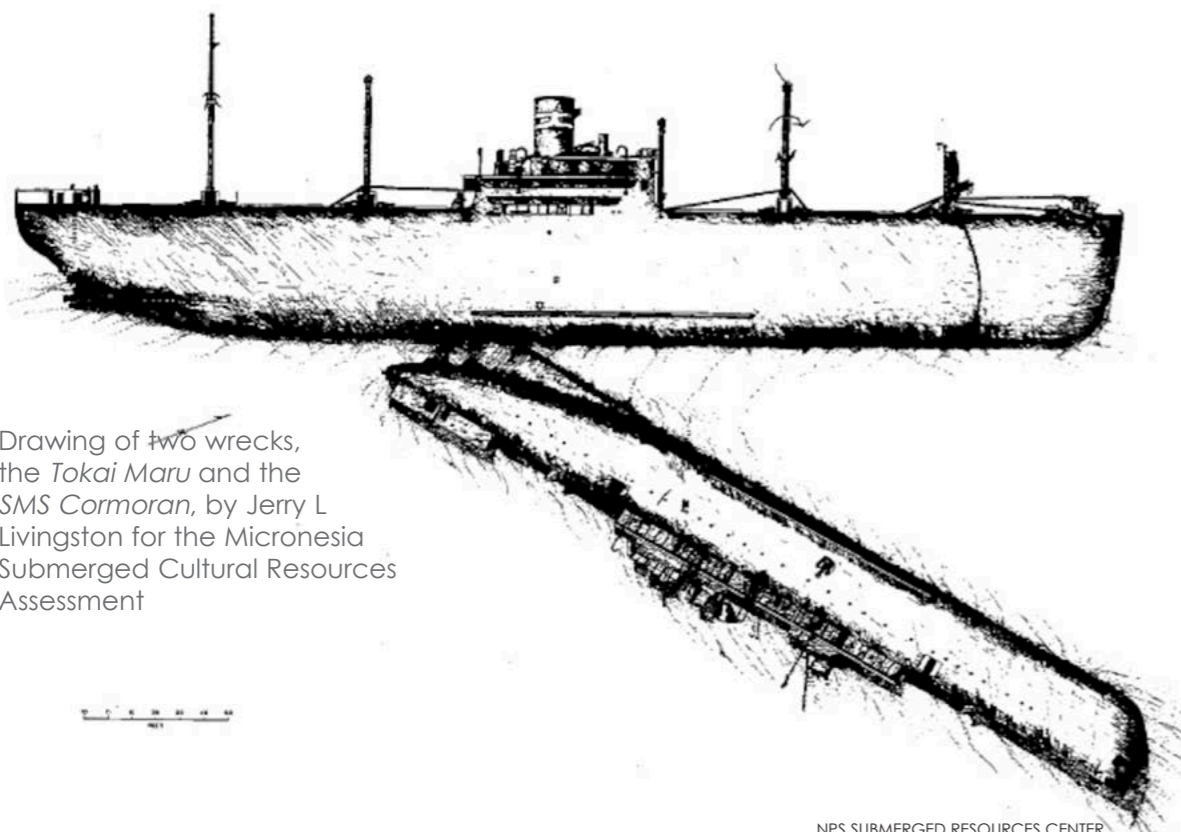


SMS Comoran (left); Tokai Maru (above); Impact point of the SMS Cormoran and the Tokai Maru (right)

off Korea by the SMS Emden. Converted to an auxiliary cruiser in the port of Tsingtao, Northern China, she was outfitted with guns salvaged from a disabled warship called the *Cormoran*, which had serious engine failures; she was renamed after that ship.

Once refitted for war, the SMS *Cormoran* took to

ing, the captain sent his ship and 13 crew to the bottom of the sea. These crewmembers are buried with full military honors in the Naval cemetery in Agana, Guam, and the rest of the crew were sent to Fort Douglas, Utah, for the duration of the war. This was the only hostile encounter between United States and German forces during the Pacific Ocean campaign of the war.



Drawing of two wrecks, the *Tokai Maru* and the SMS *Cormoran*, by Jerry L Livingston for the Micronesia Submerged Cultural Resources Assessment

the Pacific where she spent all her time avoiding allied warships and Japanese battleships. Prior to reaching Guam she had not sunk any enemy ships.

Scuttling the ship

News reached Guam of America's declaration of war on Germany on 7 April 1917, and in an attempt to prevent hostilities between the Germans living on Guam and keep the Guamanians from harm, the Americans asked Captain Zuckschwerdt to surrender. He agreed to surrender and asked if he could go to his ship to let his men know the news.

Upon returning to his ship, he ordered the crew to scuttle the vessel. As the Americans saw this happening, they fired a warning shot across the bow of the *Cormoran*, the first shot fired by Americans in WWI. Ignoring this warn-

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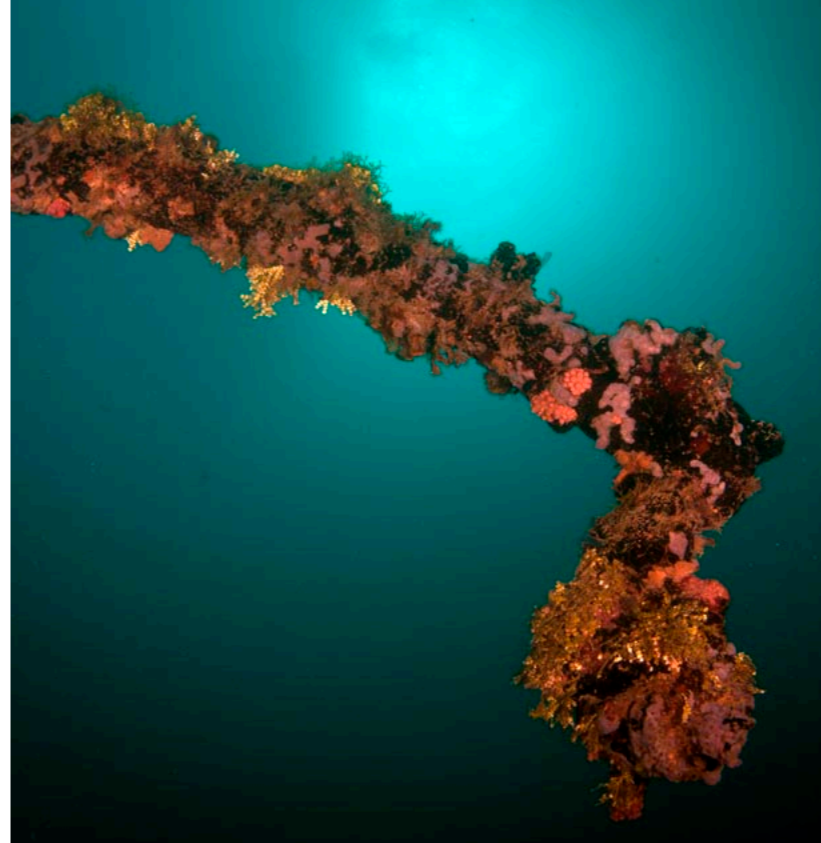
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wreck rap



SMS Cormoran; Coral growth on davit on Tokai Maru (far right)



Treasure Coins of the *Nuestra Señora de Atocha* & the *Santa Margarita*

1622

Carol Tedesco

In 40 succinct pages, *Treasure Coins of the Nuestra Señora de Atocha & the Santa Margarita* answers all the most frequently asked questions, including what the coins look like when first discovered, the meaning of the various markings, how they are cleaned, conserved and graded, what they were worth in the 17th century, and the most up-to-date information on the names and periods of office of the men who made them. Of particular interest to 1622 fleet coin enthusiasts is a section devoted to the exceedingly rare Old World minted coins discovered on the Atocha and the Santa Margarita.

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Location of Guam on global map

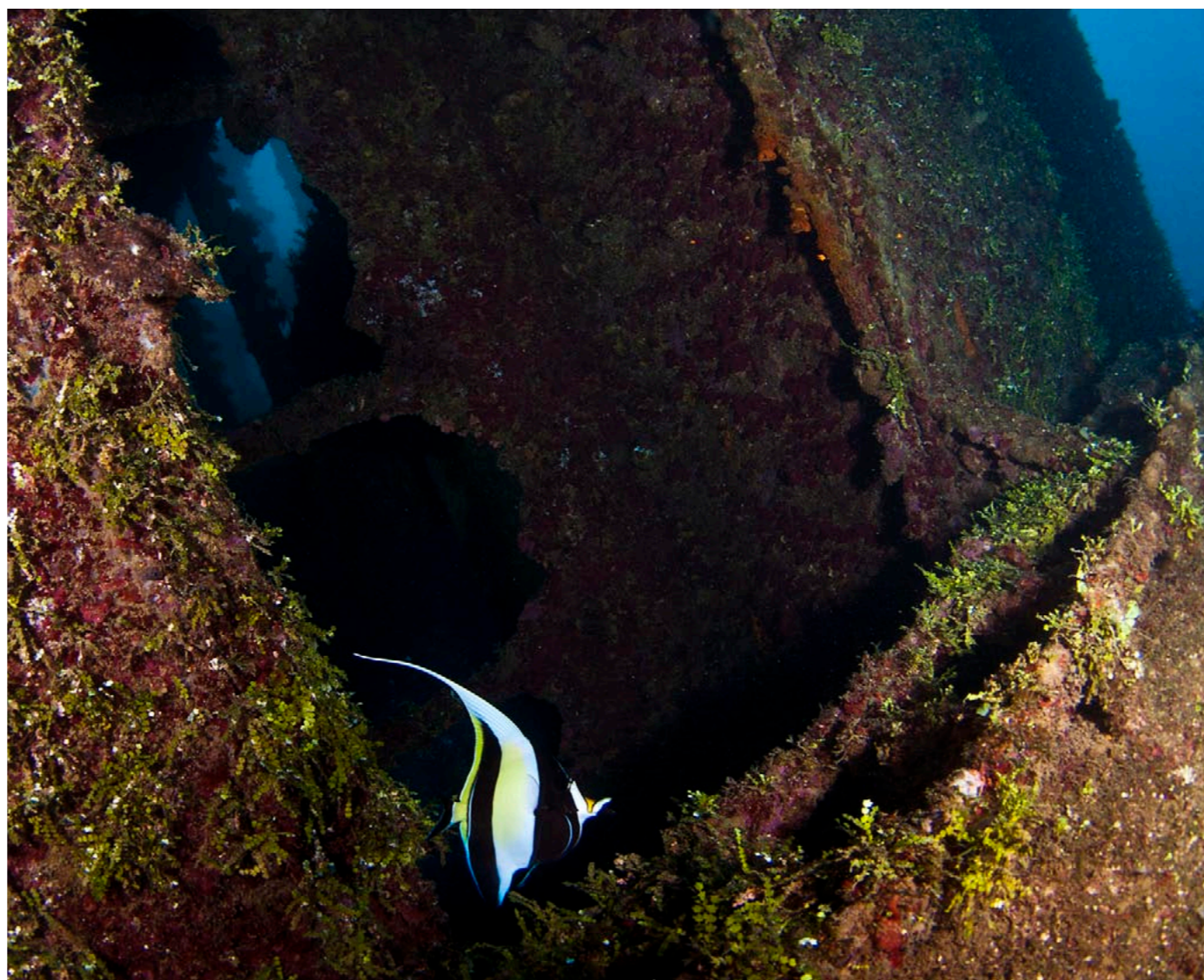


Apra Harbor

World War II

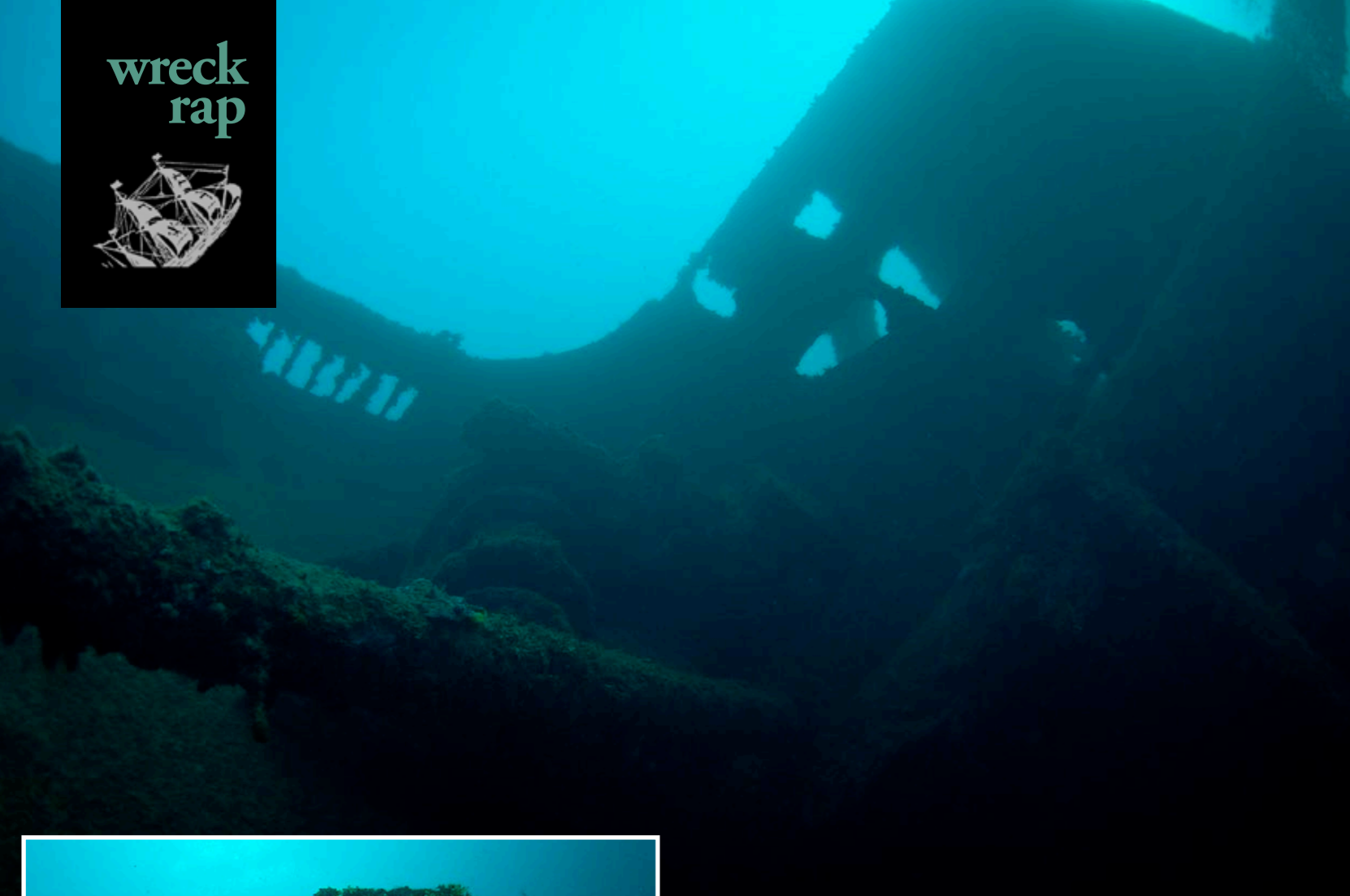
Almost 25 years and another war later, Guam was invaded by Japan. In 1941, Japan occupied Guam—the only United States territory occupied by Japanese forces during WWII. The *Tokai Maru* was a ship built by the Osaka Shosen Company as a Japanese luxury liner in 1930. It travelled from Tokyo to New York and was 134 meters (440ft) long and 18 meters (60ft) wide. In 1940, it was recommissioned as a freighter to transport personnel and war materials for the Japanese Imperial Navy.

On 24 January 1943, the U.S. submarine *Flying Fish* spotted the Japanese Imperial Navy freighter *Tokai Maru* in Apra Harbor. The submarine waited just outside the harbor for three days for it to leave. Giving up on the waiting, the *USS Flying Fish* fired two torpedoes, one missing com-



Moorish idol hides in the Tokai Maru

Map of Guam



THIS PAGE: Scenes from the wreck of the *Tokai Maru*

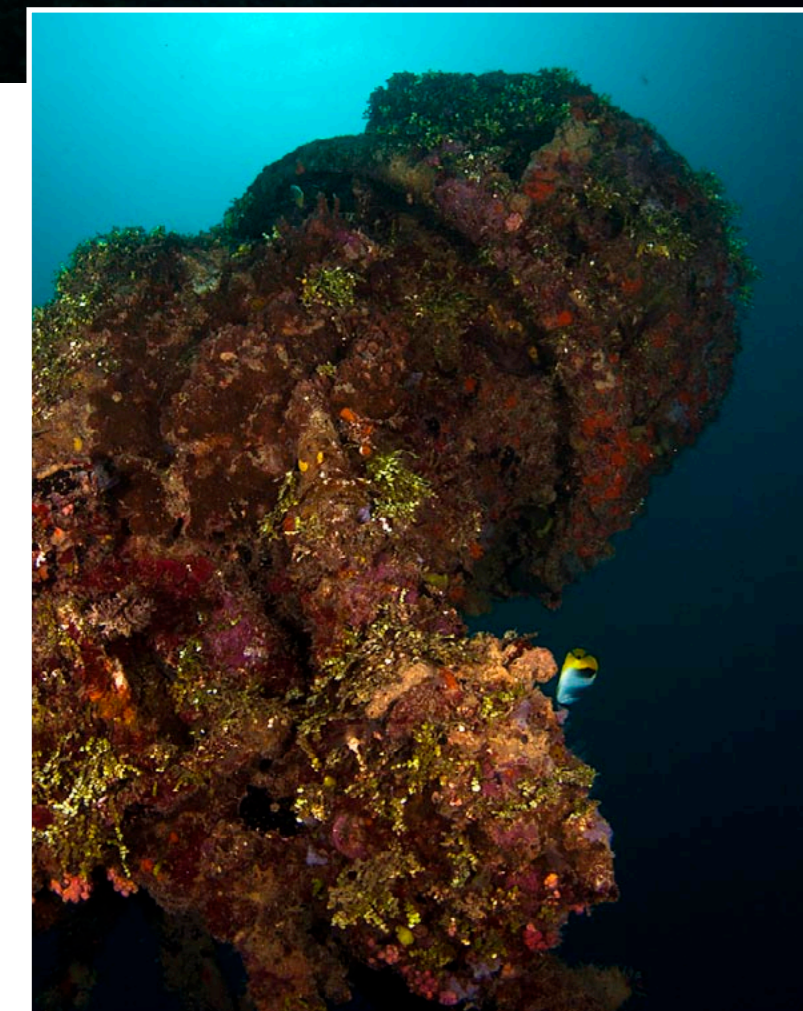
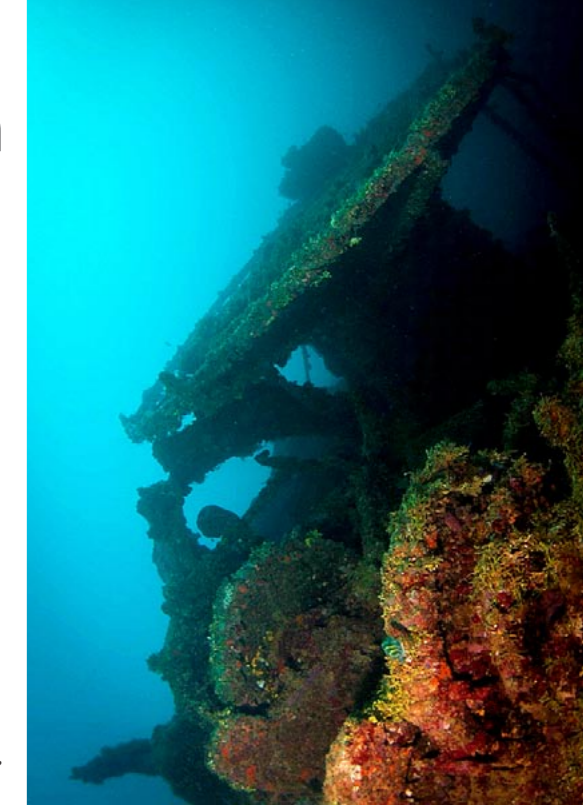
Guam

tinue across the ship to where it touches the *Cormoran* around 30 meters (100ft). Then divers explore the *Cormoran* first, the majority of that ship being deeper, during dive one. Often the second dive is used to explore the slightly shallower *Tokai Maru*. MDA does not lead dives, but for an extra cost will provide a guide. Unfortunately the location of these wrecks inside the harbor leads to varied visibility, usually 10-11 meters (35-40ft), depending on tide change and ship traffic in the harbor.

Guam also offers plenty

of other diving including a Japanese Val bomber, a 90-meter concrete barge called the *American Tanker* to provide a breakwater at the mouth of Apra Harbor, and spectacular reef diving with a lot of healthy hard corals, schools of fish and more anemone fish than one can count. ■

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



pletely, running aground on a reef, and the other striking the *Tokai*, but not sinking her.

Seven months later, on 27 August 1943, another U.S. submarine, the *USS Snapper*, was given another chance to finish the job the *Flying Fish* started. They fired four torpedoes, three hitting and sinking the *Tokai Maru*, the fourth hitting another injured Japanese vessel, the *Nichiyo Maru*.

The *Tokai Maru* sank next to the *Cormoran* in Apra Harbor, with one small section touching each other. The *Tokai* rests in 36 meters (120ft) of water with an 85 degree list to her port. The upper forward bridge is the shallowest area start-

ing around 12 meters (40ft). Most of the superstructure is still intact, and the engine room still has two engines with intact catwalks. Depth charges can still be seen in the stern, and the holds contain bed and truck frames. The *Cormoran* sits in 36 meters on her port side.

Diving the wrecks

Only a 10-minute boat ride from shore, both wrecks can be seen on one dive, but most dive shops, including Micronesian Diver Association (MDA) offers weekly two-tank boat trips allowing for two dives on these wrecks. With the mooring attached to the *Tokai*, most divers descend to the *Tokai* and con-



Diver peers through interior of *Tokai Maru*



Pay-as-you-go carsharing goes global, appeals to tourists, not just locals

Pay as you go instead of paying by the day, that's the new way cars can be rented not only in the United States but also in several countries around the world. One of the largest of these services, Zipcar, with some 767,000 members, was just bought by Avis, the global car rental corporation, at a cool \$500 million, catapulting the concept into the media and highlighting the globalization of car sharing.

Originally geared to locals, travellers and tourists are finding the pay-as-you-go services increasingly appealing and convenient, as they find these type of rental cars available in more and more cities. While you can't yet join while abroad, several service providers let you book a car in another country by using your electronically coded membership card.

The main appeal for travellers is the ability to find cars parked all around town available on the spot at any hour of any day or night, adding spontaneity and flexibility to one's trip. For example, if in London, you could take a jaunt to Stonehenge in a car. No need to figure out how to get there by bus or train.

Because you can reserve cars online or with an iPhone or Android app, anytime, you can get around the limited office hours, limited locations and closed Sundays of traditional car rental companies. Often as



MARIO ROBERTO DURAN ORTIZ / WIKIMEDIA COMMONS

cheap as US\$8 an hour, which covers fuel, insurance and roadside assistance, the premiums don't go up if you are driving in a foreign country, but read the rules carefully. And if you happen to run out of fuel, you can just top it up with the company credit card supplied with the vehicle. How smart is that?

There are a few drawbacks to pay-as-you-go car rentals including the fact that you can't join yet while overseas and there is little availability at airports, with a few exceptions in New York City, Baltimore, Vienna and Hamburg. In addition, it's designed for short-term use and not cost-effective on long journeys. After about 24 hours, you might as well go with traditional day rental, because the cost of pay-as-you-go will exceed the flat daily rate. ■ SOURCE: BBC



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EC debates regulation of carry-on luggage fees

European Parliament lawmakers (MEPs) stated they wanted to end “the excessive restrictions and arbitrary charges that some airlines impose on carry-on luggage”. In addition, MEPs pressed the European Commission, “to include a reasonable hand luggage allowance rule in the coming revision of air passenger rights legislation”—a revision to be postponed for consideration before summer.

“We must protect consumers from the abusive commercial practices that airlines use to generate extra income,” said MEP Georges Bach. In order to allow for carry-on purchases in the airport, MEP Said El Khadraoui said that hand luggage should be checked at the check-in counter rather than at the gate.

However, Commissioner De Gucht was not in favor of more regulatory action even though he conceded that current restrictions varied a lot reflecting what he called a “diversity in a very competitive market”. To that, MEP Wolf Klinz rebutted: “Citizens have lost a lot of confidence in the EU—here's a chance to do something to restore it.” ■

SOURCE: ATWONLINE.COM

World's biggest airport to be built in Istanbul

Turkey has announced plans to build the world's largest airport. With six runways and a cost US\$5.6 billion, the hub will be able to service 150 million passengers per year. That's 60 million more than Hartsfield-Jackson Atlanta International Airport, which is currently the busiest airport in the planet. Slated to be completed in 2017, the airport will be built in four stages on a 77 million square meter area near Istanbul. According to Turkey's transport minister, Binali Yildirim, the new airport will have an annual capacity of 90 million once operational. He said that the plans for the airport would help improve Turkey's bid for the 2020 Olympics. There are other large construction projects planned for Istanbul, which include a high-speed train to Ankara, a make-over for Taksim Square and a third bridge over the Bosphorus. ■

SOURCE: TELEGRAPH.CO.UK



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Planes powered by plants look promising

New fuels made from plants are making waves in the airline industry, as flight tests such as the one made by a twin-engine bio-fueled Falcon 20 from Ottawa International airport in Canada in October 2012 make aviation history.

Upon landing the National Research Council of Canada (NRC) craft, pilot Tim Leslie said, "Today, I flew the world's first 100% biofuel flight. It is truly inspiring to take this step towards an eco-friendly future."

Bio-fuel benefits reported by the Canadian Falcon 20 test flight showed a 50 percent decrease in aerosol emissions as well as increased engine efficiency.

The plane ran on a fuel made from rapeseed oil, but there are other fuels it could have used made from flax, algae, coconut husks or even used cooking oil. Considered eco-friendly because they are carbon neutral, these kinds of "green" fuels are derived from plants that absorb CO2 from the atmosphere while they grow and release the gas when they burn without adding any net greenhouse gases. So many believe that these bio-fuels are the way to go for the aviation industry to decrease its carbon footprint -- an important point considering that aviation contributes 2 percent of all greenhouse gases, according to the IPCC (Intergovernmental Panel on Climate Change).

Some argue the percentage

is closer to 5 to 10 percent due to altitude. Steven Barrett, assistant professor of astronautics and aeronautics at the Massachusetts Institute of Technology (MIT), and the director of the Laboratory for Aviation and the Environment, told the BBC, "Emissions from planes have a different impact than they would on the ground."

While the number of passengers and flights is likely to double by 2030, according to the U.N. International Civil Aviation Organization, airline manufacturers and carriers are scrambling to find effective alternatives. Dr John Tracy, chief technology officer (CTO) at Boeing, told the BBC, "Probably 75% of the research and development

dollars we invest in the commercial airplane side goes towards improving our environmental footprint."

Flying in the future

Long into the future, we may see new aircraft shapes running on electricity, hydrogen or solar energy, but for now, biofuels are seen as a potential savior, as most commercial passenger jets need no modifications to use them. There are those who fear that mass use of bio-fuels will lead to deforestation or the taking of land away from the growing of food, and scientists are calling for further research and assessment of the entire life-cycle of a fuel before it is called 'green' and sustainable. ■



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that airline personnel can scan to identify your luggage and view your itinerary. If someone without access to scanning technology finds your luggage, your tag number can be entered on the ReboundTAG website and you will be notified by text message or e-mail. Cost is GB£34.99 (about US\$54.60) including a one-year membership.

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While not outfitted with special codes or microchips, **Magellan's Retriever Tags** encapsulates instructions written in eight languages (English, Italian, Spanish, Portuguese, Japanese, Chinese, French and German) alerting baggage agents to check the itinerary inside your bag and send your luggage to your next destination. Cost is US\$10.50.

Airlines must compensate passengers for delays

Stuck in an airport for hours or even days because your flight is delayed? Well, now you may be able to get compensation from the airline for your trouble. In a landmark ruling in the United Kingdom, airlines could be required to pay compensation to any passenger whose flight is delayed more than three hours.

European Court of Justice decision, which was made in October 2012. In the European Court case, a Staffordshire couple Jeff and Joyce Halsall claimed that their return flight from Tenerife on Thomas Cook Airlines was delayed by 22 hours.

In the Halsall's claim, which was initially rejected by a local judge, the airline is said to have blamed the delay on an 'exceptional circumstance', which was beyond its control. It was discovered, however, that the flight was actually delayed due to a mechanical problem. So, the Halsalls filed an appeal to the European Court.

Currently, European legislation permits passengers to claim GB£200-£480 if their flights are delayed by more than three hours. These claims can still be rejected by airlines when delays are outside their control, such as strikes or bad weather. It is hoped

by consumer groups that airlines will now not be able to so easily reject most claims, as they have been allowed to do for far too long.

Statistics show that nearly 2 million passengers out of 200 million in U.K. airports each year, endure flight delays of three hours or more. ■ SOURCE: WANDERLUST.CO.UK



TED & DANI PERCIVAL / CREATIVE COMMONS

In a court in Staffordshire, a key ruling has paved the way for passengers to get compensation if their flights are delayed three or more hours. Theoretically, travelers can now even place claims for delays that date back several years—back to 2005, in fact.

The Stoke-on-Trent County Court judge was in fact implementing a

Wikivoyage presents destination guides

Have you checked out the new Wikivoyage? Re-launched under Wikimedia in January 2013, Wikivoyage offers travel guides to destinations all around the world. With user-generated content, the popular online encyclopedia, Wikipedia, collaborates with Wikivoyagers—globe-trotting Internet users—to compile useful travel information on a wide range of countries and places, all on one website. The website states that travel information is currently available in nine languages including English, French, German, Italian, Spanish, Portuguese, Russian,

Swedish and Dutch.

Billed on the site as "the free, worldwide travel guide that anyone can edit", Wikivoyage states that it currently has 27,045 articles in English, and that contributors are not averse to calling a spade a spade: "Being 'fair' does not necessarily mean being 'nice'. We have a mission to make (among other things) a reliable and complete travel guide, and a travel guide that doesn't give qualitative information about the things it describes isn't reliable or complete." For example, an entry about a particular restaurant might state that "serv-

ice can be slow and quality suffers during rush hour".

While it claims not to be a travel magazine, users of Wikivoyage will find a wealth of travel information on each destination entry including details about terrain, weather, a bit of history, and the most popular places to visit. In addition, there's information about how to get into the country and how to get around. One has only to surf the pages to learn more. ■

SOURCE: JYLLANDS-POSTEN.DK



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Sharks show plane makers how to fly more efficiently

Airbus and the German airline Lufthansa are testing a shark-skin coating for their airplanes.

Sharks skin is composed of jagged scales covered with tiny longitudinal ridges, which play a big role in why sharks can so easily slice through the water. Experiments suggest that the ridges cut down on the friction between the shark and the water, channelling the water and even speeding it along, as it moves over the skin and preventing eddies, which contribute to drag. This observation has made the aviation industry believe sharks could hold the key to cutting energy consumption.

The aviation industry believes sharks could hold the key to cutting energy consumption

To this effect, a new state-of-the-art varnish, which attempts to mimic the skins of fast-swimming sharks, has been developed by the Fraunhofer Institute for Manufacturing Technology and Advanced Materials (FAM) in Bremen, Germany.

In the past, said Volkmar Stenzel, the project's head at the Fraunhofer Institute, sheets of plastic imitation shark skin were glued to the aircraft's exterior. "But the foil had major disadvantages: it was rather heavy and the added weight cancelled out the amount of fuel that could be saved," Stenzel said.

Instead Fraunhofer Institute have developed a new technique to emboss the structures of shark skin into aircraft paints.

The idea is to make surfaces more aerodynamic and reduce fuel consumption by about one percent and lower operating costs. ■

SOURCE: BLOOMBERG BUSINESSWEEK



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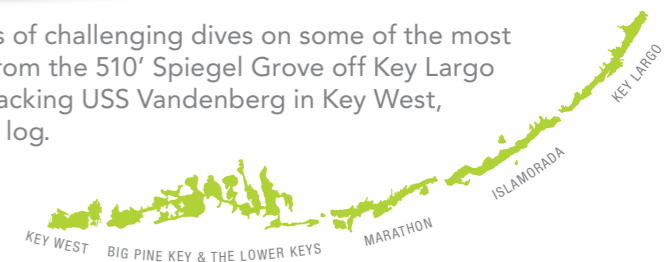
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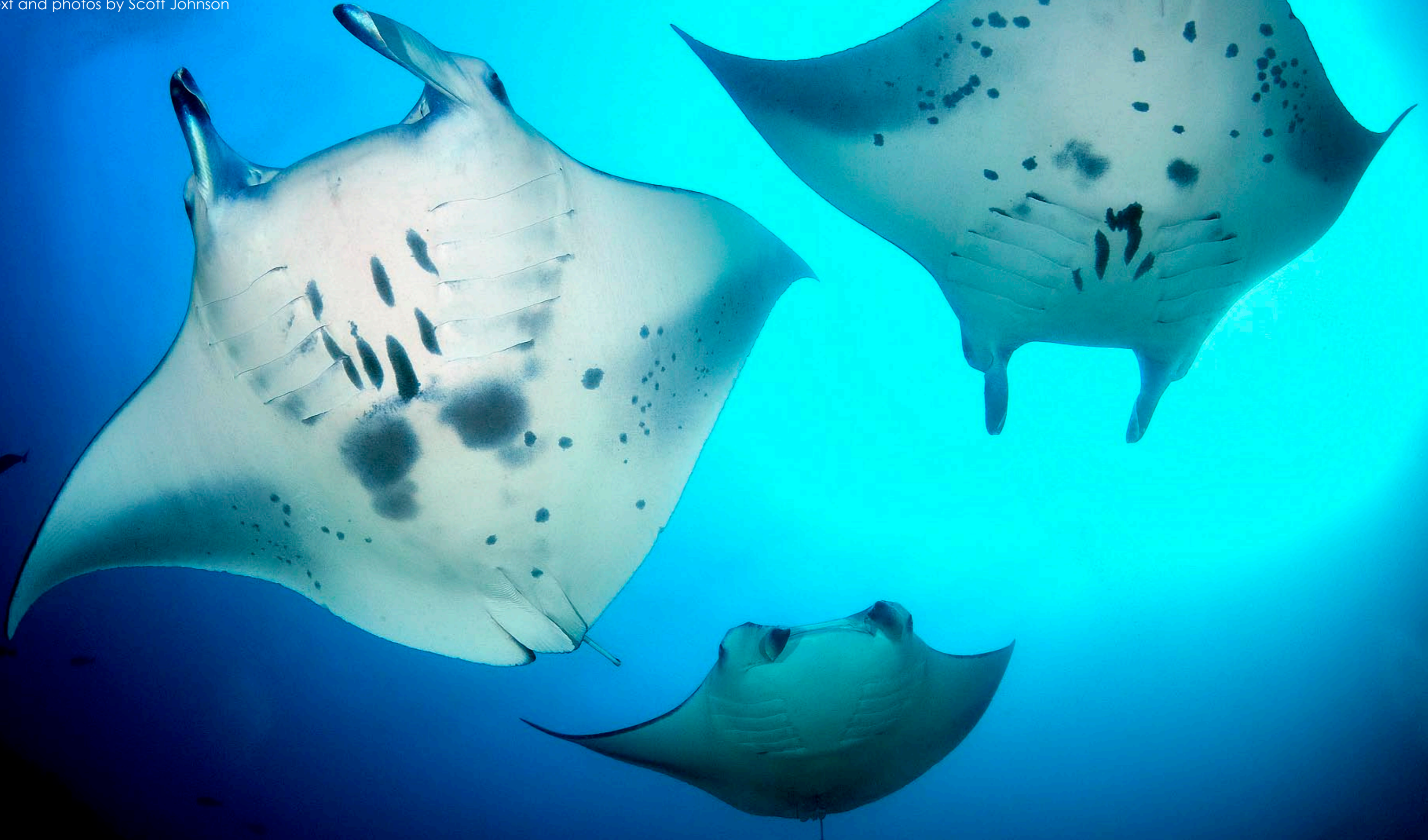
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Maldives *Sumptuous Diving*

Text and photos by Scott Johnson





A dhooni, Maldivian style sailboat, at Four Seasons Resort (above); Massive school of bluesripe snapper (right) at Banana Reef, North Male' Atoll; Friendly honeycomb moray eel (below) being cleaned by bluestreak cleaner wrasse. PREVIOUS PAGE: Resident manta rays circling at Lankan, North Male' Atoll

I eagerly plunge into the refreshing, blue water at Miyaru Faru off South Male' Atoll and begin to drift with the rest of my group as the stiff current pushes us along. Within minutes, I spot one of my favorite marine animals extended from a hole near the bottom. I quickly exhale and spread my arms wide to simultaneously descend and slowdown so as not to overshoot the area.

The surrounding coral outcroppings offer protection from the current and allow me to focus on the impressive honeycomb moray (*Gymnothorax favagineus*) that seems as curious of me as I am of it. The beautiful eel sways back and forth as if to some siren's melody that only it can hear. I compose a

series of shots through the viewfinder of my Aquatica AD7000 housing, pausing only long enough to reposition the two Sea and Sea YS-250 strobes. The viz is limited due to the sand being stirred by the outgoing tide, but I persevere in hopes that at least one of the images will be decent.

My dwindling remaining bottom time forces me to leave the friendly moray and gradually work my way to fresh air. When I surface, I spot the *dhooni* (the infamous Maldivian style of boat that epitomizes "a slow boat to China") highlighted in the glow of the setting sun, but far away. Apparently, the rest of the group rode the current throughout the dive while I surfaced close to where I entered.

As I reach for my SMB (surface marker buoy), a speed boat appears out of nowhere and passes much too close for comfort. The dwindling ambient light means I need to inflate the SMB sooner rather than later. Before I can

even begin to blow into the SMB, I hear someone clear his throat behind me. I turn to see two uniformed crewman standing on the bow of a yacht and a couple sipping champagne on a platform above them.





One of the beaches (above) and swimming pools (left) at the Four Seasons Resort



The Maldives Aggressor liveaboard

The crewman on the right says, "We saw that idiot race his boat dangerously close to your position and thought you could use our assistance. Would you like us to take you to your vessel?" Stunned, I simply nodded my head in agreement. The crew helps me aboard, and the couple insists I be given a glass of champagne. Thus, I am transported "James Bond" style back to the *Maldives Aggressor's* dhoni, holding a glass of bubbly and chatting with my rescuers. My dive mates roar with laughter when they realize it is me and yell in unison, "It figures!" This is the perfect ending to another glorious day of diving in the Maldives.

The Flower of the Indies

The Republic of Maldives is comprised of 26 geographical atolls that collectively resemble an elongated, jeweled necklace running north/south

and are situated slightly above the equator in the Indian Ocean. An atoll, which is derived from the Maldivian word *atholhu*, is the product of fringing reefs that originated from the sides of a volcano and then continued to grow towards the surface as the volcano receded back to the ocean floor. The resulting ring-shaped barrier reefs have a foundation of lava and dead coral, protect a central lagoon and are separated from each other by channels that lead for the lagoon to the sea. Since atolls are built from colonizing corals, they are limited to tropical and sub-tropical oceans that possess the warm water and plentiful nutrients needed to support such creatures.

The Maldivian atolls, which are part of the submarine mountain range called the Laccadives-Chagos Ridge, are intermittently spread over 56,000 sq mi (90,000 sq km). They protect



Oriental sweetlips at dusk off South Ari Atoll; Private villa beach, Four Seasons Resort (top left)

almost 2,000 islands, only 200 of which are inhabited. Ninety-nine percent of the Maldives is ocean and only 186 sq mi (300 sq km) of the country is above the water's surface!

Marco Polo called the Maldives the "Flower of the Indies". Polo obviously had fine taste. I have visited many countries and islands throughout my career, but I have never flown over a more beautiful island nation. The low flying sea planes provide the perfect vantage points for soaking in the brilliant white sand beaches, statuesque palm trees and exquisite shades of blue, from the dark blue sea to the turquoise waters outlining the atolls. The scenery is absolutely breathtaking.

A dive holiday here is like staging your own version of *Lifestyles of the Rich and Famous*. The natural settings and idyllic private island resorts offer lavish get-

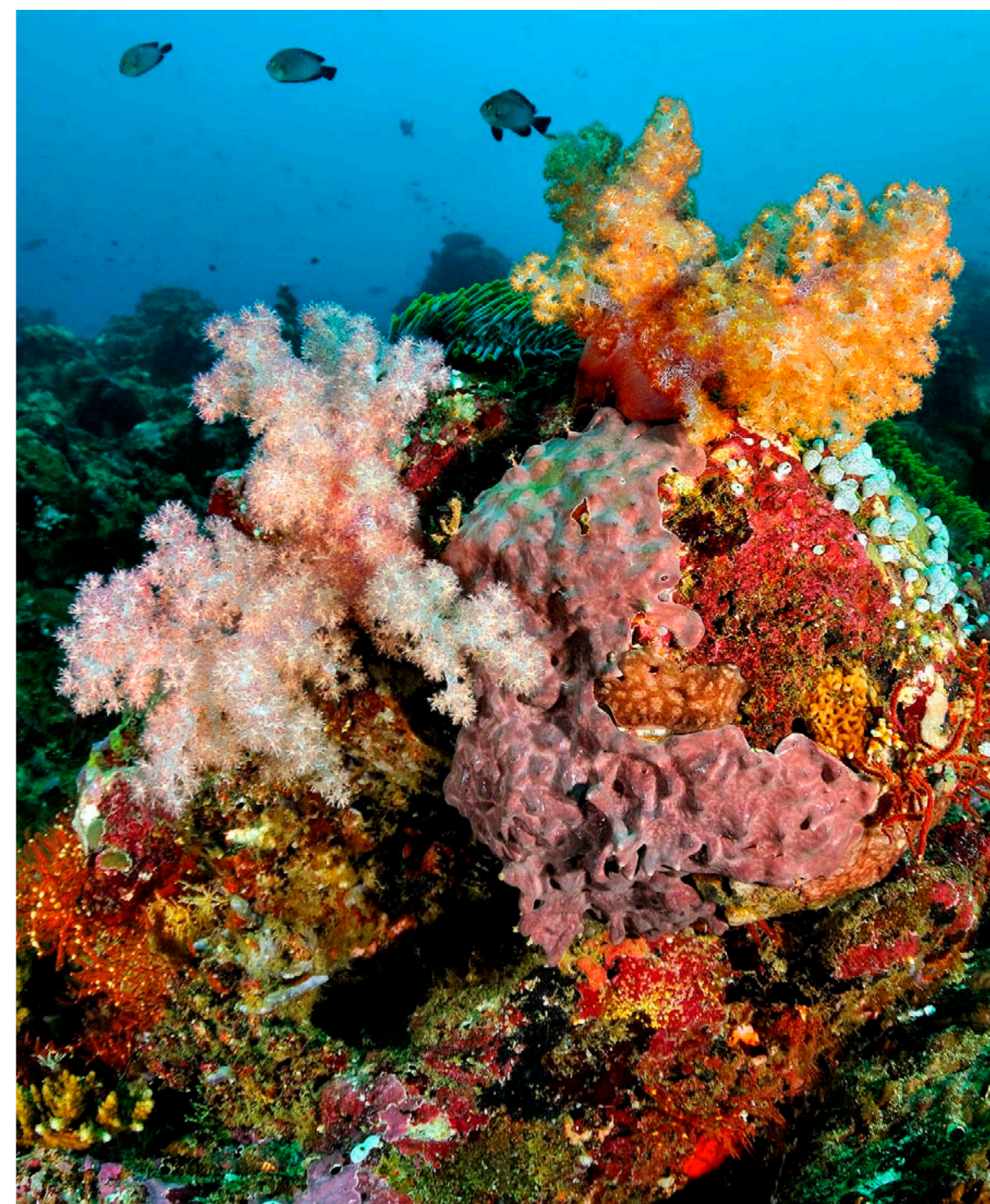
aways that are beyond mere opulence. Pampered cycles of dive-eat-and-relax allow you to indulge personal passions, while making it easy to forget the hectic pace of modern life.

My own *Rich and Shameless* episode features a stay at the luxurious Four Seasons Resort at Landaa Giraavaru and charters on the Four Season's *Maldives Explorer* and *Maldives Aggressor*. This combination of land-based resort and liveaboard (safari boat in the Maldives) charter is the ideal way to both explore and soak in the enchanting surroundings. Impeccable service is the norm. To be candid, the unremitting effort to appease and even anticipate my every need throughout my stay has left me a bit paranoid. I keep waiting for a hand to materialize whenever I need to wipe my nose or other less visible body parts.



Maldivian anemonefish in a magnificent anemone at Maaya Thila, North Ari Atoll

Curious hawksbill sea turtle at Muthaafush Thila, Baa Atoll



South corals, Back Faru, North Male' Atoll; Longnose hawkfish, Vaadhoo Thila, Raa Atoll (top)

Lyretail anthias and hard coral cover at Radhdhiggaa Thila, South Ari Atoll

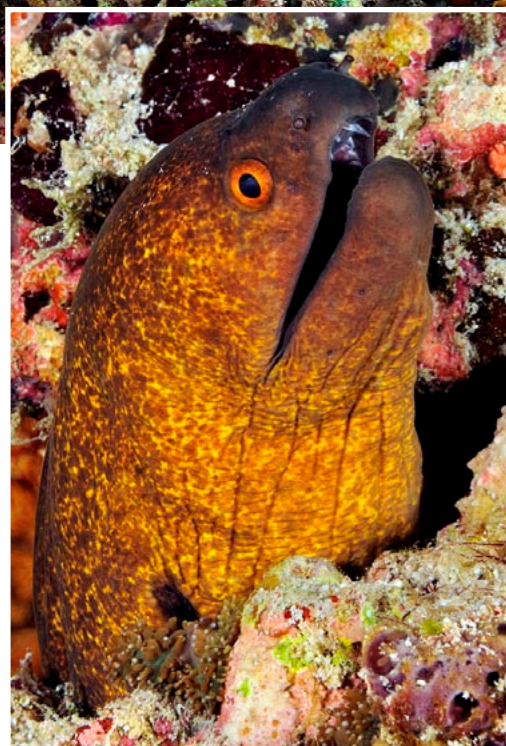
The currents rule, the divers drool

The Maldivian underwater world is even more rich and extravagant than any terrestrial man-made setting. More than 1,000 species of fish and 200 species of coral are present. Currents carry you along healthy reefs adorned in hard and soft corals. Brightly colored anthias dart among coral heads, while large schools of bluestripe snapper and neon fusiliers move in unison as they cling to or sweep over the reef. Yes, currents dictate

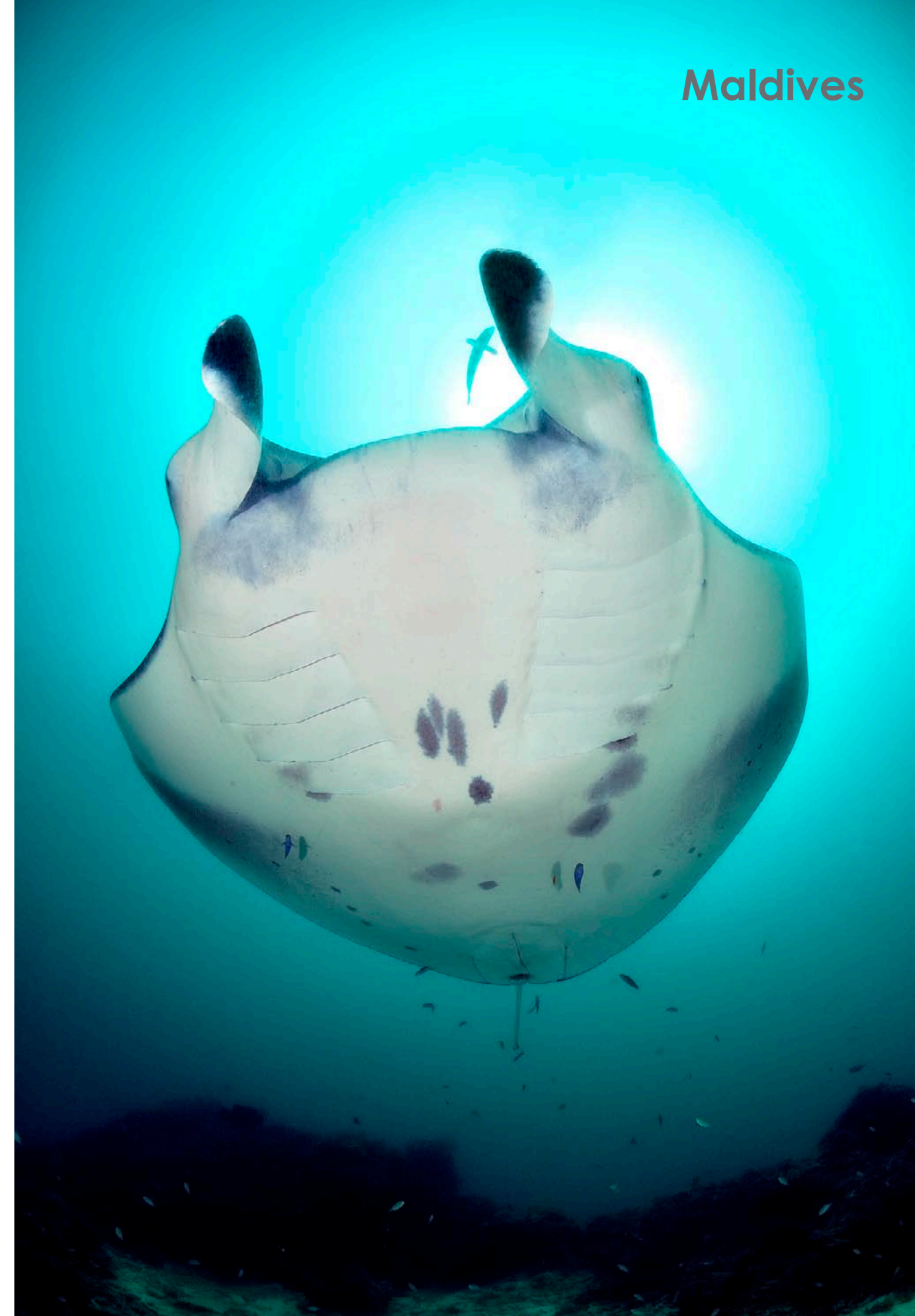
the location, direction, pace, difficulty and even the excitement of the dives.

The diving is defined by a reef's formation, size and depth as a *kandu*, *faru*, *thila* or *giri*. A *kandu* is a channel that connects a lagoon to the open ocean. These dives often produce strong currents and should only be attempted on an incoming tide that carries divers into the safety of the lagoon. The incoming tide also provides much better visibility than the outgoing variety. A *faru* is

a circular reef within a channel that extends to the surface. Its outer edge is exposed to the open ocean and often a prime location for spotting pelagics and large schools. *Thilas* are oblong or circular reefs within an atoll with tops 6m to 12m (20ft to 40ft) below the surface. Their steep walls are pocked with overhangs that are lined with soft corals and filled with fish. A *giri* is like a *thila*, but smaller and reaching within 1m to 3m (5ft to 10ft) of the surface.



Yellowmargin moray eel at Miyaru Gaa, South Ari Atoll



About the only way to spend a week diving here and miss them is to scuba in a pool or keep your eyes closed. Lankan or Manta Point off North Male' Atoll offers one of the many shallow-water Manta Ray cleaning stations scattered throughout the archipelago.

ments. I watch 17 large mantas sweep over the divers' heads and take turns being cleaned. The rays' movements seem to be perfectly choreographed as they dance and yet avoid one another in such a compressed space. The other divers, like me, are in awe at the performance. The mantas were there when we arrived and remain even as we watch them during our respective safety stops.

The color, variety and action on even these "simple" dives can be a bit overwhelming if you take the time to soak in the entirety of your surroundings. For example, I made three consecutive dives on another manta ray cleaning station located in Hanifar Bay, Baa

Marine marvels

Manta rays (*Manta alfredi*) are the signature marine animal in the Maldives.

Prior to the dive, guests are instructed to find a spot just below the top of the small reef so as not to obstruct the manta's move-

THIS PAGE: Resident manta rays are commonly sighted throughout the Maldives archipelago





Atoll. On the first dive, I used a Tokina 10-17mm fisheye lens to photograph four majestic rays that repeatedly circled the site as they were cleaned by industrious blues-treak cleaner wrasse (*Labroides dimidiatus*). The second tank and a 60mm lens allowed me to frame an exquisite, white leaf scorpionfish (*Taenianotus triacanthus*) as it yawned and seemed to proudly pose. The third dive and a super macro set-up yielded shots of a male coral cardinalfish (*Apogon properupta*) incubating eggs in its mouth. The manta rays, leaf scorpionfish and coral cardinalfish were often within 20ft (6m) of one another at intervals throughout the day. I needed three dives and three alternate perspectives

on this tiny site to even begin to appreciate some of the wonderful treasures it had to offer.

I spend a week at Hanifaru Bay working from Guy Stevens' research dhoni. Guy, a marine biologist whose work is supported by the Save Our Seas Foundation and the Four Seasons Resort at Landaa Giraavaru, is the founder of both Manta Trust and the Maldivian Manta Ray Project. His passion for the mantas, Hanifaru and marine conservation is clearly evident. Guy endures long days with his research assistants identifying and tracking the elegant rays, as well as studying their behavior from the surface and underwater. He has concluded there are two different species of mantas in the

Maldives: residents (*Manta alfredi*) and pelagics (*Manta birostris*).

Hanifaru is about the size of a football field, but Guy faithfully monitors it during the *Hulhangu* (the southwest monsoon or wet season) for a much different kind of spectacle. When the conditions are right, a veritable buffet of plankton flows into the bay and gets trapped. This causes some unknown dinner bell to ring and prompts hungry mantas to arrive in mass.

Guy has frequently spotted as many as 200 mantas and multiple whale sharks (*Rhincodon typus*) with their maws agape, all feeding on the plankton at the same time. I gave Guy a you-gotta-be-kidding-me look, as I simply could not



Mouthbreeding male coral cardinalfish, Hanifaru Bay, Baa Atoll

CLOCKWISE: White leaf scorpionfish, Hanifaru Bay, Baa Atoll; Diver with whale shark, Sunset Reef, South Ari Atoll; Manta ray being cleaned, Lankan, North Male' Atoll; Resting leopard shark, dusk dive, Maamiggili Out, South Ari Atoll



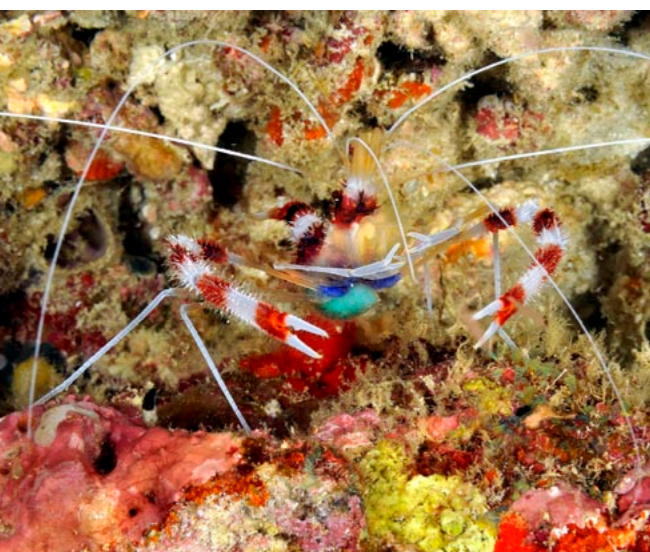


White collar butterflyfish (left), Banana Reef, North Male' Atoll; Slipper lobster (above), South Ari Atoll; Idyllic spa bungalows at the Four Seasons Resort (right), Landaa Giraavaru



Hanifaru Bay Plankton Party may ultimately lead to its demise if protective legislation is not implemented and vigilantly enforced.

Snorkelers and divers now regularly outnumber the marine animals and are a threat to one another, as well as the hungry creatures. I personally witnessed divers being dumped on other divers and snorkelers by dive operators that were either neg-



fathom how any water could be left in the bay with so many large animals packed inside it. I eventually concluded he was not pulling my fin as I, too, spotted numerous mantas during my dives there. Besides, he had video and pictures to prove it. Only South Africa's Sardine Run can rival this awe-inspiring feeding aggregation.

South Ari is usually your best chance to swim with whale sharks in the archipelago. Juveniles are regularly spotted feeding near the surface here and seem to be rather tolerant to us humans. The *Aggressor* whale shark procedure is pretty simple. The captain positions the dhoni well ahead of and parallel to a shark. Guests are then told to quietly slip into the water and wait for the animal to appear.

Of course, "quietly slipping" usually translates

into jumping and splashing. And, "waiting" generally means the guests swim as fast as they can in all directions.

The plankton-feeding sharks do not seem to be moving fast when observed from the boat. The "in water" experience is altogether different. The sharks blow by you with the bare minimum of effort, so each snorkeling opportunity is fairly short. Even so, the cumulative effect of repeated encounters results in an exuberant, grateful and tired group.

Saving paradise

Paradise is never won or maintained without sacrifice. The discovery and subsequent fame of the



Hard corals on Sunset Reef, South Ari Atoll

Banded coral shrimp with eggs at Dhigali Reef, Raa Atoll



Male', the bustling capital city of the Maldives, offers many sightseeing options and is just a ten-minute boat ride from the airport

ligent or poorly trained. Boats sped through the human mass, and I was amazed no one was seriously injured. I left Hanifaru wondering if it would take the death a tourist to make the government do the right thing. Fortunately, I was wrong.

Guy, and the rest of the Baa Atoll community, have finally worked out a management plan for Hanifaru Bay with members of the Ministry of Housing and Environment. The Management Plan for Hanifaru Marine Protected Area will be part of the Atoll Ecosystem Conservation Project and implemented over two years. It will eliminate scuba diving in the bay after 2011, limit the number of snorkelers and provide funding for the ongoing conservation efforts.

The Marine Discovery Center at the Four Seasons Resort at Landaa Giraavaru is at the forefront of numerous critical conservation efforts. In response to a 1998 mass coral bleaching event that killed 90 per-

cent of the coral above 45ft (15m), it launched a coral propagation project with Reefscapers that has transplanted almost 70,000 coral fragments since 2005, with a survival rate of 80 percent.

The primary goal of this project is to develop heartier strains of coral that are more resistant to prolonged water temperature spikes. Healthy reefs play vital roles in sustaining the marine life, fueling the growing tourism industry and protecting the Maldivian flat islands from high waves that could decimate the nation.

No nation is more threatened by global warming than the Maldives. It is the lowest country on Earth with an average ground level of only 5ft (1.5m). Its highest point is only 8ft (2.4m). Scientists have predicted rising ocean levels may make the Maldives uninhabitable by 2100. The nation's former President, Mohamed Nasheed, held the world's first underwater cabinet meeting on 17 October 2009 to

sign a resolution entitled, *SOS From The Frontline*, calling for global cuts in carbon emissions. The document was presented at the Climate Summit in Copenhagen, Denmark, two months later.

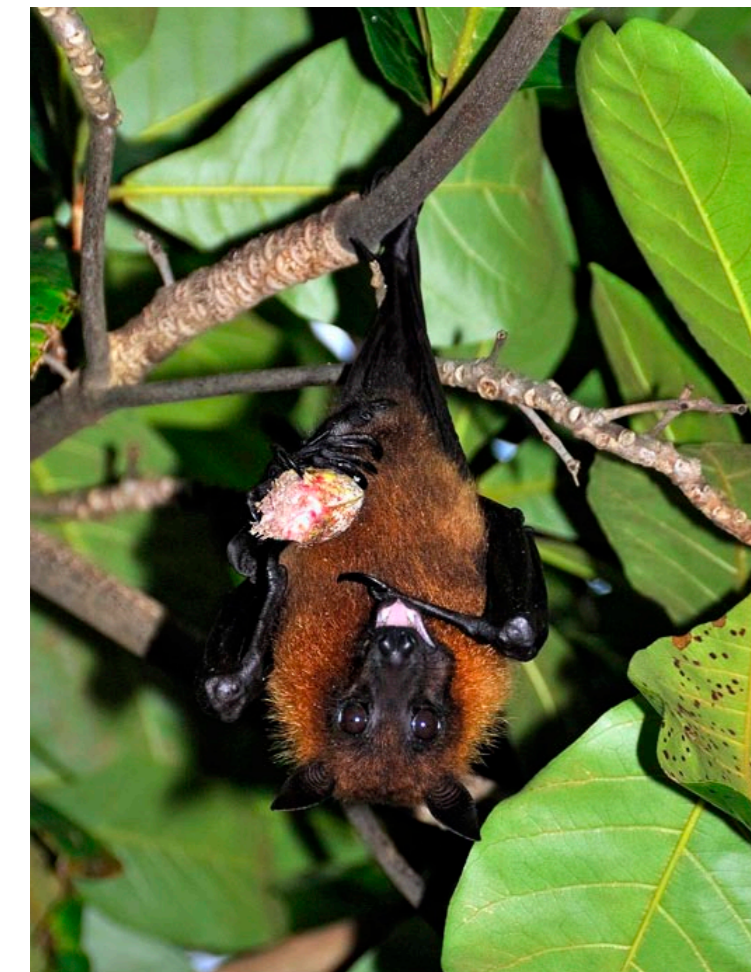
The President has committed to making the Maldives the first carbon neutral county by 2020 and is setting aside a portion of the country's annual tourist income to potentially purchase land in India, Sri Lanka or Australia for his people should global warming drown paradise.

Go batty

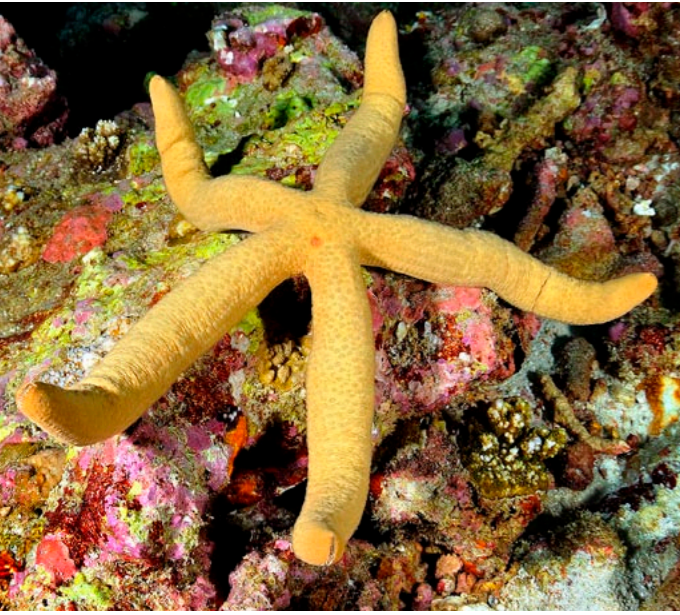
There is little to do on land in the Maldives, except relax, soak up some rays, get to know the friendly locals and/or try other water activities, such as surfing. My favorite past-time is watching the large fruit bats (*Pteropus giganteus ariel*), which are active around the clock. Most fruit bats I have encountered elsewhere stay hidden during the day, but the



Plumeria adorn the Four Seasons Resort grounds



Feeding Indian flying fox fruit bat



Marching yellow starfish on Miyaru Faru, South Ari Atoll (above); Swarming glassy sweepers at Kudhadoo Beyru, South Ari Atoll (right); Dhonis anchored off South Ari Atoll (bottom)



Maldivian bats do not have to worry about predators and thus do not fear the sunshine. The best time to photograph them is in the evening when they are feeding on fruit. I look for trees with ripe, low-hanging fruit and more often than not, one of bats will arrive to feast while I am flash away.

Male'—the Maldives' bustling capital—is a ten-minute boat ride from the Malé International airport, which, like the many luxurious resorts, is located on its own island. Male' is packed with people and offers sightseeing options, such as the National Museum and the Grand Friday Mosque. It is worth a short visit at the end of your holiday, as you wait for your flight home, but the experience will likely leave you wanting to return to the solitude of a secluded atoll.

Hungering for déjà vu

From sea planes to dhoni rides to live-aboards, you can only explore a fraction of the Maldives' expansive territory during a single visit. The Maldives is definitely a multi-trip destination. I highly recommend splitting your time between a live-aboard and a resort to give your body

the chance to adjust to the new time zone and take the opportunity to stop and smell the "Flower of the Indies". The Four Seasons Resort at Landaa Giraavaru and the *Maldives Aggressor* will allow you to indulge yourself in the "Luxury Isles". The challenge is figuring out how to return as often as possible. Remember, paradise is indeed addictive. ■

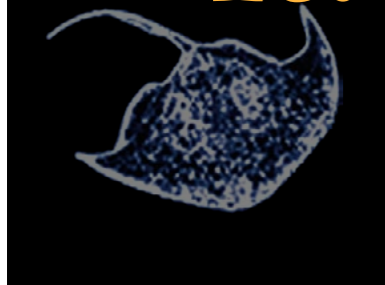
The author would like to thank Guy Stevens (www.mantatrust.org), *Four*

Seasons Resort Maldives at Landaa Giraavaru (www.fourseasons.com/maldiveslg), *Four Seasons Resort Maldives at Kuda Huraa* (www.fourseasons.com/maldiveskh), *Four Seasons Maldives Explorer* (www.fourseasons.com/maldivesfse) and *Maldives Aggressor* (www.aggressor.com).

Scott Johnson is a widely published U.S.-based photojournalist who specializes in marine, wildlife and travel subjects. See: Seascapesimages.com



fact file



Maldives



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

History The Maldives is located in the heart of the Indian Ocean shipping lanes. This has been both a blessing and curse in terms of the outside world's impact on its culture and way of life. The Maldivian history prior to AD 1153 is a mixture of conjecture and legend due to the lack of written materials and artifacts. The earliest inhabitants likely migrated from India and Sri Lanka. Sailors and traders braved the treacherous Maldivian reefs to collect fresh water, dried fish, fruit, coir (coconut husk) rope and cowry shells. The Maldives existed as a sultanate from the 12th century until 1887, when the archipelago became a British protectorate. In 1968, it became a republic, three years after it claimed independence. For 30 years, President Gayoom dominated the islands' political arena. Via single-party referendums, he was elected to six successive terms. In 2003, political demonstrations in the capital city of Male'

spurred the president and his government to initiate democratic reforms. These included a political system that was more representative of the people as well as expanded political freedoms. It was slow going, though, and the realization of some of the promised reforms was sluggish. Despite this, political parties were legalized in 2005, and in 2008, a new constitution was finalized by a constituent assembly. It was then ratified by the president in summer. In the fall of the same year, the first-ever presidential elections were held under a multi-candidate, multi-party system. The incumbent president was defeated and Mohamed Nasheed became the new president. He was a political activist who had in previous years been put in jail by the former regime.

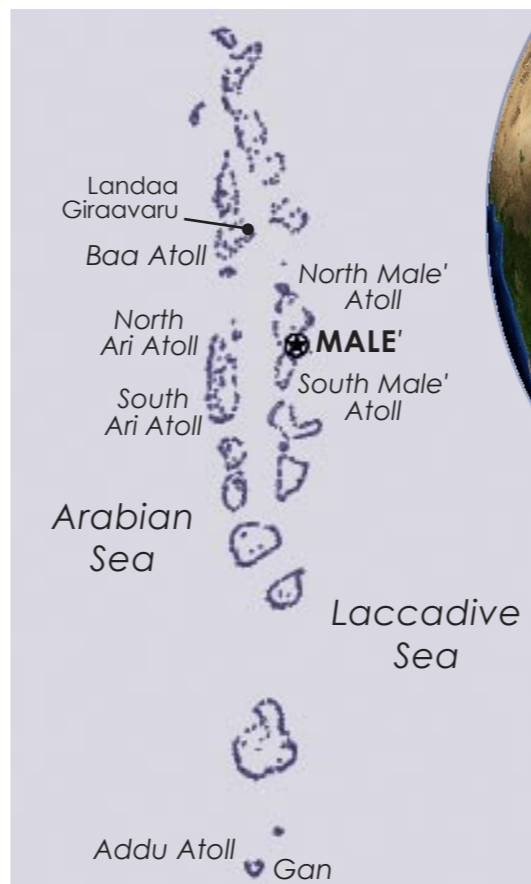
Challenges facing the new president included strengthening democracy in the country and finding solutions to drug abuse and poverty. Nasheed resigned in 2012, after several weeks of demonstrations in the streets following his firing of a top judge. Vice President Waheed then took over. In international climate change discussions, Maldivian officials have played a prominent role, as the

country is threatened by sea level rise due to its low elevation. Government: republic. Capital: Male'

Geography

Located in Southern Asia, the Maldives are a group of atolls in the Indian Ocean just south-southwest of India. Coastline: 644km. The terrain is flat, with white sandy beaches. Lowest point: Indian Ocean 0m. Highest point: a point in the Addu Atholhu, yet unnamed on Viligili 2.4m. Note: The country is comprised of 1,190 coral islands grouped into 26 atolls. There are 200 inhabited islands, as well as 80 islands with tourist resorts.

Climate Tropical, greatly influenced by the *Iruvai* ("dry" northeast monsoon that typically blows mid-November to April) and the *Hulhangu* ("wet" southwest monsoon in May to October). Air temperatures stay near 86°F (30°C) year-round. Natural hazards include tsunamis and rises in sea levels to which the country is vulnerable, as its islands have a low



RIGHT: Global map with location of the Maldives. BELOW: Location of Male' on map of the Maldives



elevation. Water temperatures are consistently between 26.5-29.5°C (80-85°F) for- eign exchange. Fishing is a distant second and the gap continues to grow.

Population 394,451 (July 2012 est.) Ethnic groups: South Indians, Sinhalese, Arabs. Internet users: 86,400 (2009) Religion: Sunni Muslim

Currency The Maldivian Rufiyaa (MVR) is pegged to the U.S. dollar at 12.8. U.S. dollars and credit cards are widely accepted and often preferred. Exchange rates: 1EUR=20.74MVR; 1USD=15.41MVR; 1GBP=24.36MVR; 1AUD=16MVR; 1SGD=12.5MVR

Language Maldivian Dhivehi is the official language—it is a dialect of Sinhala with script derived from Arabic—but English is widely spoken in Male', at the resorts and by tourism service providers.

Dress is casual and comfortable. Swimming trunks, bikinis and other beachwear are common at resorts and on safari boats. Some guests prefer to dress a bit more

formally for dinner at the higher end resorts. Chests and thighs must be covered in Male' and on inhabited, non-resort islands.

Alcohol The Maldives is definitely not a BYOB destination. You are not allowed to bring alcoholic drinks into the Maldives. Even if you purchase duty free alcoholic items in the Singapore or Dubai airports en route to the Male' International Airport, these items will be confiscated upon arrival as bags are x-rayed. Only businesses specializing in tourism are allowed to import, store and/or serve alcoholic beverages, including wine.

Electricity 220/240 volt AC at 50 cycles; no standard socket types.

Driving Forget it! The Maldives only has 55mi (88km) of roads and over 80% of them are the crowded streets of Male'.

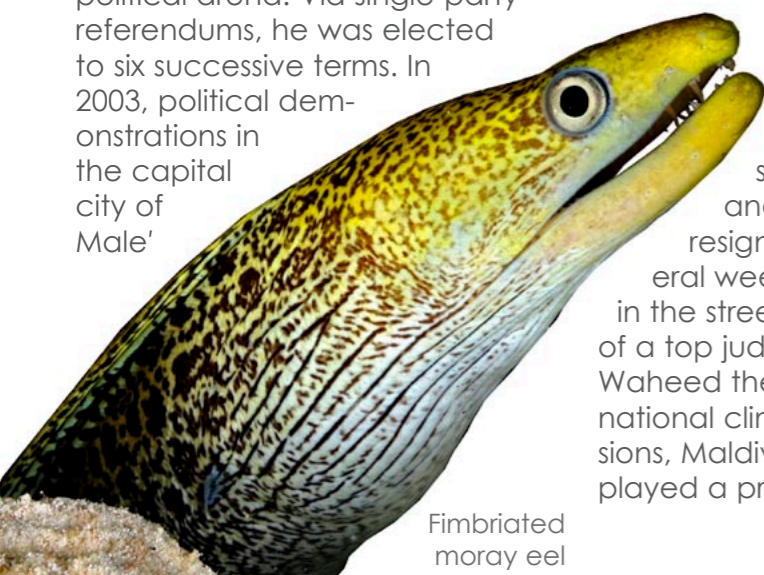
Getting there Singapore Airlines, Malaysian Airlines, British Airways, Emirates Airline and Qatar Airways offer direct flights from such cities as Singapore, Bangkok and Kuala Lumpur, in addition to major hubs in Europe and India.

Entry/Visa A free 30-day visa is extended upon arrival.

Decompression chambers

Bandos Island Resort
Bandos Medical Clinic & Hyperbaric Center, tel: + 960 440 088
Kandoludhoo Island Resort
Kandoludhoo Divers Rescue tel: + 960 773 485
Kuramathi Resort
Kuramathi Medical Centre
Hotline +960 777 3485

Web sites
Maldives Tourism
www.visitmaldives.com



Fimbriated moray eel

Murter Island Croatia

Diving the Adriatic Sea



Drop-off covered with dense beds of red corals (left); View of the little port of Jezera and Murter Island (above); There are caverns and caves, too (right)

For quite a time, I had been wanting to go back to Croatia to see first hand what this young nation with ancient roots had to offer, both below and above the surface. Back in the 1980s, in the days when Prince and Michael Jackson were the dominant figures in popular music, I went there on a camping trip. It was before my diving days, but the pristine archipelago with its brochure-like, clear, turquoise waters was forever, clearly imprinted in my memory. For many years, the brutal civil war, which ravaged the Balkans and splintered the Yugoslavian federation, made it if not impossible then at least unwise to go there for a revisit. But finally, about a quarter of a century later, I was back, and this time, I brought lots of diving and camera gear.



Text and photos by Peter Symes and Andrey Bizyukin

The Romans called the Mediterranean Sea, *Mare Nostrum*—our sea—which signals some degree of proximity and relative ease of access, at least if you live in Europe. With all the hassles at airports these days, the long waiting lines, intrusive security and still tighter restrictions on lug-

gage allowances just getting worse over time, destinations that I could possibly drive to rather than fly to were starting to look more and more attractive by the day. In this case, I ended up flying anyway, but at least I stayed within the same time zone, so no jet lag.

As I, one late summer day, once again stepped out into Dalmatia—the historic region of Croatia that

makes up the central part of the eastern coast of the Adriatic Sea—I was greeted with a landscape that had been baked all summer long by the scorching midday sun. There were lots of browns and yellows, colors of the soil and dried underbrush under the dusty green foliage. Villages nestled between orchards of olive trees covering the rolling hills were generally made up of quaint,



ANDREY BIZYUKIN

The promenade in the port of Jezera (above); A school of what we tentatively identify as some species of horse mackerel darting over a reef covered with red coral (left)



ANDREY BIZYUKIN

white cottages and villas with red, tiled roofs. In the distance, totally contrasting in colour and texture, I could see the glittering sea. It was the same turquoise colour I so clearly remembered.

Jezera

Nautilus dive center is conveniently located in the picturesque, little fishing village of Jezera on the island of Murter from where the stunning archipelago, including the marine reserve of Kornati National Park, is easily reached by a short boat trip.

The village clearly caters to a lot of tourists during the summer but not in an intrusive way; there are no major hotels or resort complexes, just a bustling harbour fringed with restaurants, boutiques, ice cream stalls, and booths selling jewellery and cheap souvenirs. There was a small hotel, but the most common form of accommo-

dation offered to tourists were rooms and small apartments rented by local owners of private villas.

So, we ended up with a local family who offered us a comfortable private apartment with a big balcony overlooking the port and the family's lovely garden full of fig trees hanging heavy with fruit. Booked through the very helpful and friendly staff of the Bisage Travel Agency in the center of town, Apartman Irena (www.murter-apartmani.net) run by Karlo Klarin and his family, was just a short walk to the marina and Lucica Beach. Karlo was, fortunately for us, also an official tour guide and native of Murter Island, with a wealth of information on the culture, history, attractions and activities of the island and fluent in no less than five languages: English, German, Italian, Czech and Croat.

The dive center is located right on the harbour front, not in a shop but



ANDREY BIZYUKIN

The omnipresent lush hard corals are one of the attraction for divers and underwater photographers



PETER SYMES



PETER SYMES

Small, hemispherical hard coral colonies (left) with large corallites of indeterminate species; Great viz (above) along the outer reef of Kornati Island; Typical scenery (top right) at about 25m depth; *Aplysina aerophoba*—a common species in the Mediterranean (below)

Diving

The dive boat was huge and very spacious. It was a fishing trawler of sorts, the size of a small Red Sea liveaboard, albeit not very fancy but with a large upper sun deck with benches and tables and room for at least a couple of dozen people. We steamed out towards open sea with a mixed crowd of divers and some of their families. At one of the tables, a couple of kids were totally absorbed playing with their Gameboys, while at another table, a team of divers were meddling with their cameras. There was a soothing, relaxed atmosphere.

Just getting to the dive sites felt

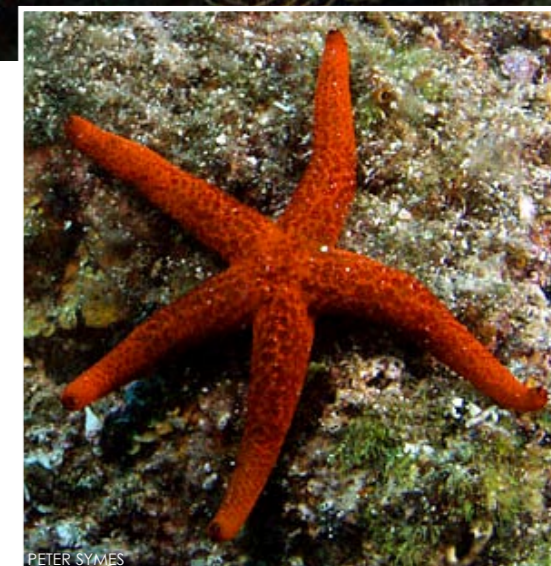


PETER SYMES

like a mini-cruise, as the vessel wove in and out of the many islets en route. The blue sea was dotted with leisure crafts, motorboats and sail boats, as we headed out towards the Kornati National Park.

Ranging over

35km, with 140 islands in an area of sea of about 320 squ km, the Kornati is the densest archipelago in the Mediterranean. In 1980, the 89 southernmost islands, islets and reefs of the Kornati archipelago were declared a national park, Nacionalni Park Kornati, protecting the islands and their marine surroundings. Kornat, which by far is the biggest of the islands is connected to the mainland by a drawbridge. There are no



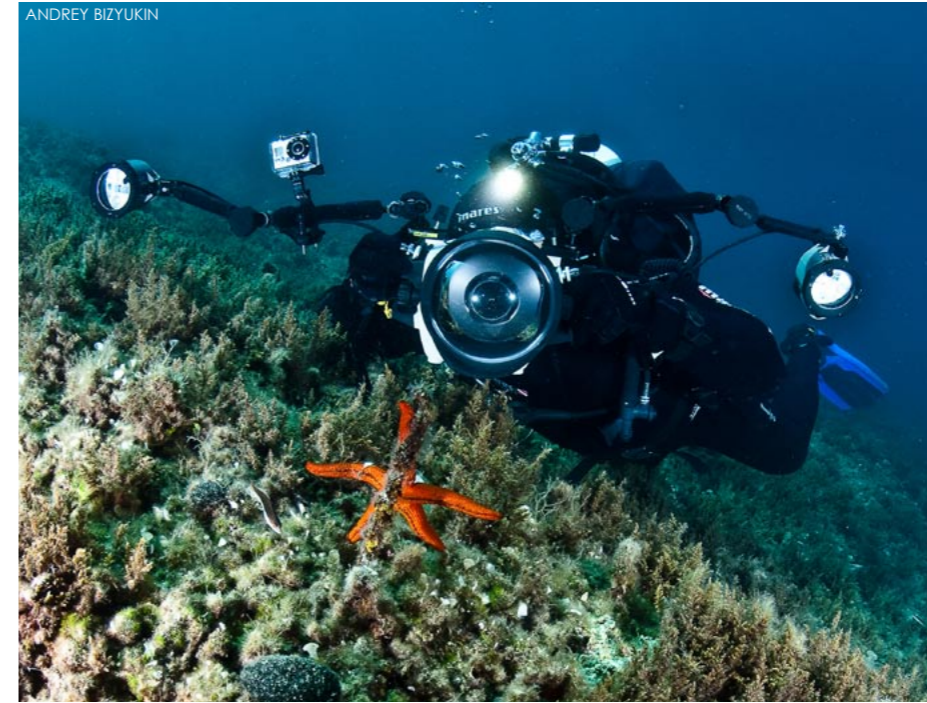
PETER SYMES

in a building that was probably a converted warehouse of some kind. But no matter, it did the trick. There was ample space for storing kit in there and a sitting area with wi-fi, so you could enjoy a cup of coffee while uploading the day's harvest of images to Facebook.

Bright red and violet soft gorgonians adorn the Croatian reefs (left). OTHER IMAGES THIS PAGE: At very shallow depths, the reefs are a lot less colourful, but there are always some interesting critters to be found, which can entertain divers undertaking lengthy decompression stops



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to almost 100m. As we descended, I was struck with the clarity of the water, the viz was excellent. At first, there was not much marine growth to be seen; the rocks were covered only by some short seaweeds, but the good stuff was down deep. We levelled off at 40m and swam along what was almost a vertical drop-off. The wall was speckled with all sorts of small gorgonia, most of which I deemed to be red coral, *Coralium rubrum*. These corals are quite intolerant to sedimentation, so they grow on the rocky sea bottom in the depths, or on walls, or in dark caverns or crevices. The corals take the shape of small leafless bushes and grow up to a meter in height. They

permanent settlements on the islands but a few simple houses that most likely serve as cabins for leisure.

We moored along the outer edge of Kornati, facing the open sea, at a location called Panitula, which I understood was a popular dive site. The coastline was steep and rugged, but the seas were calm. I was teaming up with my old friend and fellow X-RAY MAG editor Andrey Bizyukin and his buddy Alexander who was in the Russian special forces.

Between two small islands, there was a shallow channel no deeper than 5-10m, which was a perfect staging area before going over the ledge that descended straight down



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THIS PAGE: Many caves and caverns in the area provide yet another underwater activity

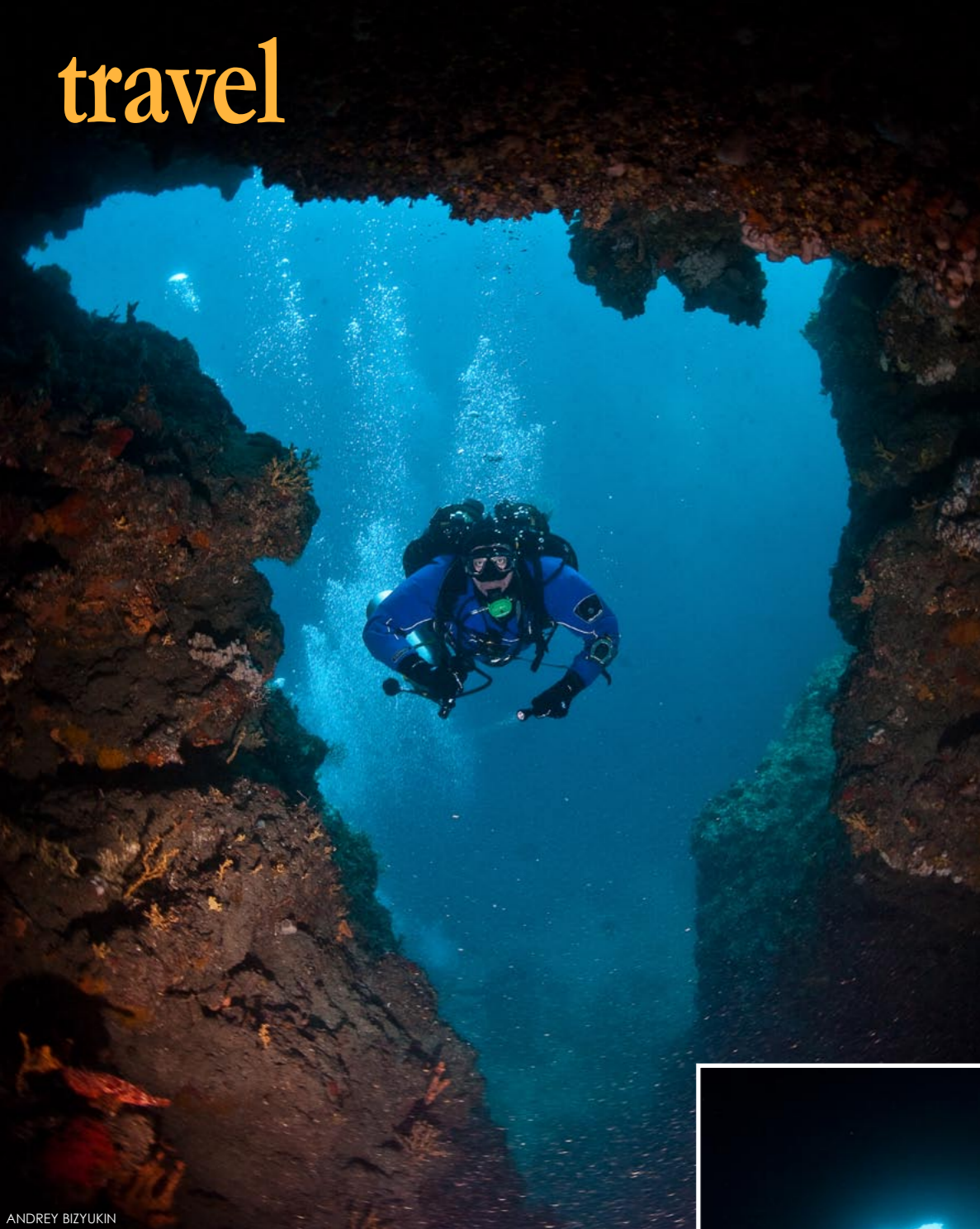
insulation for a protracted stay at this depth—not that the gas reserves carried in a commonplace single tank and decompression limits permitted for much more time anyway. But the lesson was learned.

Before going on the trip, Andrey had advised me to bring my drysuit, too. I must admit, I did not quite believe it was necessary. After all, we were going to the Med in late summer. Surely, it had to be warm—and it was, only not at depth.

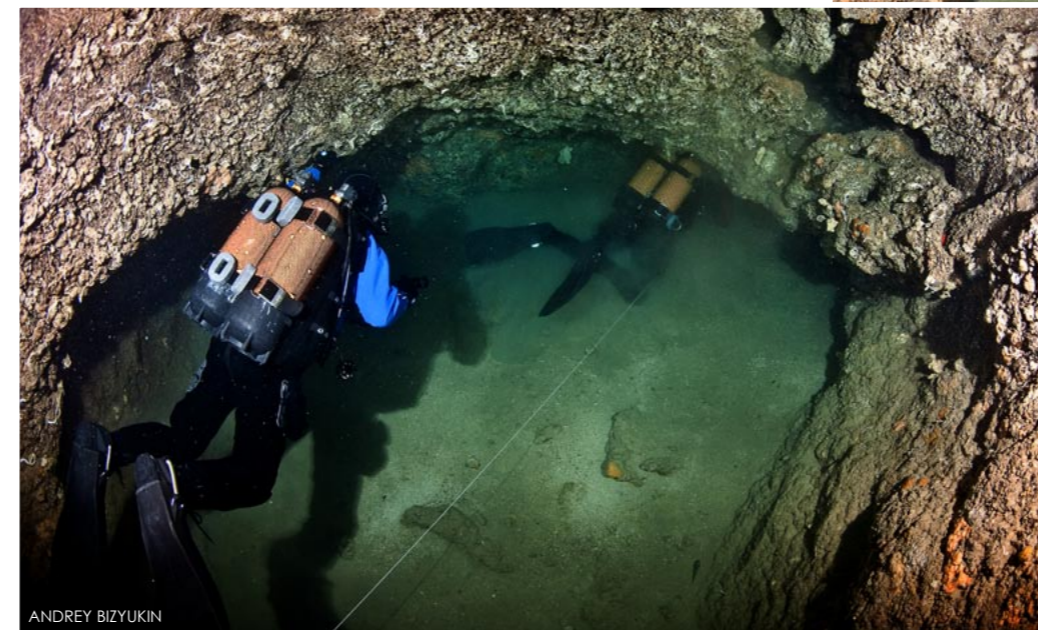
Looking around, I noticed that everybody else in the group was not only wearing a drysuit but was geared up in a technical fashion as well. Fortunately, I did heed Andrey's advice and brought a drysuit, too. Hav-



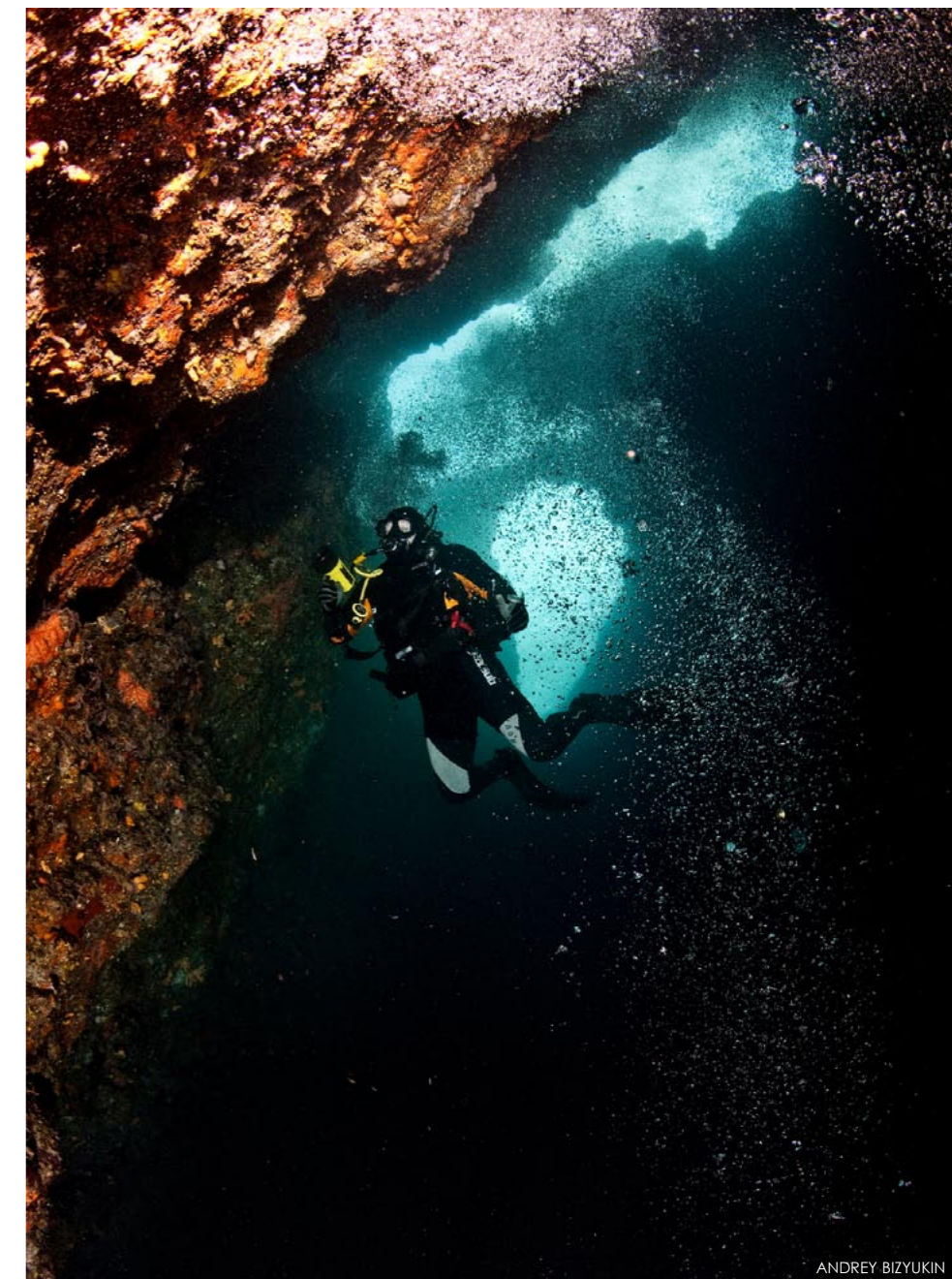
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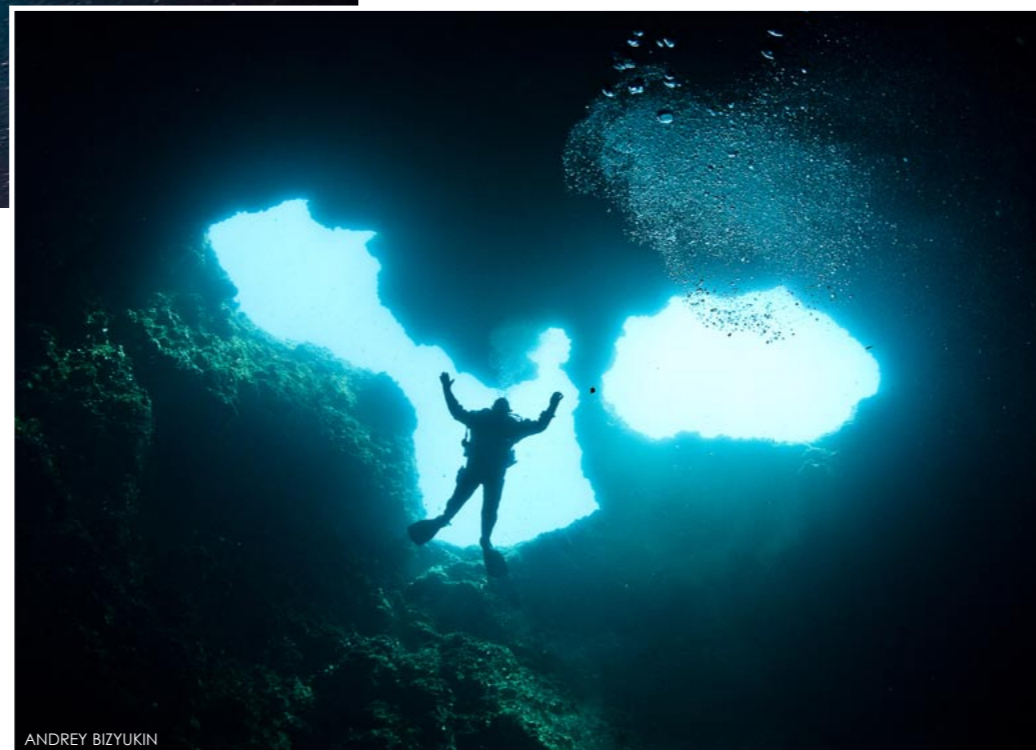
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can be found at depths of ten to 300 meters below sea level, although the shallower habitats have been largely depleted. Owing to its intense and permanent coloration and glossiness, precious coral skeletons have been harvested since antiquity for decorative use in jewellery.

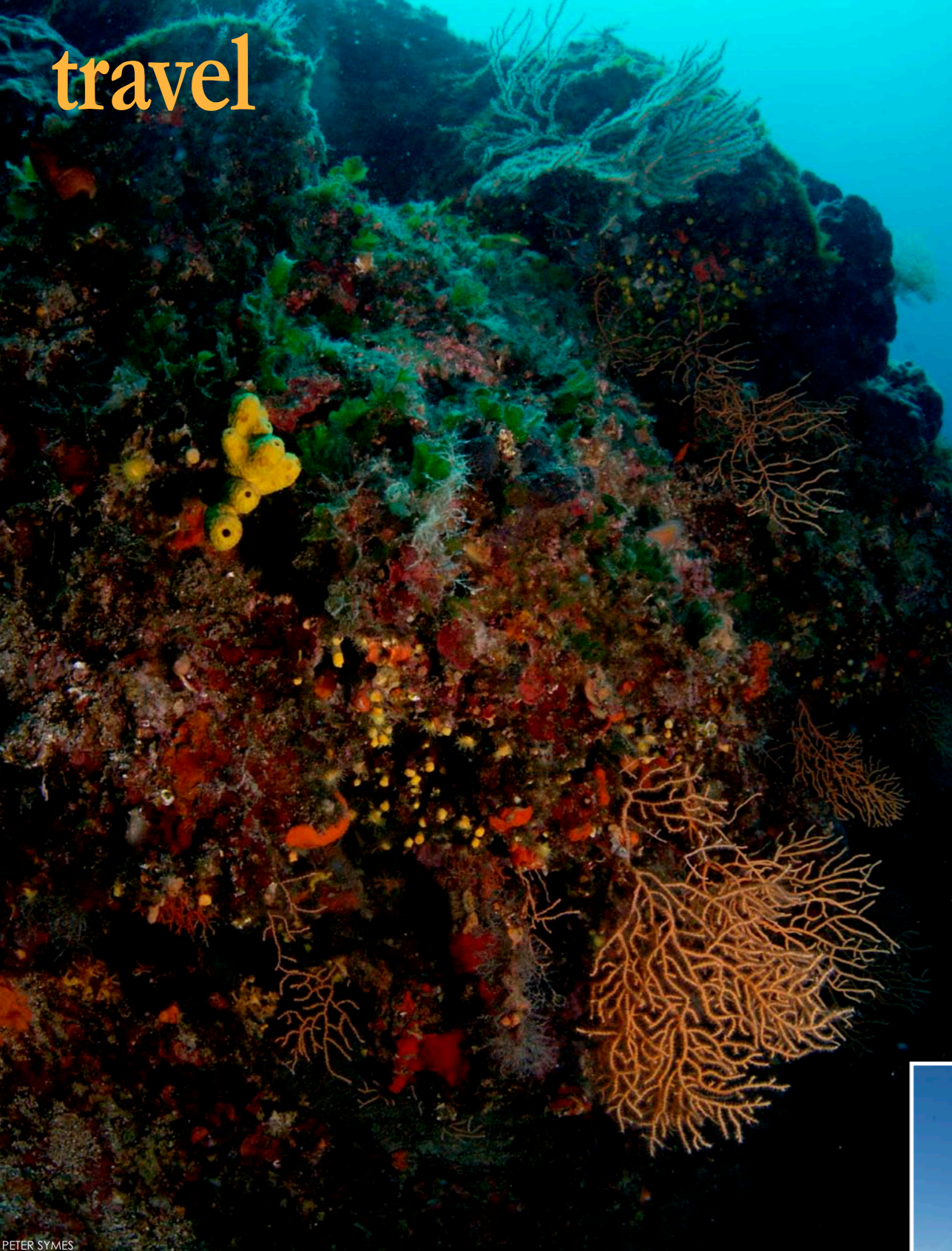
As we slowly propelled ourselves forward with patient measured strokes, keeping our pulse and air consumption as low as possible, I was starting to feel the cold creep through my 5.5mm wetsuit. While the surface and top layers were pleasurablely warm, we did pass through a thermocline under which the water was markedly cooler. With the pressure at depth squeezing my wetsuit, it no longer held sufficient



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ing not worn it on this day, however, I was getting chilled, so I began to ascend.

At around 25m, I passed through the thermocline, and it was like stepping into a warm house on a chilly autumn day. Soon, I was all comfy again. Also, I was no longer steering right into a decompression stop obligation for which I wasn't really prepared nor properly equipped. For now, I was more than happy just to trail the group of 'tekkies' below me who had reached a



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shallower level, which, mind you, at 25m (82ft), was still not exactly shallow.

Looking around, the view, thanks to the great viz, was still spectacular. Not so many fishes were to be seen, though. But it was no matter; I was still having a good and most pleasant dive.

Interval

Lunch! One of the highlights of a good diving day, and I can think of much worse places to enjoy a meal than sitting on a deck with a view over this archipelago. It was quiet out there; aside from the subdued chatter around the ta-



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CLOCKWISE FROM FAR LEFT: Reef scenery with reef covered by a mix of sponges, algae, soft and hard corals; Scenery from the archipelago around Kornati National park; Juvenile rockfish, presumably *Scorpena notata*; Tomisa is a trawler adapted to taking out divers and snorkellers; Lunch served on the dive boat

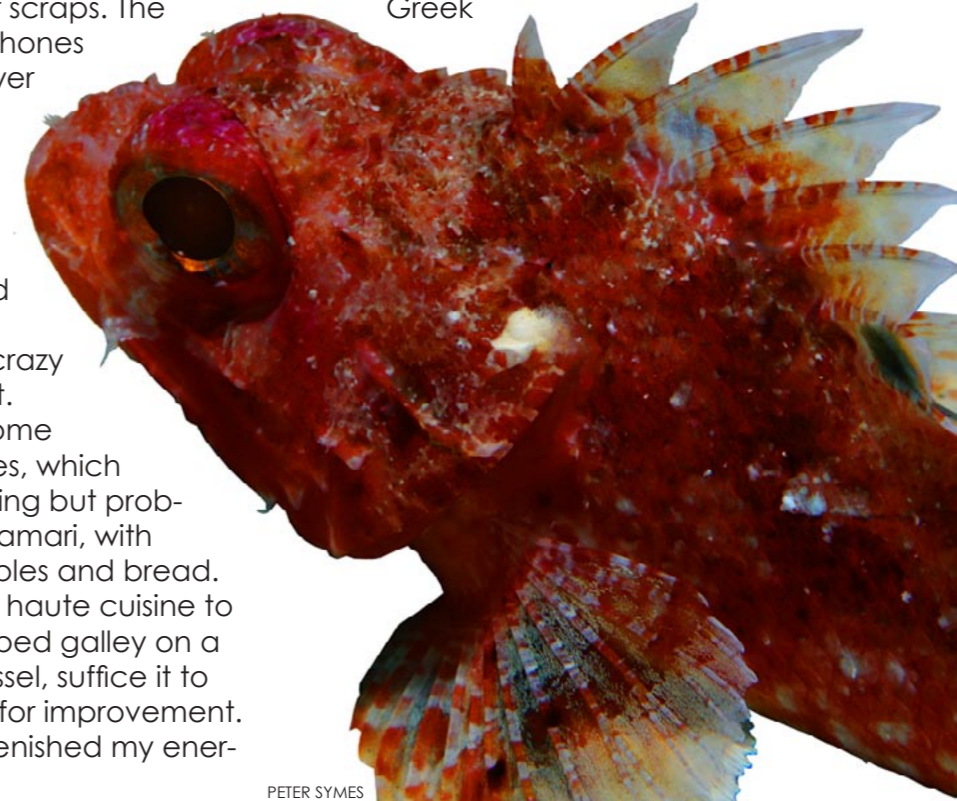
bles, I could only hear a gentle splashing of wavelets breaking against the hull and the occasional screams from seagulls fighting over scraps. The constant ringing of phones and pressure to answer emails was so far out of mind—what bliss.

The meal was typically Eastern European: sturdy and hardy, without much finesse. I wasn't too crazy about it, I must admit. It was grilled fish of some indeterminate species, which reminded me of herring but probably wasn't, and calamari, with some boiled vegetables and bread. While I didn't expect haute cuisine to come out of a cramped galley on a converted fishing vessel, suffice it to say, there was room for improvement. It was okay and replenished my ener-

gies but hardly a selling point. I liked sipping the cool local white wine, though. It had a distinct piney flavour akin to the Greek



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Retsina, the famous resinated white wine. Bearing in mind that I had more dives ahead of me, I restricted myself to one—well, all right—two glasses. We had a long lazy break, so they would wear off in time for the next dip.

Croatia

Croatia has such a complex history. Over the millennia, it has been part of numerous empires; from Ancient Rome and onwards, it became independent and then gobbled up again by some larger entity. In modern

THIS PAGE: Scenes from the village of Jezera and Murter Island



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Examples of the hearty cuisine to be enjoyed in the many restaurants on the island (above and right)

times, it was part of Yugoslavia, declaring independence in 1991. The tensions in the already volatile region escalated into the Croatian War of Independence when the Yugoslav National Army and various Serb paramilitaries at-



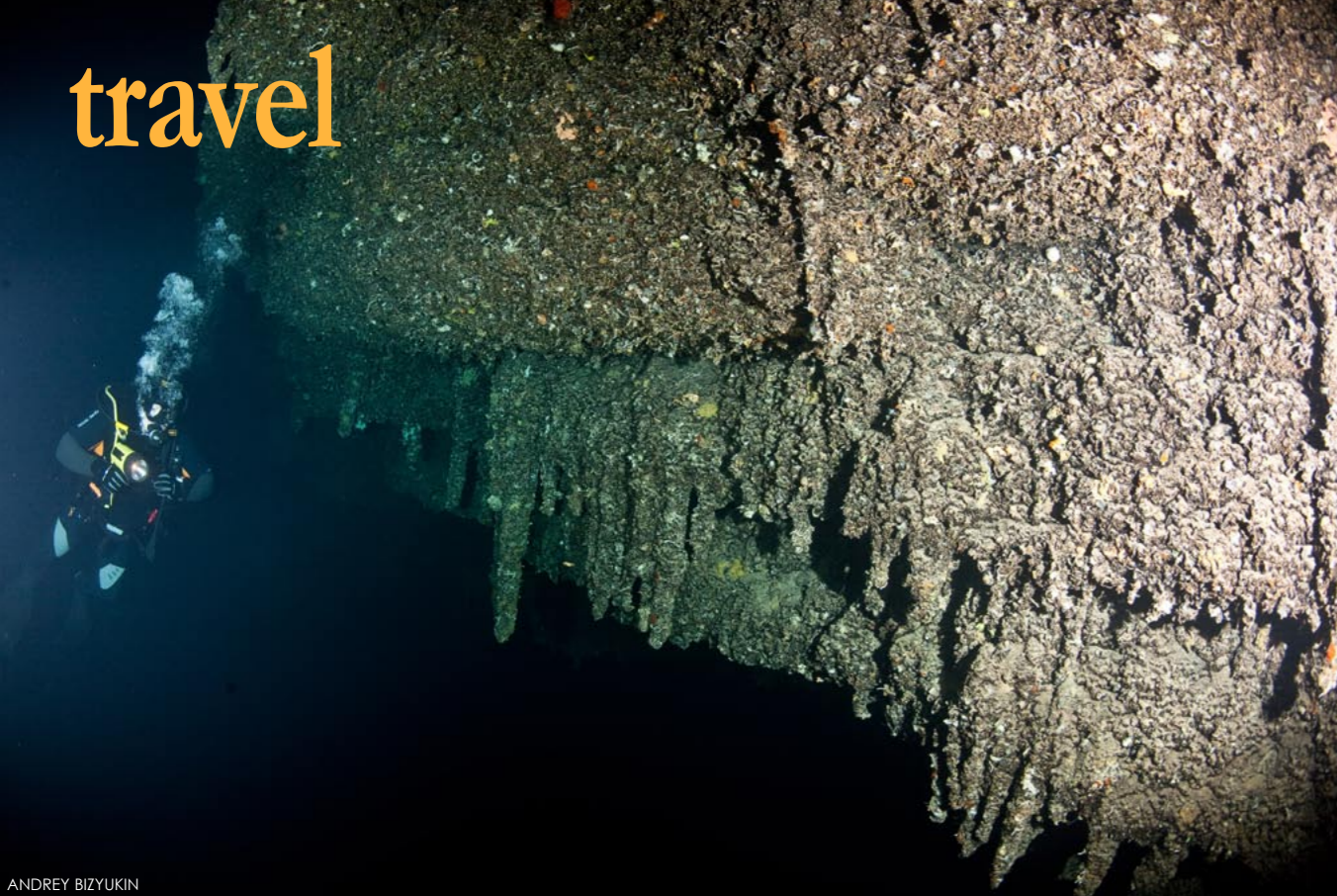
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tacked Croatia. The war ended in 1995 with a total Croatian victory, as it achieved the goals it had declared at the beginning of the war: independence and preservation of its borders. However, much of Croatia was devastated and much of its economy was in ruins.

Today, the World Bank classifies Croatia as a high income economy. The

country will become a full member of the European Union in July 2013. It has clearly come a long way in a very short period of time. There are no longer any visible signs of the war, but what the Croatians now refer to as the Homeland War is still clearly a painful memory for many, even in this remote region of the country I was visiting, which saw little of the fighting.

As a tourist, it just seemed so peaceful and well organised. The infrastructure



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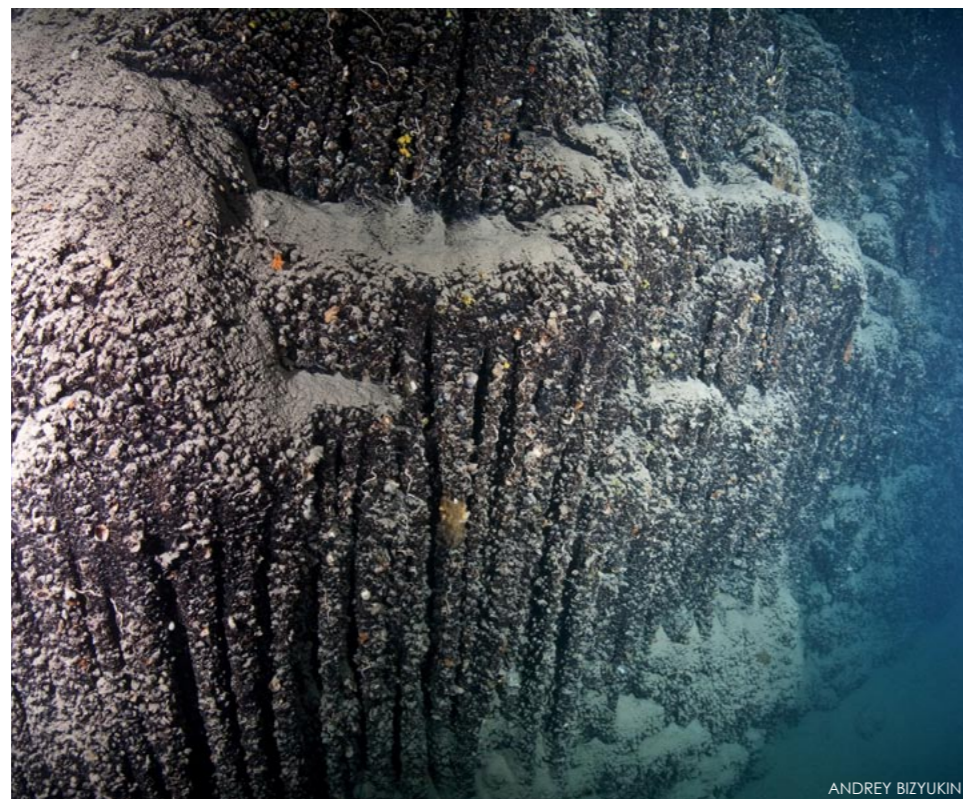


Croatia

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was good, and the standards seemed as up to date as in any other modern developed economy.

As I looked around, seeing all the olive groves on the islands, I got to thinking about the long and colourful parts of this nation's history predating the recent war, from antiquity when Greek trading colonies were established, its inclusion in the Roman empire, the establishment of a Croatian kingdom in 925 AD, the fight against the Ottomans and so on. I came to think that it was probably unfair to put all that much focus on these matters. But I suppose it's only human nature, given that most adults today will have some memory of watching the news of



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the war on television. In other ways, time seemed to stand still here. As I dipped my bread into the olive oil and looked around, I saw row upon row of olive groves, which seemed to have been here forever, and perhaps

they have.

The olive tree is native to the Mediterranean region, and it is estimated that the cultivation of olive trees began more than 7,000 years ago, although the place, time and immediate ancestry of the cultivated olive are unknown. But it was already during ancient

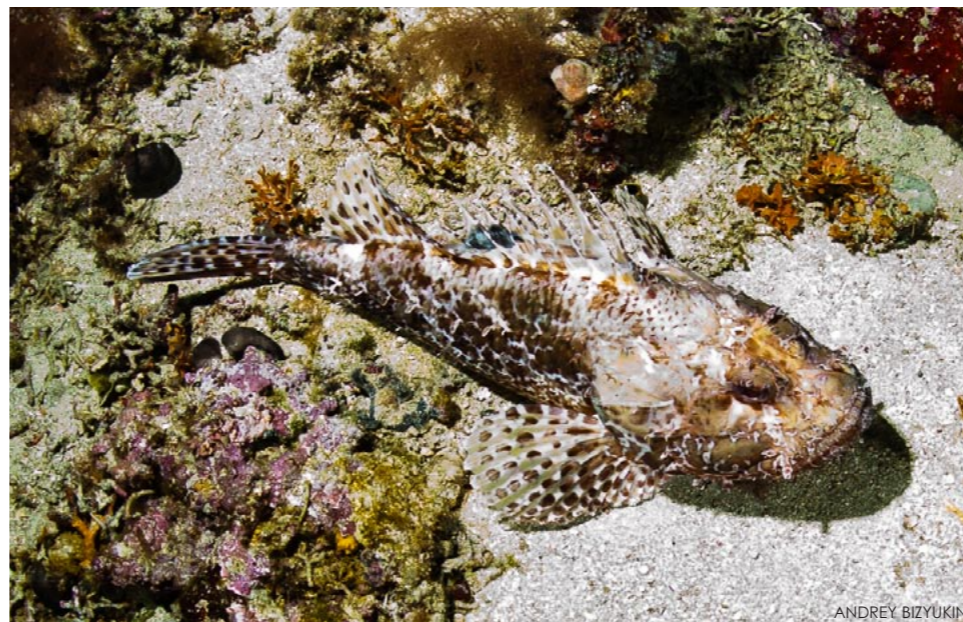
times that the Greeks observed that olive trees rarely thrived in a location far from the sea but rather thrived where other crops failed—upon the meager, water-deficient soils of these islands.

Dive sites

We were now anchored in a shallow, sheltered cove off a little

islet with a lighthouse perched on top. It doesn't seem much bigger than a tennis court, and I understand the idea was to swim around it.

Once again, we were being told that gorgonians and other corals



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THIS PAGE: Some underwater caves were created and stalactites formed in dry air before the Mediterranean basin was filled by water from the Atlantic via the strait at Gibraltar. It is still possible to find old stalactites underwater; Rockfish (above), possibly *Scorpena plumeri*; Assemblage of sponges and gorgonians (top right) form a colourful bouquet; Mediterrean feather star (right) is an unstalked crinoid, which feeds by filtering small particles of food from sea water with feather like arms. Tube feet covered with a sticky mucus trap any food that floats past



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The rockfish's camouflage is effective but one can still spot it by swimming slowly and looking closely at the reef; Small colony of golden cup coral, *Astroides calycularis* (below)

and zipped up the suit. Then, off I went.

I followed Alexander straight down the slope. He was once a paratrooper and it showed. I couldn't keep up with him, as he plummeted quickly toward the seabed far below. Once again, we didn't level off until we passed 40m, after which we swam along the wall poking into nooks and crannies looking for critters. I soon went into a shallow ascent along the reef to stay clear of decompression obligations, keeping visual contact with Alexander who just kept steaming full throttle ahead—too fast for me.

I prefer diving solo anyway, minding my own business and going about taking pictures without having particles kicked up into my face by divers with poor buoyancy control or situational awareness. Yet, it was not the same as diving alone. I was always maneuvering so I could retain visual contact with my buddy—if only he would just slow down a bit.

When using open circuit, I al-



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could be found predominantly below 25m where there was a ledge and a small drop-off leading down to a flatter seabed at +40m.

Being all the wiser, I kitted up with my drysuit this time and twin tanks. Not that I was going technical on this dive; I just didn't want to be chilled, nor end up short on air, should I decide to go deeper in

pursuit of some better footage. As I didn't want to overheat before I got into the water—it was a nice warm summer day—I made sure that all the gear was completely rigged and the camera all set, as I donned

THE NEW W4

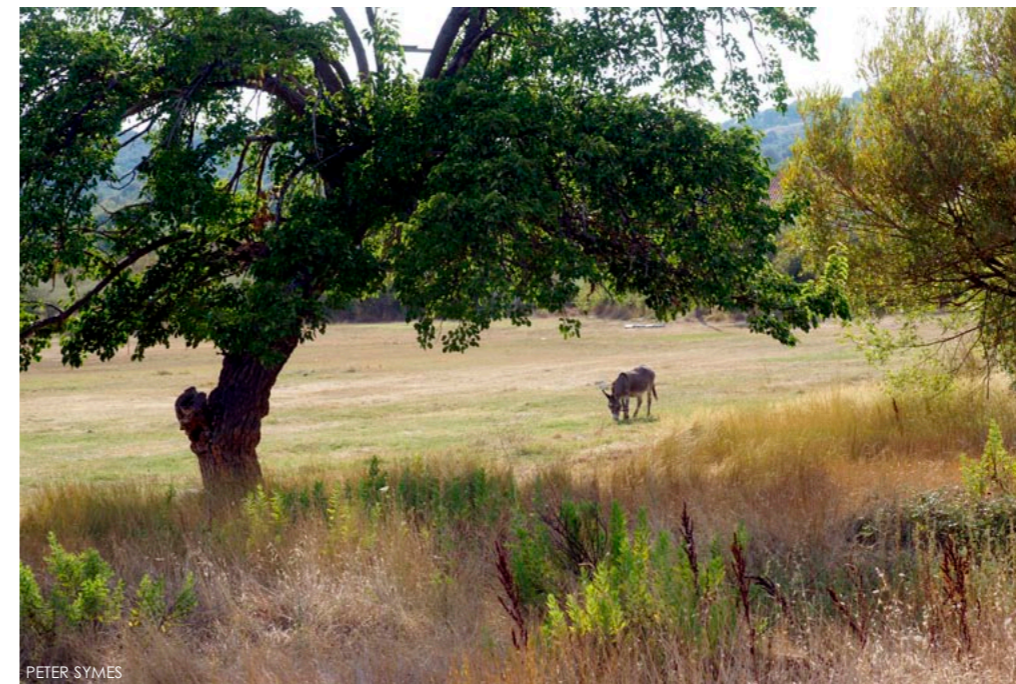


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way up. The small fields were all boxed in with ancient stone borders, and our path upwards wove in and out of small plots with different crops such as grapes for making wine, figs, olives, vegetables, orchards of fruit trees or just meadows of grass for grazing livestock. As we made our way towards the summit, we were accompanied by a ferocious concert of cicadas trying to outperform

believe that these sponges were *Aplysina aerophoba*—a common species in the Mediterranean. I haven't been able to ascertain that they have any use, which is probably

deco, or a safety stop, can comfortably be conducted (i.e. simply by sitting on the bottom) that Alexander finally noticed me and looked at me with an expression I did not know what to make of in that instant. Only afterwards did I learn that he thought he lost me early on and couldn't find me, making him nervous. Yet, I was always within visual range and never lost sight of him. I just could not keep up with him while carrying a big camera, which wasn't very streamlined and could not be pushed through water very quickly.

Topside activities

That afternoon, I went for a walk with Andrey and his kids into the hills behind the village. There was a sweet and pleasant scent of herbs, pine, hay and wild flowers in the air.

The highest point on the island was Raduč hills. At 128m above sea level, it was not so rigorous a hike as to be restricted to fitness fanatics, but it was a vigorous walk that gave a decent workout and burned off that opulent but yummy ice cream cone topped with blueberries, nuts and whipped grin I had on the

dom and calm, which always translates into greater enjoyment—knowing that I always have a complete, redundant life-support system, should I have a technical malfunction of some kind.

With the sort of diving I was doing here, it was very much a case in point. I was not embarking on any technical diving in this location, only enjoying a wider latitude, such as not having to watch a clock frantically counting down the minutes to the end of my dive. I had time to look around because the double 12's on my back gave me a plentiful supply of air to muck about with for a time.

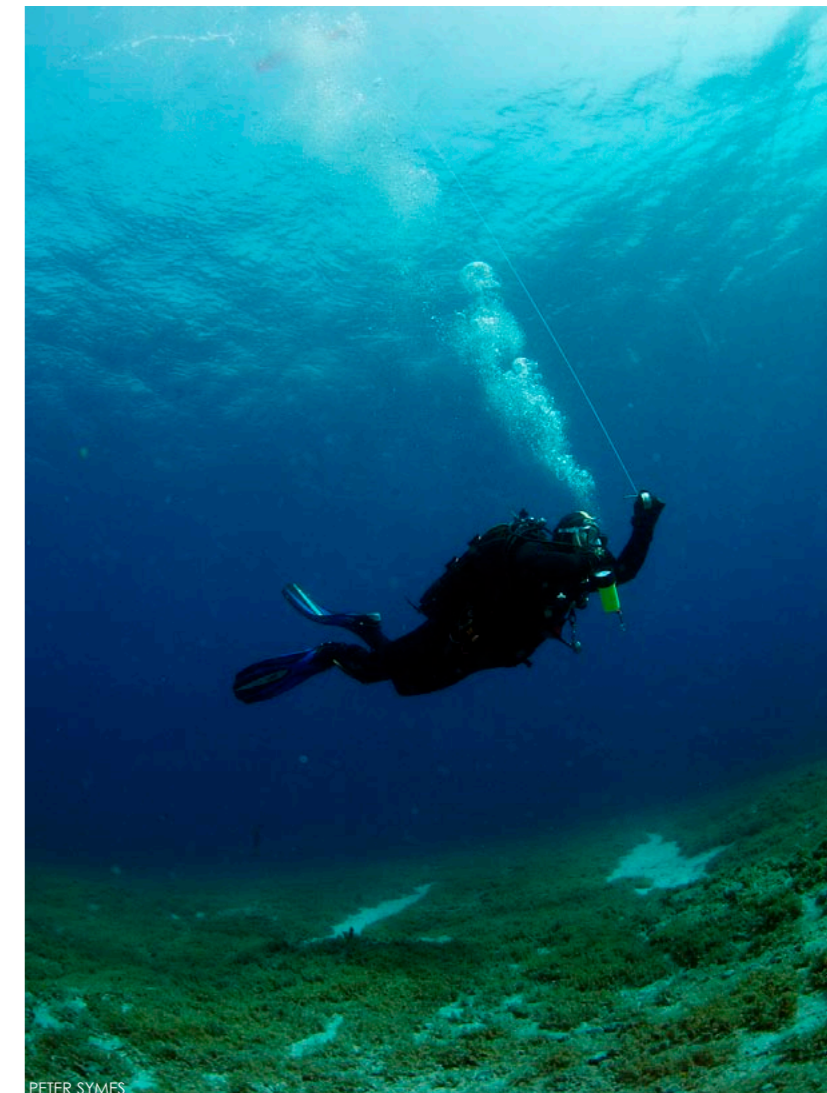
I slowed down, gliding slowly over a bed of marine grasses. Soon, I could pick out some critters—first, a purple *Flabellina nudibranch*, then an octopus contorting itself into an incredibly narrow crevice, then a pipefish. Among the grasses were small clusters of bright yellow marine sponges.

Sponges are not my forte, but consulting with guidebooks later led me to

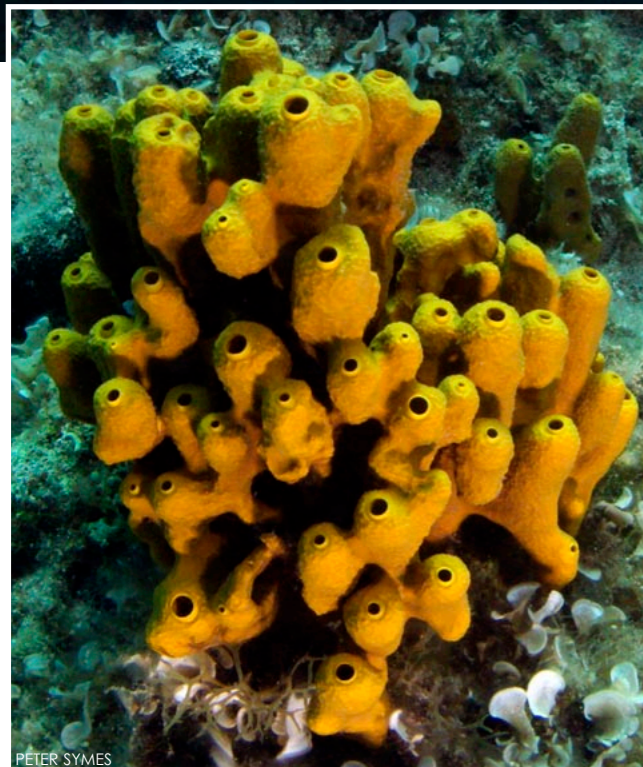
why they are so prevalent in the shallower parts, but they are very decorative.

In one of the scientific descriptions I found online, these sponges were described as: "Bright yellow in life, turning characteristically dark greenish blue-black when taken out of the water, discolouring one's fingers. In alcohol, the black colour extends into the alcohol and also blackens labels to the point of becoming illegible." So, there you have it. There is always something new to learn about the sea. It's one of the things that makes diving such a great pastime.

During my whole dive, I had kept our Russian paratrooper fixed in the corner of my eye, but now I saw him swimming somewhat frantically back and forth along the reef, as if he was searching for something. I gradually closed the gap until I finally flew to his side like a wingman for the remainder of the dive, which at this point was heading towards the shallows and the boat. It was only when we reached a plateau at around 5m where



CLOCKWISE FROM LEFT: Sponge cluster of *Aplysina aerophoba*—a common species in the Mediterranean; The archipelago also offers ample opportunity for great snorkelling; Idyllic view of donkey grazing in a field; Diver practising SMB deployment skills near the dive boat



ways dive twins—a double tank with two regulators—where available, even in the shallow end of the recreational range. I've never felt like it was overkill; it's always provided me with a sense of free-



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THIS PAGE: Views of Jezera from the hillsides surrounding the village. Walking through the winding narrow streets and pathways, there are things to discover around every corner



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WATERFALLS OF KRKA NATIONAL PARK

Krka National Park which is only a short drive from Murter Island, encompasses an area of 109 square kilometers along the Krka River after which it is named and

which it encloses. It is characterised by exceptionally rich and varied flora and fauna, with more than 860 species and subspecies of plants that have been identified here. One of the most attractive parts of the park is *Skradinski buk*, which is a massive, clear, natural pool with high waterfalls at one end and cascades at the other. ■



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sounds up to 120 decibels, which is among the loudest of all insect-produced sounds. Species have different mating songs to ensure they attract the appropriate mate. It is often difficult to make out the direction from which cicada song is coming because the low pitch carries well and because it may, in fact, be coming from many directions at once, as cicadas in various trees spur others to make noise in unison.

Cicadas are benign to humans and do not bite or sting. At the top, we had a spectacular view of the whole island and its four main villages—Tisno, Jezera, Betina and Murter—with their stone-vaulted streets and ivy-covered walls. Murter Island is only 18.6 sq km (7.2 sq miles) and yet, there exist different dialects in each village as well as a rivalry—a friendly one, I hope—between these villages, which are mere hiking distances apart, about which dialect is the proper or right way to speak. We are told that the oldest stone-built sites of cultural heritage on the island of Murter date back to the time of the Illyrians who built the hill fort of Gradina, which now lies between Murter and Betina, as well as the ruins that can easily be seen on top of the hill where a giant cross stands today. Near near Tisno, in Makirina



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Bay stands the Romanesque church of St. Martin, which dates back to the end of the 11th century. In the same locality lie the remains of Roman villas, medieval tombs and a basilica. In a way, this little island embodies all I find attractive about going diving in the Mediterranean. The underwater scenery and marine life may not compete

well against the splendours of Raja Ampat, Fiji and the like, but what does? Considering that the whole package also includes history and culture enough to fill a year's worth of episodes on the Discovery Channel, good and healthy food, no less than eight national parks, cities with roots in antiquity or the Middle Ages within range of a day trip, hospitable people and a



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one another. It was only the males that sang, and they do their most spirited singing during the hotter hours of a summer day. Some cicadas produce



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seems littered with wrecks and archaeological artefacts from ancient Greek and Roman amphorae, to the many wrecks from the World Wars and some more modern ones. For passionate treasure hunters or wreck detectives, there are plentiful options to explore wrecks and artefacts at different depths, although a number of wrecks rests too deep for recreational divers.

While we did dive on a number of wrecks, one of the more attractive was the *Francesca di Rimini*—a cargo vessel that was sunk during WWII in circumstances which are not entirely clear. According to the most reliable sources, it was transporting ammunition for the German forces in North Africa and was anchored off the island of Kaprije, experiencing engine

problems when it came under attack by British aircraft and exploded.

The wreck now rests almost upright on a flat seabed at 50m, with a large

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part of the midship torn completely open by the explosion, which must have been massive. Due to the depth of this wreck—the deck starts at 40m—it is clearly not a dive for the inexperienced, as some decompression is virtually unavoidable. That aside, it is an uncomplicated wreck to dive, provided the sea is flat and the viz is decent. A downline mounted from a permanently moored buoy takes divers straight down to where they want to be. The superstructure is gone and so is the propeller. It is not known who salvaged it. Since the wreck still holds ammunition, including substantial amounts of artillery grenades, it has in places been covered with a steel net.

We descended through crystal clear blue water along the anchor line and passed through two thermoclines or marked temperature



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THIS PAGE: Views from the wreck sites found around Murter Island

CROATIA

NP KORNATI



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WRECKS



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- FUN DIVING
- TECHNICAL DIVING
- EXCURSIONS
- ACCOMMODATION
- TRANSFER



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CROATIA, JEZERA
MURTER ISLAND

vast array of activities to indulge in, it is a pretty good deal overall. There is something for everybody, and it is easy, accessible and affordable to bring the whole family, whether you prefer to spend your time on the beaches or go visit monuments.

Wrecks

There is diving for all qualification levels from shallow reefs to caves and wrecks. The Croatian coast just



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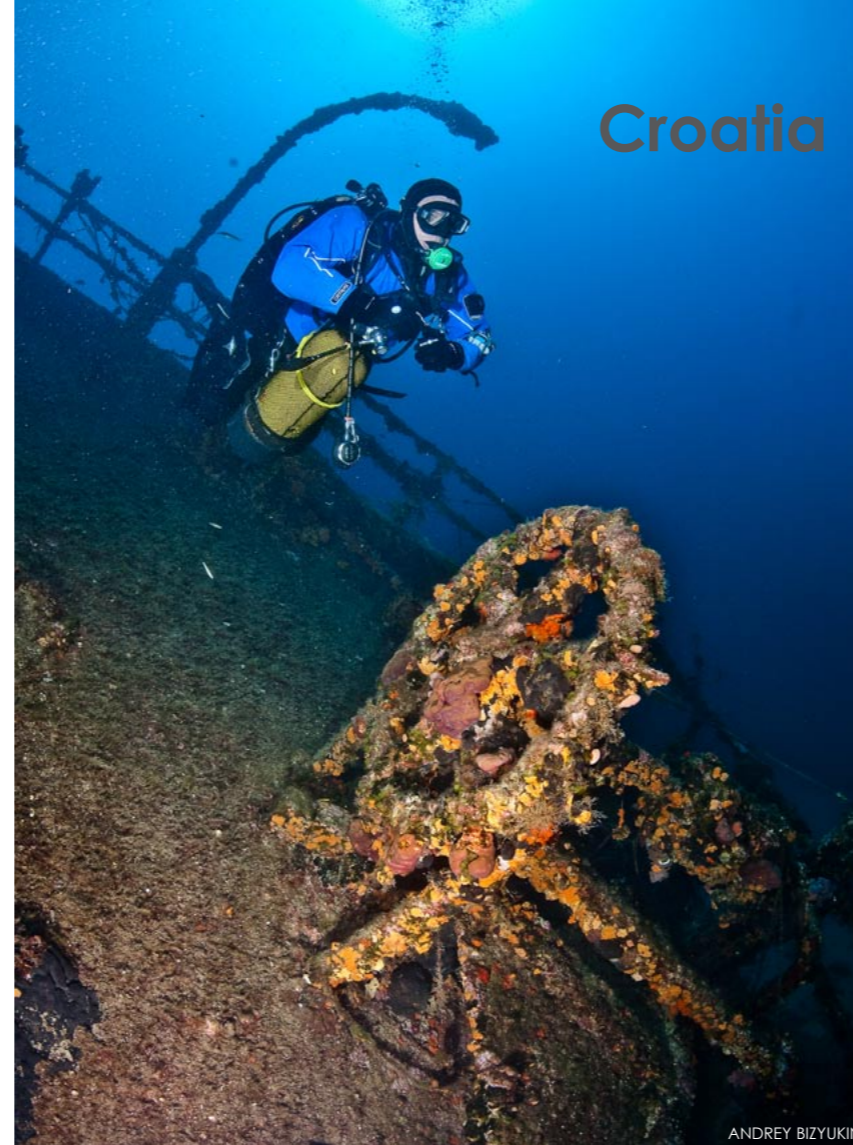


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gradients at 5 and 21 meters depth. In the blue haze beneath, I started to make out the contours of what was once a proud ship. From the top of the bow, we went to the stern along the starboard side, reaching the maximum permitted depth. We entered the open doorway of the hold. It was dark inside, but in the

distance we could see a blue spot of light, which was the second hatch of the hold. The plan was to spend 15 minutes reaching the maximum depth (MOD) and pass through the hold by going in one entrance and out the other. Inside, we turned on our lights and went

on taking pictures inside the hold, as we went towards the front of the ship. The hold was full of sharp metal structures,



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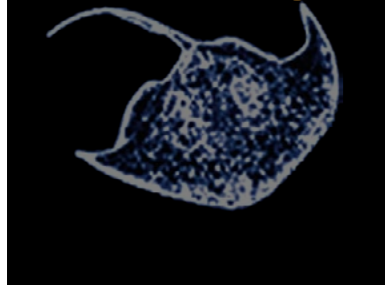
THIS PAGE: Divers explore the wreck of cargo vessel *Francesca di Rimini* sunk in WWII

so we had to be very careful not to damage the equipment or get stuck in tight spots. As we went through a passage in the hold, we found a huge hole with torn metal all over—this was quite evidently where that deadly torpedo struck the port side of the ship. We carefully made our way past it, took some more pictures and went up to the port side of

the stern. From there, we started our swim back to the bow of the ship. We threw a last sad look at the sunken giant and began our ascent. We still had a long decompression ahead of us even when we accelerated it by breathing pure oxygen at a depth of 6m before we could once again pop up into the strong Croatian sunlight, warm wind and good friends awaiting us top side. ■



fact file



Croatia



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

History Until the end of World War I, the region that now makes up Croatia was part of the Austro-Hungarian Empire. A kingdom was formed in 1918 by the Croats, Serbs and Slovenes which was called Yugoslavia after 1929. Under the heavy hand of Marshal Tito, Yugoslavia became a federal independent Communist state after World War II. In 1991, Croatia declared its independence from Yugoslavia, but it took four years of fighting before the occupying Serb forces were for the most part cleared from Croatian lands, as well as a majority of the ethnic Serb population in the country. In 1998, the last Serb-held enclave in eastern Slavonia was returned to Croatia, with the supervision of the United Nations. Croatia joined NATO in 2009, and in 2011, joined the European Union, with ratification in 2013. Government: presidential/parliamentary democracy. Capital: Zagreb

Geography Croatia is located in Southeastern Europe. It borders the Adriatic Sea and lies between Bosnia and Herzegovina and Slovenia. There is diverse geography in the terrain, with flat plains along the Hungarian border and low mountains and highlands near the Adriatic coast and islands. Coastline: 5,835km (mainland 1,777km, islands 4,058km).

Lowest point: Adriatic Sea 0m.
Highest point: Dinara 1,831m.
Note: Croatia is in control of most of the land routes from Western Europe to the Aegean Sea and the Turkish Straits; A majority of the Adriatic Sea islands are located off the coast of Croatia. There are round 1,200 islands, islets, rocks and ridges.

Climate Along the coast, Croatia has Mediterranean climate with mild winters and dry summers, while the interior has continental climate with hot summers and cold winters.

Environmental issues The country struggles with air pollution from metallurgical plants, which results in acid rain that is damaging the forests. There is also coastal pollution from domestic and industrial waste. Landmine removal



al continues as well as reconstruction of the nation's infrastructure after the civil strife in 1992-95. The nation is party to: Air Pollution, Air Pollution-Nitrogen Oxides, Air Pollution-Persistent Organic Pollutants, Air Pollution-Sulfur 94, Air Pollution-Volatile Organic Compounds, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous

RIGHT: Global map with location of Croatia

BELOW: Location of Murter Island on map of Croatia

Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution, Wetlands, Whaling

Economy While Croatia is still one of the richest of the former Yugoslav republics, its economy took a big hit during the war in 1991-95. During that time, the country's output collapsed, and it missed out on early investment in Central and Eastern Europe after the Berlin Wall fell. However, Croatia's economic outlook began to improve slowly between 2000 and 2007, with moderate but steady growth in GDP which was spurred by a rebound in tourism and consumer spending fostered by credit incentives. The worldwide economic crunch has affected Croatia since 2008, with the country's economy still struggling to recover. Challenges facing the nation include a high unemployment rate, an increasing trade deficit, a difficult invest-



ment climate and uneven regional development.

Population 4,480,043 (July 2012 est.) Ethnic groups: Croat 89.6%, Serb 4.5%, other ethnic groups including Bosniak, Hungarian, Slovene, Czech and Roma 5.9% (2001 census) Internet users: 2.234 million (2009)

Currency Ukuna (HRK) Exchange rates: 1EUR=7.58HRK; 1USD=5.68HRK; 1GBP=9.02HRK; 1AUD=6HRK; 1SGD=4.63HRK

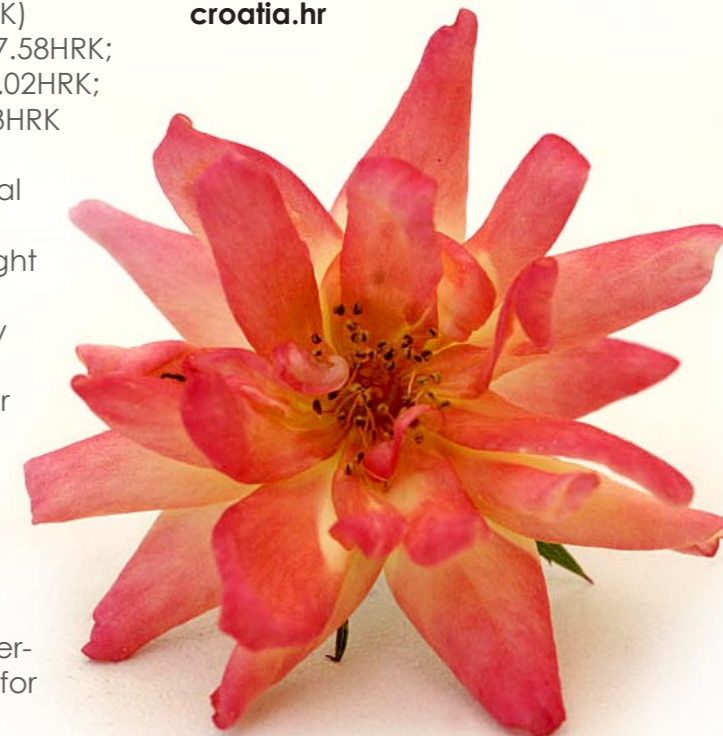
Language The official language is Croatian 96.1% but English is taught in elementary schools and is widely spoken by younger staff in tourist areas, Serbian 1%, other languages including Italian, Hungarian, Czech, Slovak and German 2.9% (2001 census)

Health There is an intermediate degree of risk for

food or waterborne diseases, such as bacterial diarrhea, and vector-borne diseases such as tickborne encephalitis. There have been cases of highly pathogenic H5N1 avian influenza in this country, but it poses a very small risk with very rare cases possible among those who are in close contact with birds (2009)

Decompression chamber The Split Hyperbaric Decompression Chamber - IPM HRM Šoltanska 1, 21 000 Split Tel: + 385 (0)21 354 511

Web sites Croatia Tourism croatia.hr



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Edited by Peter Symes



Suunto DX

The DX (D-Ten) is Suunto's first watch format dive computer that is rebreather compatible as well as offering full open circuit support for recreational and technical diving. The Finnish manufacturer writes that the DX is a 'non-monitoring' setpoint dive computer that works to support any rebreather, which in plain language means that it doesn't get any data from the rebreather. It can be configured for up to three different diluents. Other rebreather specific options include adjustable high and low setpoints, custom setpoint during dive and automatic and manual setpoint switching. It is also possible to switch to open circuit mode in case of bailout.

www.suunto.com

Neptune Space G.Divers Mask

The Neptune Space G.divers Integrated Diving Mask is now available in two sizes and four color options (emerald, cobalt, white and pink) and includes an integrated balanced second stage regulator and low pressure hose. The air circulation system is specifically designed to eliminate fogging and reduce build-up of CO and CO₂. Exhaled air is directed through a valve under the orinasal pocket limiting the mixing of used air with the fresh air breathed from the regulator.

oceanreefgroup.com

Oceanic Pro Plus 3

According to Oceanic, a dive computer should deliver crucial data quickly, without confusion and without requiring the user to squint. This is why their new Pro Plus model, which has been substantially upgraded from the PP2, is fitted with a huge display area with arguably the largest most legible digits on the market. The user interface has also undergone some major enhancements to make it more intuitive. The batteries can be replaced by the diver and a "hot-swap" feature allows change of batteries between dives while maintaining all calculations.

www.oceanicworldwide.com

Aqvatech LEDs

The Aqvalight is a string of diodes which can be used as marker light for individual divers or a downline. The LEDs and electronics are embedded in a resin that is both waterproof and highly resistant to compression generated by pressure at depth. The Aqvalight comes in three variant with the smallest model, The Quasar, intended to be a personal locator. This can be affixed to the tank or the thigh. A wet contact automatically turns on the system as the wearer enters the water. A bigger models, The Comet, which is depth rated to 60m water, has primarily been designed for the purpose of clearly marking the point of ascent such as the downline making it visible from a distance and in bad viz.

www.aqvatech.it



Aquabotix

Scope out dive locations before going down. The new Aquabotix HydroView Sport is a remote-operated video camera-submarine that sends and records live HD video to an iPad from 30m (100ft) underwater. The HydroView is simply controlled via motion-control on an iPad or the keyboard on a laptop, translating device movements into vehicle action. The vehicle comes standard with a 4 GB memory card. This ensures ten minutes of HD video. Listed price US\$3,995.00 includes free shipping within the United States. www.aquabotix.com



C-8-T

The C-8-T Drysuit from Austrian Camaro combines trilaminate and neoprene. The legs are made from a 7mm elastic neoprene lined with stretch terry plush. The torso is made with a robust trilaminate. The suit also has an integrated long-sleeved thermoshirt made from a 'SCS Titanium Open Cell material', which Camaro states offers high flexibility and great heat insulation. The zipper is on the front and seals are made from latex with a neoprene collar. www.camaro.at



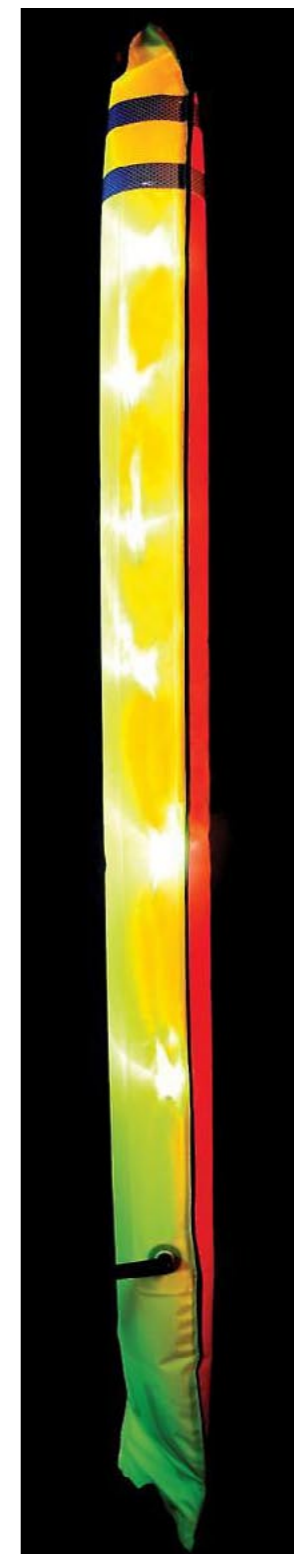
All fogged up?

Tusa's TA-200A anti-fog film will keep your favorite mask fog-free while diving underwater. Made with long-lasting durable material, the TA-200A can be installed easily on any two-window mask and is reusable with proper care. tusa.com



DiveAlert SMB LED

Surfacing on a night dive away from your charter or in dark open water can be incredibly distressing. The DiveAlert SMB.LED incorporates six water tight LED lamps spanning the 65-inch length. Driven by two AAA batteries in a double o-ring sealed tubular switch, the LED's can be powered up by a simple turn of the cap. It is built with 400 Denier polyurethane coated nylon, and utilizes one-way valve construction, which prevents air loss when fully inflated. Coast Guard approved Solas reflective tape lines the crest of the buoy for added visibility day or night. www.divealert.com



RS2

Sea-Doo's new RS2 delivers thrust for a speed of up to 6 km/h (3.7 mph) while being light enough to carry in one hand, weighing in at just 8.6 kg (19 lbs) including battery. It runs on a Lithium-ion battery, which will last for up to 75 minutes with normal use. Recharge takes four hours. The RS2 is designed to be neutrally buoyant in seawater, and in fresh water, lakes or pools, it will be negatively buoyant. The scooter comes with four ballast weights and two glide fins. seadooseascooter.com



WWW.DDIVERS.ORG



PHOTO: DAVID FILOSOF

WWW.DDIVERS.ORG



Know your sensor

As all rebreather divers know, oxygen sensors have a limited lifespan over which they gradually degrade until they have to be replaced with fresh ones, typically after 12-18

months. Exactly when is a judgement call. As sensors currently cost around USD 100 each and three are usually required, significant savings can be made if the sensors' performance can be validated. Enter TEMC's DE-OX Check, a fully digital analyser with a digital pressure transducer that measures the output of up to three oxygen sensors simultaneously in an aluminium pressure chamber, which is the black canister shown standing to the right. The oxygen sensor(s) are then hooked up to the analyser's circuitry and put under pressure by means of connecting it to a tank with a

known gas and pressure. This gas is fed in via the low-pressure hose coming in from the left. The pressure can then be regulated (up to 10 bar) and eventually releases via the circular release valve seen in the centre. On the display on the main unit, the sensor's readings are then compared to the known gas and pressure and the level of any discrepancies listed as a percentage.

It is also possible to read the actual response time of each sensor. At BOOT show in Germany in January 2013, this piece of kit was priced at € 765 (~USD 1,000) which is reasonable enough that a group of divers should soon be able to recoup the cost. www.temc.it



DivePhone

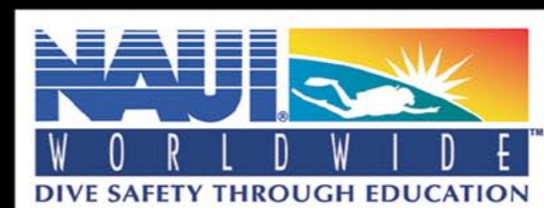
DivePhone is a housing and pressure transducer combo for can any kind of mobile device that runs on Android or iOS (iPhone Operating System) into a programmable dive computer by virtue of an app. It works by having an external module with a pressure sensor—docked on the housing—transmitting data to your smartphone by means of a wireless connection and without use of any external connectors.

This also means that the housing is not restricted for use with a specific phone model but will work with any model using these operating systems as long as they can fit inside the housing. The app can be downloaded from either iTunes or App Market. The DivePhone Housing is tested and rated for use to depths down to 80 meters. Keep an eye out for an upcoming review of this housing. innovasub.com

What will you do with your certification?



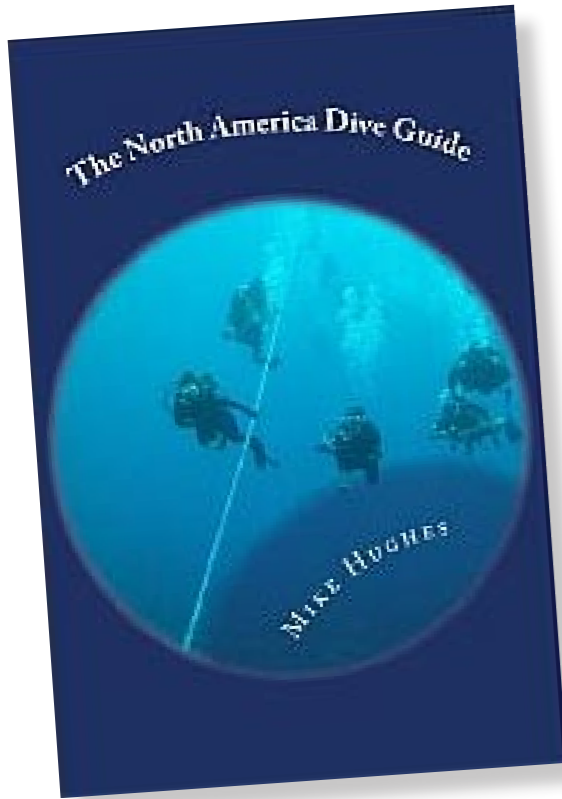
Continue your education with NAUI Worldwide!



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Edited by
Catherine
GS Lim

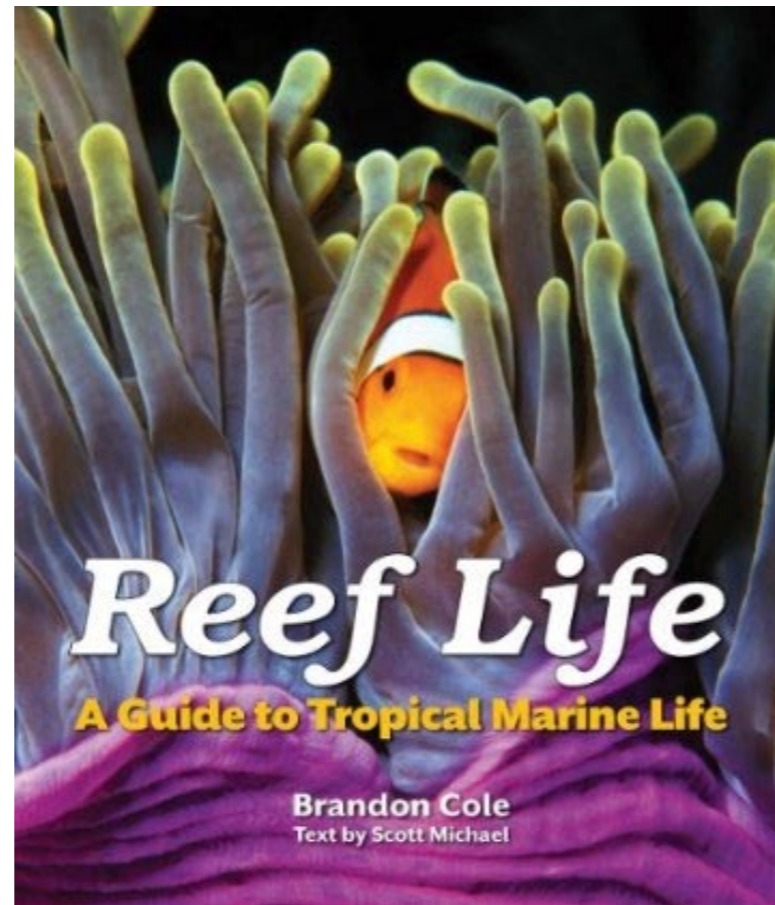


The North America Dive Guide

Although the author, Michael Hughes, has not visited all

the dive sites featured in this book, the information contained within has been gathered from dive shop owners, employees and local divers. Armed with this local insight, divers using this book would be better informed on how to fully experience all that these dive sites offer. This edition covers all 50 U.S. states, and selected sites in Canada, Mexico and other parts of the world.

Paperback: 366 pages
Publisher: C Two C Publications
Date: 17 January 2013
ISBN-10: 0966413032
ISBN-13: 978-0966413038



Reef Life

—A Guide to Tropical Marine Life

This comprehensive guide book by Brandon Cole and Scott W. Michael covers more than 400 species of fishes that reign in the reefs and open waters. You can make use of more than 800 colour photos in this book to find inspiration for your next dive trip. The coverage is worldwide, and each species has details like its habitat, range, feeding habits, survival strategies profiled. There are also sections on invertebrates and algae. Ideal for divers, naturalists and students.

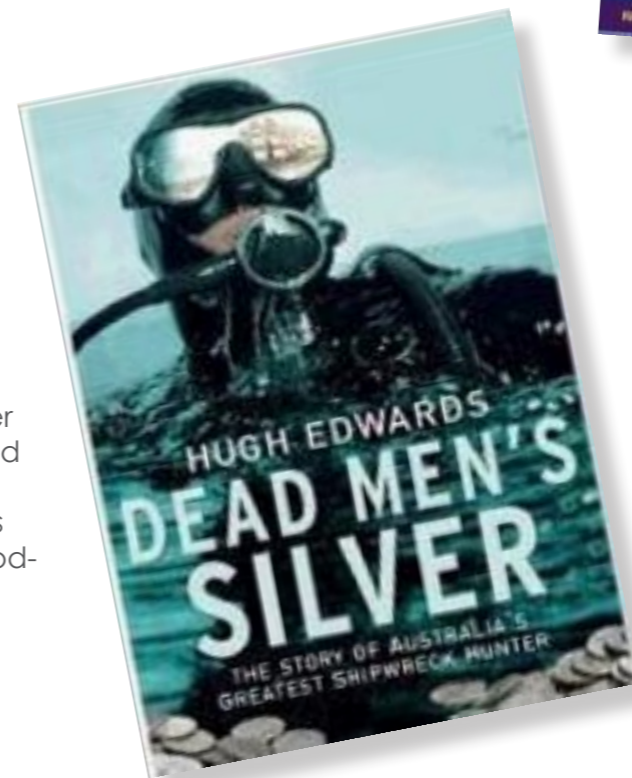
Paperback: 616 pages
Publisher: Firefly Books
Date: 19 March 2013
ISBN-10: 1770851909
ISBN-13: 978-1770851900

Dead Men's Silver

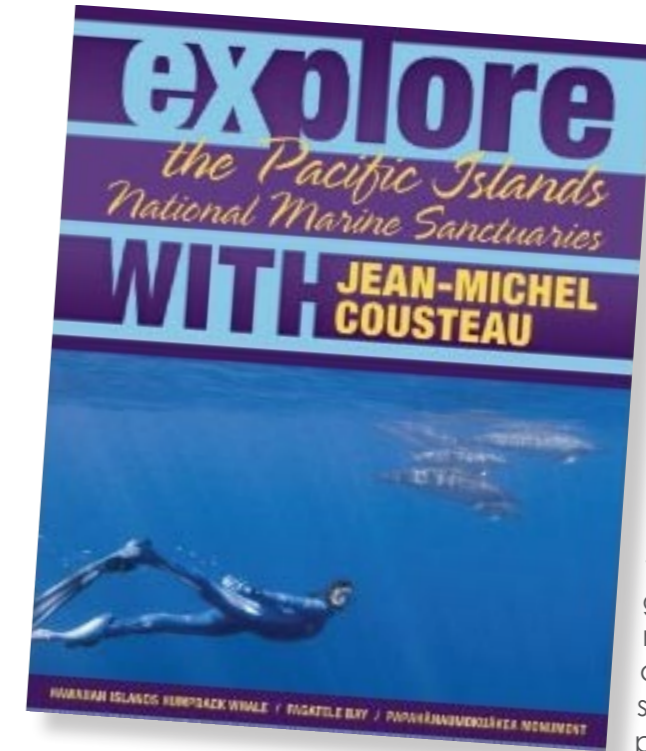
—The Story of Australia's Greatest Shipwreck Hunter

Get inspired by the story of Australian shipwreck hunter Hugh Edwards. Even as a young lad, he aspired to uncover sunken treasure on the high seas. Contrary to the book's title, it wasn't just silver that spurred him on. In his career, he has also found Dutch ducats, Burgundian crowns, Spanish silver dollars, and of course, 'pieces of eight'. Pick up this book if you're game for real-life adventures of a modern-day treasure hunter.

Paperback: 416 pages
Publisher: HarperCollins Publishers (Australia) Pty Ltd
Date: 10 Feb 2013
ISBN-10: 0732294509
ISBN-13: 978-0732294502



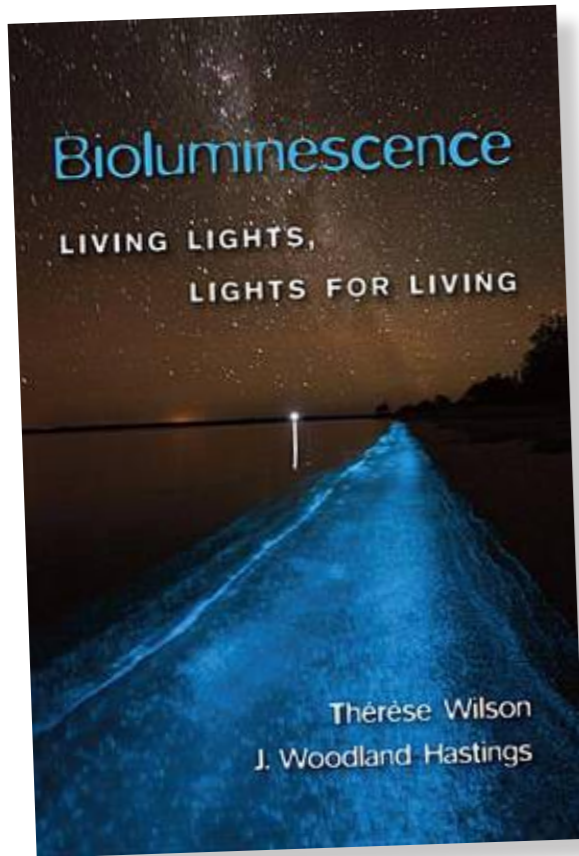
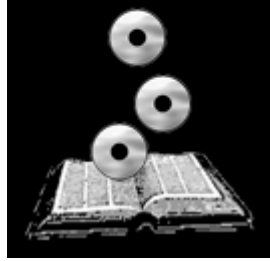
The Pacific Islands



Explore each of the four regions of the U.S. National Marine Sanctuary System with the explorers from the Ocean Futures Society! Based on the film series *Jean-Michel Cousteau: Ocean Adventures*, readers can join the crew on expeditions into these unique regions, through stunning photography and behind-the-scenes stories. This particular edition explores the Pacific

Islands, which include Fagatele Bay, American Samoa and Papahānaumokuākea Marine National Monument, Northwestern Hawaiian Islands.

Paperback: 208 pages
Publisher: Ocean Publishing
Date: 1 Feb 2013
ISBN-10: 0982694040
ISBN-13: 978-0982694046



Bioluminescence

Bioluminescence—the emission of light by living organisms—is actually more common than one may think. Besides fireflies, some bacteria, mushrooms, invertebrates, jellyfish and fishes have the ability to light up. This book examines the natural history, evolution, biochemistry and distribution of these organisms. Whether it is used for defence, attack or sexual courtship, bioluminescence is an area of research with applications in locating cancer cells, detecting microbial contamination in beef and water, as well as working out the circuitry in our brains.

Hardcover: 208 pages
 Publisher: Harvard University Press
 Date: 18 February 2013
 ISBN-10: 0674067169
 ISBN-13: 978-0674067165



Rivers & Ponds

Enter the surreal world of freshwater river and ponds through the stunning photography of Emmanuel Lattes. Although sometimes literally at our feet, most of us don't pause to consider the beauty and life within this freshwater ecosystems. But this need not be the case anymore. With this book at the helm, it is time to take a peek into this fascinating and fragile world.

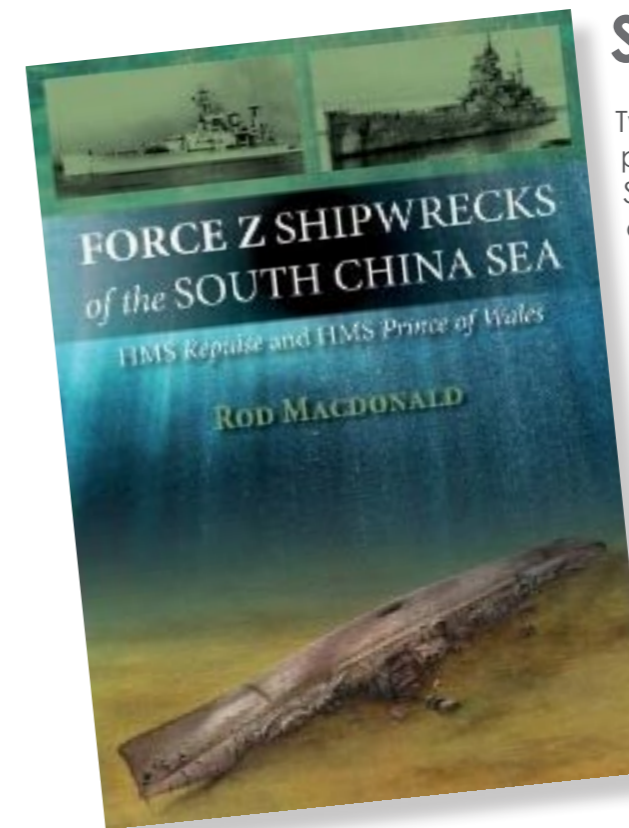
Paperback: 60 pages
 Publisher: CreateSpace
 Independent Publishing Platform
 Date: 21 January 2013
 ISBN-10: 1481952463
 ISBN-13: 978-1481952460



Narwhals

For most of us, the narwhal is simply an oddly-shaped whale with a long tusk. But this intriguing creature is more than that. Author Todd McLeish braves the Arctic cold to bring to light the true character of the narwhal, through whalers' logbooks and interviews with folklorists and historians. Then, he also explores the historical trade in narwhal tusks, their vocalizations, as well as the effects of climate change on the narwhal.

Hardcover: 216 pages
 Publisher: University of Washington Press
 Date: 1 March 2013
 ISBN-10: 0295992646
 ISBN-13: 978-0295992648



Shipwrecks

Two hundred miles north of Singapore beneath the waters of the South China Sea lie the remains of two British warships that were sunk during the Second World War. Author Rod Macdonald was invited on a military expedition to dive and survey the wrecks of the *HMS Prince of Wales* and *HMS Repulse*. The result is this book, documenting the loss of these two ships, and the stories of the men who served aboard them, alongside specially commissioned illustrations of the wrecks.

Paperback: 192 pages
 Publisher: Whittles Publishing
 Date: 28 Feb 2013
 ISBN-10: 1849950954
 ISBN-13: 978-1849950954

An underwater photograph of a shipwreck's interior. The scene is dimly lit, with two bright blue lights illuminating the space. The walls and floor are covered in coral and other marine life. The floor appears to be made of metal grating. The overall atmosphere is mysterious and historical.

Chuuk

Wreck Junkie Heaven

Text and photos by Brandi Mueller



Coral growth on the wreck of the Sankisan Maru

Chuuk



View of Chuuk Island. PREVIOUS PAGE: Diver in interior of Betty plane

My dream history lesson includes a tropical Pacific island where I step off a beautiful boat soaked in sunshine the warm Micronesian waters and descend on a coral covered ship that was part of World War II. This dream and these ships came to life for me during a recent trip aboard the *MV Odyssey* liveaboard. Truk Lagoon, now known as Chuuk, is most certainly one of the world's greatest wreck diving destinations. These lush green islands with palm trees and calm blue waters make it almost impossible to fathom the immense battle that took place on the 17th and 18th of February, 1944.

Under Japanese occupation during World War II, Truk served as one of the Japanese Imperial Navy's main bases in the South Pacific Theater. Some compared it as Japan's Pearl Harbor. This logistical and operations base for the Japanese Combine Fleet served as the stage for the United States' attack called Operation Hailstone.

Known in Japan as *Torakku-tō Kūshū* (the airstrike on Truk Island),

the United States took Japan by almost complete surprise with two days of daytime and nighttime airstrikes, surface ship actions, and submarine attacks. Ordered by Admiral Raymond Spruance, Vice Admiral Marc A Mitscher's Task Force 58 included five fleet carriers (the *USS Enterprise*, *USS Yorktown*, *USS Essex*, *USS Intrepid*, and the *USS Bunker Hill*) and four light carriers embarking more than 500 planes. There were also seven

battleships, numerous cruisers, destroyers, submarines and other support ships assisting the carriers.

Airstrikes, employed fighters, dive bombers and torpedo aircraft were used in the attacks focusing on airfields, aircraft, shore installations, and ships around the Truk anchorage throughout the day and night. Many airplanes were destroyed as they were unable to take off, having just been delivered off cargo ships and still



CLOCKWISE FROM LEFT: Coral-encrusted mast of the *Fujikawa Maru*, with the *Odyssey* hovering overhead; Damselfish; The *MV Odyssey*; Damselfish looks out from a sponge on the *Fujikawa Maru*

being disassembled.

Although still a major success for the Americans, just a week before Operation Hailstone, much of the Japanese fleet's larger warships were sent to sea to be relocated out of Truk. This was probably due to the base becoming too vulnerable. But even with those ships gone, the Americans sank 12 Japanese warships, 32 merchant ships, and destroyed 249 aircraft. Many of the ships were loaded with supplies to be delivered to other parts of the Pacific and little of the cargo was recovered, thereby hindering the Japanese Navy in the Central and South Pacific and ending Truk as a threat to Allied operations in the Central Pacific.

Many ships sank and many lives were lost, but the ships of Truk Lagoon now serve a new purpose underwater. Reborn as artificial reefs, the wrecks have become covered with marine life and become home to schools of fish, anemones, corals, sharks and much more.

The wrecks of Truk Lagoon had been on my 'must dive' list for years, but Chuuk is a long way away from almost everywhere. Serviced only by United Airlines, a stop in Honolulu or Guam is required to get to Truk. My flights included eight hours to Honolulu, eight more to Guam, and a thankfully short two-hour flight to Chuuk.



Arriving very late, and very tired, I was greeted at the airport by several pleasant crew from the *Odyssey* who took us to the boat. Much too excited to sleep, I laid awake in my cabin waiting for morning and our first wreck.



Diving the wrecks

Finally, morning came. Breakfast was served and Captain Nelson gave us the dive deck briefing. He touched on several important topics concerning diving these wrecks, the first being that these wrecks were not sunk on purpose. Unlike many wrecks sunk artificially, which are cleaned and made safer for divers, these are actual sunken warships with potential hazards requiring divers to be aware at all times of

what they're doing, especially inside the wrecks. Visibility inside the wrecks can go from great to zero quickly from bubbles knocking off rust from overhead environments and stray fins can kick up silt leading to low visibility situations. These ships, having been underwater for almost 70 years, are beginning to show their age. For example, one of the Lagoon's most famous wrecks, the *Fujikawa Maru*,



Gas mask (left) and bicycle parts (below) on the *Kiyosumi Maru*; The *Odyssey* (right) at the surface over a ship mast covered in soft coral

sengers launched in 1934 and converted into an armed merchant raider in 1941. She participated in the Battle of Midway and had been towed to Truk for repairs after being damaged by aircraft bombs.

Sunk on her port side, laying in the sand at 31m (100ft), we swam the length of the ship and eventually entered hold #2 through the hole caused by the bomb that sank the ship. Covered in growth, particularly long branched bushes of black coral, jellyfish seemed to be strategically placed around the outside of the ship, as if they guarded it. Originally holding eight guns, all have been removed, but the platforms remain. Our dive guide led us into hold #5 to see parts of two bikes and then hold #6 to see two massive spare propeller blades. Collections of bottles found inside the



known for its spectacular engine room penetration, has had most of its super structure collapse in the past year, making it dangerous to access its famous engine room.

Before diving each wreck, the *Odyssey's* knowledgeable staff gives a thorough briefing about each wreck showing a dive map to recommend dive plans, points of interest as well as hazards. They also give incredible history about each wreck, discussing each ship's role before and during the war.

Kiyosumi Maru. Stepping off the *Odyssey* and descending upon our first wreck, the

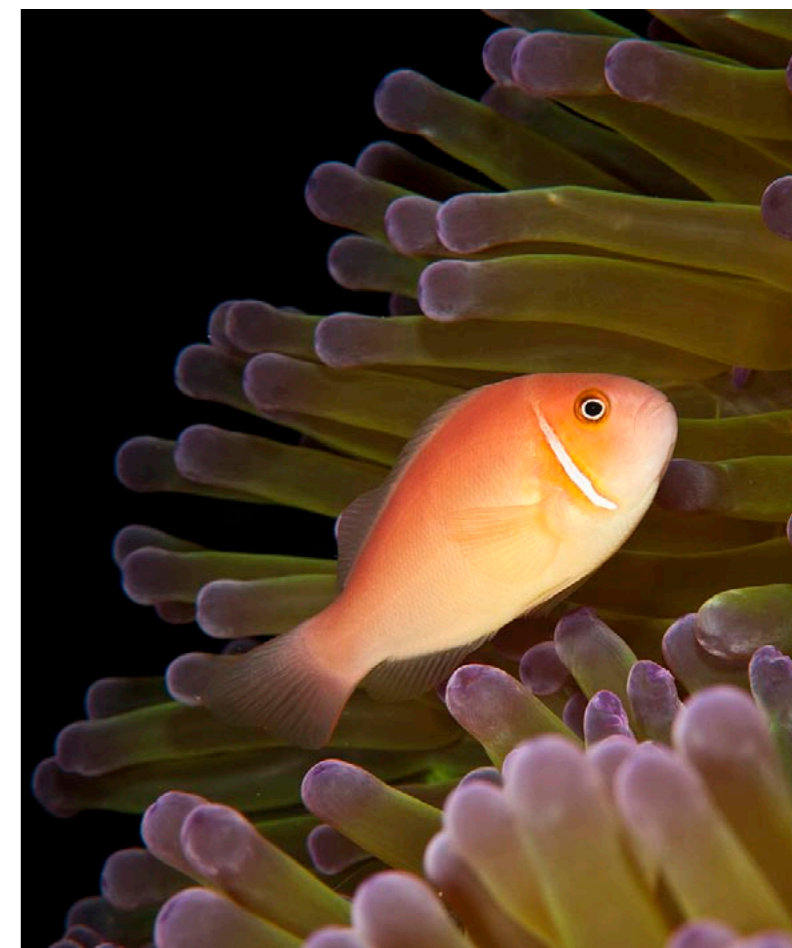
Kiyosumi Maru, feels like entering another world. The intact ship body, sitting 12m (40ft) below the warm Micronesian waters starts to bring to life the battle that took place here.

In Japanese, *maru* means *circle*, or *round*. This name is given to ships that circle back to where they came from. The warships did not have that distinction, as they were sent into battle, not expected to return. The *Kiyosumi Maru* was a 137m (450ft) long and 18m (6ft) wide freighter that also carried pas-

ship have been gathered in several places on the outside for divers to see. We also came upon a gas mask that almost looks like you could put it on and use it today.

Yamagiri Maru. The *Yamagiri Maru* was a 133m (437ft) passenger/cargo carrier launched in 1939 and converted to a military transport ship in 1941. This ship was damaged by two torpedoes in 1943 from the submarine *USS Drum* and repaired in Rabaul before sailing to Truk and then sank by dive bombers from the *Yorktown* and *Bunker Hill*.

Sitting at 36m (120ft) with its shallowest parts around 18m (60ft), this ship's most interesting feature is in hold #5. On their way to be delivered to the battleships *Yamato* and *Mushashi* were armor-piercing shells 45cm (18in) long, weighing over 3,000 pounds each, which could be hurled 38km. These gun rounds were for the largest guns



Anemonefish on the *Fujikawa Maru*



The bow gun of the *Fujikawa Maru*; The *Kiyosumi Maru* before the war (top right)

ever made for a battleship; the largest American battleships had only 40cm (16in) guns.

Being a lover of macro ocean life, I couldn't help but be amazed at all the little creatures that could be found making their homes in these sunken ships. One second the dive guide would be pointing out 45cm ammunition and the next moment I would find a nudibranch crawling its way up across the bow of the WWII wreck. Anemones seem to have happily made their homes all over the wrecks, and their respective anemone fish eagerly come up to look at you, looking back at them.

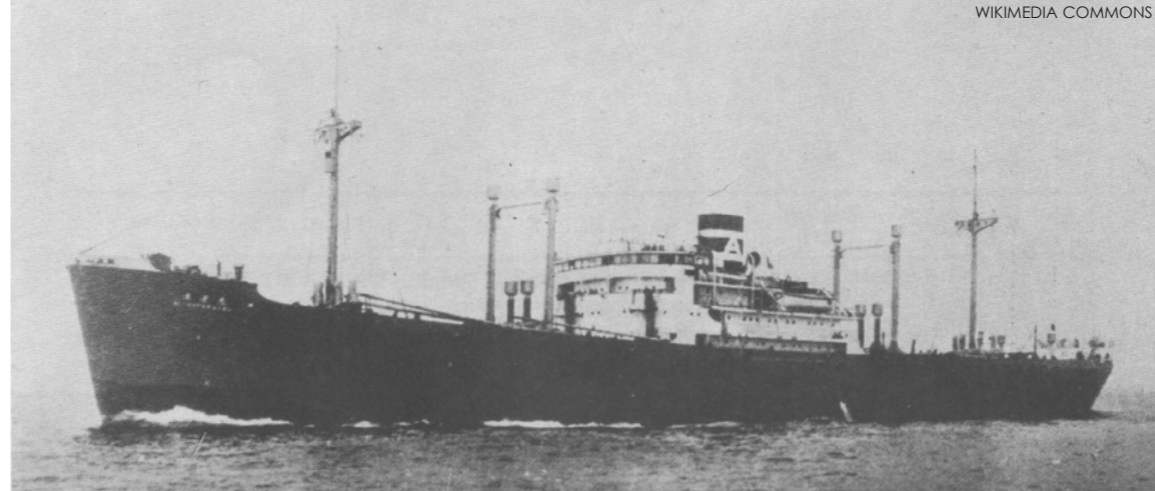
Fujikawa Maru. The *Fujikawa Maru* is one of the lagoon's most famous wrecks. Covered in lush coral, this ship was built in 1938 as a passenger cargo ship that car-

ried raw silk and cotton between South America and India. Commissioned into the Japanese Navy in 1940 and outfitted with 15cm (6in) guns on her bow and stern, she was tasked for transportation, including the delivery of aircraft and aircraft parts to Pacific islands.

Carrying planes to Truk, the *Fujikawa Maru* off-loaded 30 B5N2 bombers (Jill planes) which lay in pieces on Eten Airfield (Eten Island) during Operation Hailstone. They were unable to help defend against the Americans. Bombed by air attacks on February 17, the *Fujikawa* was still afloat on February 18. Essex dive bombers hit the port quarter with a 1,000-pound bomb. Finally, two Monterey airplanes attacked and witnessed a huge explosion and the ship in flames.

Still aboard the ship during the attack were three Zero fighter planes in cargo hold #2 and a fourth plane that is possibly an A6M "Claude" fighter, the only known surviving plane of that type. The *Fujikawa* sits upright, and we followed our dive guide from the surface down into cargo hold #2 to see these mostly intact planes. In the clear water, the planes looked as if a pilot could sit in them today and fly right out of the ocean and back into the air. We also saw spare wings and fuel drums.

Often boasted as one of the most beautiful wrecks in the lagoon, this magnificent ship is covered in pink and white soft coral, blue sponges, and every inch of it is covered in differently-colored marine life. On the deck, a plaque dedicates the preserva-



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Chuuk

only two made-for-war ships sunk in Chuuk, it is a 97m (320ft) Mutuki Class destroyer built in 1926 and was in Truk for repairs from an attack by U.S. planes near Rabaul on 4 January

tion and respect of the *Fujikawa* and other wrecks in the lagoon. Collections of artifacts from the inside are gathered on different parts of the ship including china with Japanese brandings. Schools of tuna and smaller fish circled the wreck, and a large barracuda seemed to be standing guard over the bow gun.

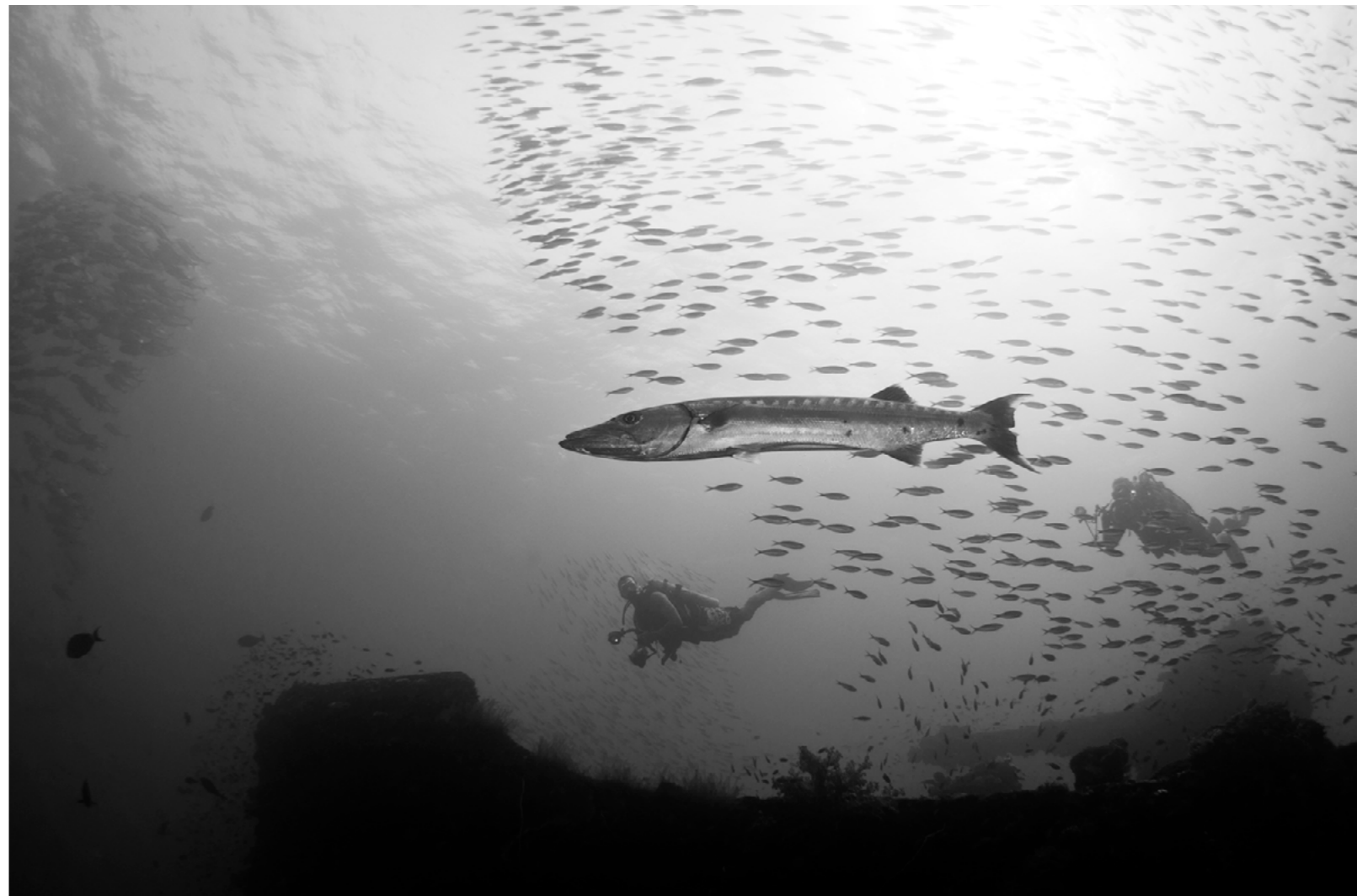
Often considered one of the

best wreck penetrations, much of the superstructure of the *Fujikawa Maru* has collapsed recently, making it very difficult and potentially dangerous to enter the engine room due to its instability.

Fumitsuki Destroyer. The *Fumitsuki* is a dedicated warship built for the Japanese Navy, and has no "maru" following its name. One of

1944. Prior to the Rabaul damages, the *Fumizuki* helped relieve Japanese forces in the battle of Guadalcanal as part of the "Tokyo Express".

Damaged by bombing during Operation Hailstone, her crew abandoned her when she lost power. They attempted to tow her to a new anchorage, but had not noticed the ship had its



Divers swim over the *Fujikawa Maru* to get a better look at a barracuda



Panel of gauges lies in the sand a few feet from the Emily plane

anchor dropped to avoid drifting on the reef.

Sitting between 24-36m (80-120ft) this warship still has intact bow and stern guns and a torpedo launcher. Being built as a warship and not a more comfortable passenger ship, we could immediately tell how much more compact the spaces were on the ship. We swam through companionways and looked into crew spaces, which were noticeably smaller and reduced in size compared to the passenger ships.

Airplanes. Some of the more popular airplane wreck dives in the Lagoon include the Kawanishi H8K1 "Emily" flying boat and the Mitsubishi G4M "Betty" bomber. Bomber aircraft were often given female names, and fighter aircraft were often nicknamed with men's names.

The Emily flying boat was known for its long range. Nicknamed the "Flying Porcupine", it was very difficult to shoot down because it had self-sealing fuel tanks and internal fire extinguishers. It held a crew of 16, had a 37m (124ft) wingspan and was 28m (92ft) long. It had four 1850 horsepower Mitsubishi Kasei engines.

This particular plane was bringing back the commanding officer of the Fourth Fleet, his chief of staff and other senior Japanese naval officers from a meeting in Palau. U.S. fighters repeatedly attacked, and the pilot still managed to escape the fighters and return to Truk. Although, while

trying to land the damaged aircraft, the pilot lost control, and it crashed and sank. The pilot, admiral and chief of staff survived.

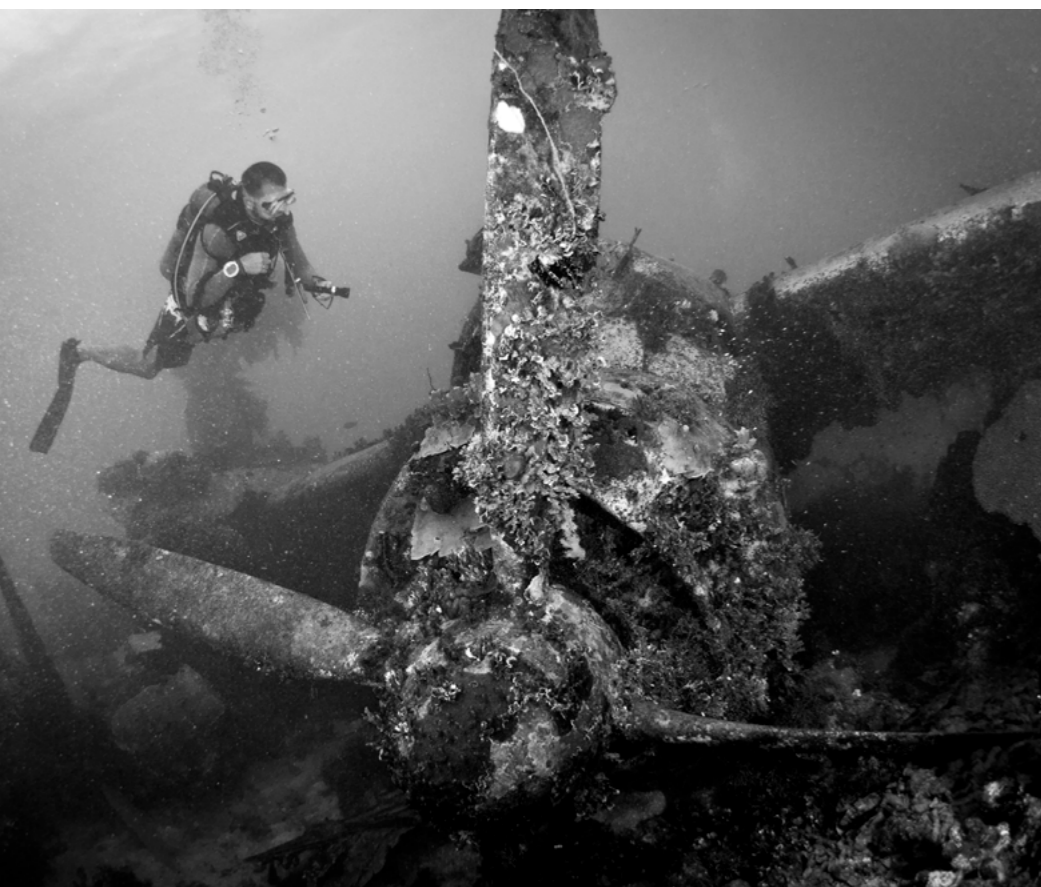
An easy wreck to dive at 15m (50ft), much of the plane was intact including several propellers. Near the plane sat several gauge panels and other airplane parts.

The Betty bomber was a small twin engine plane. The wreck sat in the sand at a depth of 15-18m (50-60ft). Made to be as light as possible, the fuel tanks were unprotected and easily caught fire, making them very vulnerable.

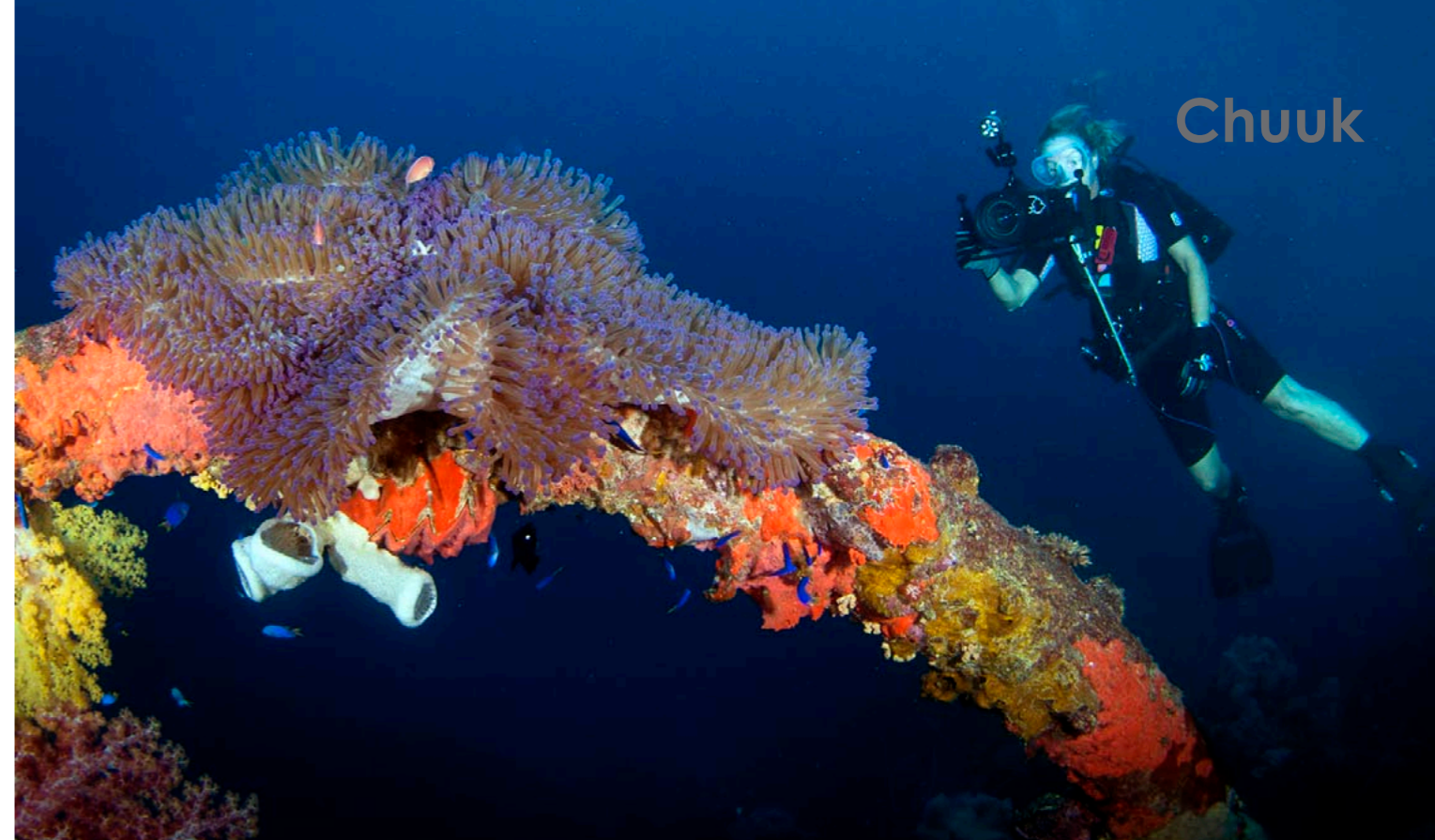
This plane crashed while trying to land on Eten Island. It is unknown if it was shot down or crashed on its own. The engines are found at about 90m (300ft) in front of the rest of the wreck closer to the island. The plane could hold a crew of seven, had a wingspan of 25m (85ft), was 20m (66ft) long and had four 12.7mm machine guns, one 20mm cannon and one 1750lb bomb.



Chuuk



Octopus (above) takes up residence in part of the Betty plane; Diver swims over the remains of an Emily plane (left)



Shinkoku Maru.

My favorite wreck in the lagoon—the *Shinkoku Maru*—has become a fantastically beautiful artificial reef. Pink and purple anemones can be found all over the top deck. Schools of fish, big and small, have populated the ship. Sitting between 9-40m (30-135ft), the 152m (500ft) commercial tanker was built in 1940. Before the war, it transported oil from the United States to Japan.

Its name meaning “divine country”, it was

requisitioned by the Japanese Navy into a naval tanker in 1941. She participated in the attack on Pearl Harbor.

Minor damage to the *Shinkoku* occurred on 17 August 1942 when the ship was torpedoed by the U.S. submarine *Gudgeon* and was repaired. Arriving to Truk only three days before the carrier strikes on 14 February 1944, it is thought she received a bomb hit amidships by

Yorktown planes, but she did not sink until an unknown air group struck the ship with a torpedo attack later in the day. Planes from *Bunker Hill* made six torpedo drops that all missed.

Sinking upright, the masts used to be above the water line, but due to possible boat traffic hazards, they were toppled by explosives. The ship was identified by the ship's bell, which was found with the name engraved.

With the super structure of the *Fujikawa Maru* collapsing, it's my opinion that the engine room tour of the *Shinkoku* is probably now the best in the lagoon. My dive guide took me into the ship through the smoke stacks that start around 18m (60ft). Headed straight down to around 33m (110ft), one can exit the ship through the torpedo hole at 41m (135ft) in the bottom port stern. We came out the torpedo hole, looked up at the massive ship and went back in through the hole to tour the engine room, generator rooms and other areas inside the wreck.

Along with the fantastic penetration, this ship has prolific and abundant marine life. Schools of batfish are found along the top deck, and several sharks were seen passing

the ship. With the superstructure being fairly shallow and so much marine life and abundant artifacts gathered on the deck, this wreck definitely needs several dives to see it all.

Hoki Maru. Another lagoon favorite is the *Hoki Maru* due to her cargo. Construction equipment and vehicles are found in hold #5 including intact trucks, tractors, a steamroller and two bulldozers. The trucks have right hand steering wheels, and the tractor looks similar to a John Deere model.

Originally named the *Hauraki*, this ship was a British/New Zealand cargo and passenger ship launched



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CLOCKWISE FROM ABOVE: *Shinkoku Maru*; Anemonefish in large anemone on the wreck of the *Shinkoku Maru*; Artifact on the *Shinkoku Maru* wreck; Diver at davit on the *Hoki Maru*; Truck on the *Hoki Maru*; Historical image of the *Hoki Maru*

in 1921. Seized by the Japanese in 1942, it was renamed the *Hoki Maru*. She was used for special transport. Sitting around 49m (160ft) in the

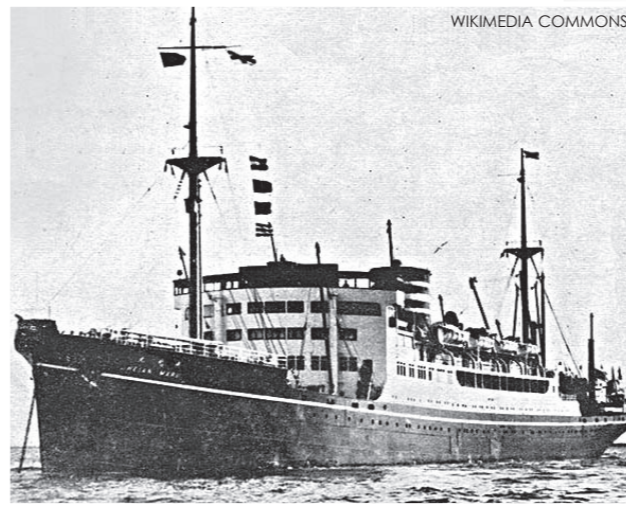
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CLOCKWISE FROM BOTTOM LEFT: Tractor on *Hoki Maru*; Diver on the *Nippo Maru*; *Heian Maru* pre-war; Divers at mast of *Nippo Maru*; Medical kit found in *Heian Maru*

sand, this 137m (450ft) ship's bow was severely damaged by two 1,000-pound bombs that hit the port side igniting fuel and causing a massive explosion and fire. The deck appeared to have been peeled back or ripped open from the rest of the ship.



Nippo Maru. Hit and sunk by three 500-pound bombs in its stern, the *Nippo Maru* was a 106m (350ft) transport ship mostly carrying water. Originally a passenger and cargo freighter, she was seized in 1941 by the Japanese. She now sits mostly upright with a 20 degree port list between 15 and 45m (50-150ft). The *Nippo* has a very noticeable wheelhouse with an intact telegraph and steering helm. Hold #4 is particularly interesting with its aluminum water containers, bottles and bike parts. On the port side bow, a small, mostly intact tank is found as well as a truck chassis.



Heian Maru. The largest wreck in the lagoon at 155m (510ft), the *Heian Maru* was built in 1930 as a passenger cargo ship. Recalled to Japan during a normal voyage between Hong Kong and Seattle in 1941, she was then converted to a submarine tender. Her name is found in both English and Japanese on the hull. She was named after the ancient city of Heinkyo, "The City of Peace and Tranquility".

Sunk on her port side and sitting between

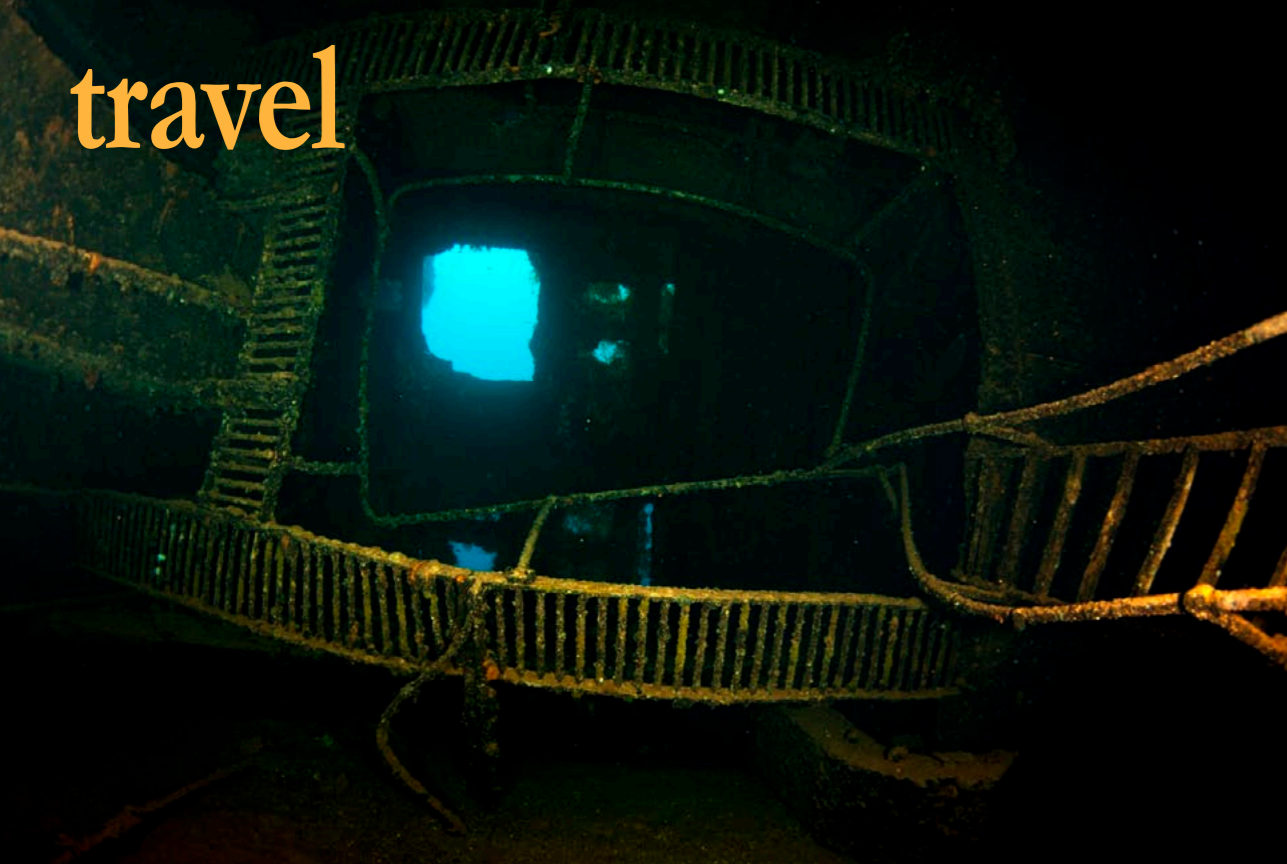


10-30m (35-100ft) of water, one of the most notable parts of the *Heian Maru* are Type-95, 7m (23ft) long torpedoes, which are stored upright in the forward holds. Artifacts have also been gathered from inside the ship and placed together including a fantastic medical kit with several different colored bottles.

San Francisco Maru. Although I did not dive this wreck, it deserves to be mentioned here. One of the deeper wrecks in the lagoon sitting upright from 45-63m (145-205ft), it is unique, as there is not much growth due to its depth. It is also a very interesting wreck because it has three intact Japanese Type-95 light tanks, which were crewed

Torpedoes inside the *Heian Maru*





Inside the *Rio de Janeiro Maru* (left); Engine room (bottom left), Bottle Room (center) and mast (right) of the *Rio de Janeiro Maru*

trucks, fuel and aerial bombs and torpedoes, and depth charges are found in the aft holds.

Rio de Janeiro Maru. Before WWII, the *Rio de Janeiro Maru* was an eight-deck passenger luxury liner, which carried people and cargo from Japan to many areas of the world including South America, South Africa, the United States. Built in 1940 and converted into a submarine tender in 1940 for the Japanese Navy, she serviced six submarines. After Japan lost most of its submarines, she was reclassified as a transport ship. Sunk by at least one bomb from an Essex aircraft, she now rests on her starboard side at 40m (130ft).

Another of my favorites, this 137m (450ft) wreck had an easily accessed large engine room with many knobs, gauges and pipes. There was also a hold referred to as the 'bottle room' with stacked boxes of beer bottles. The ship also had very large, photogenic, propellers. One needs several dives to fully explore this large, mostly shallow wreck.

Afterthoughts

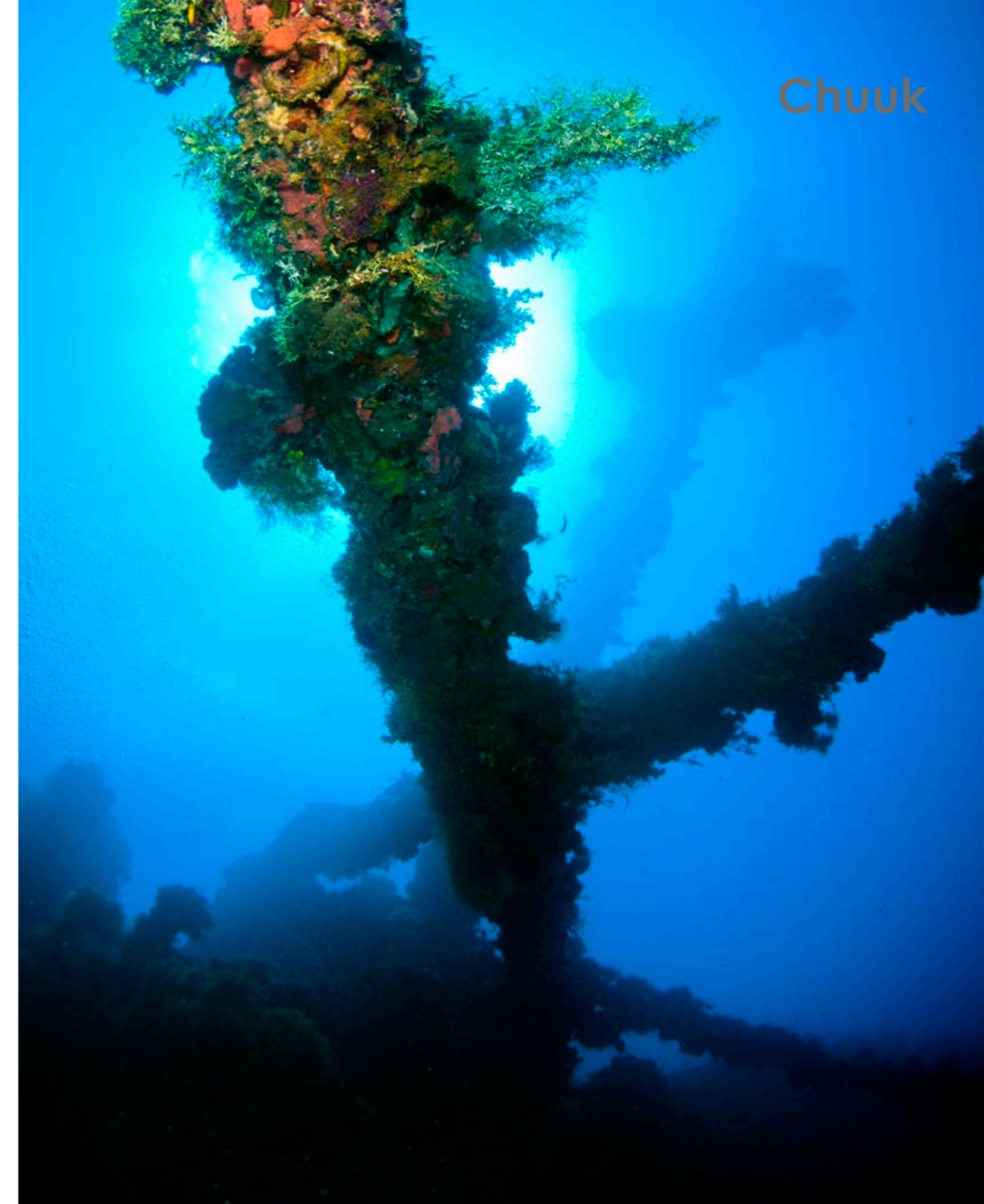
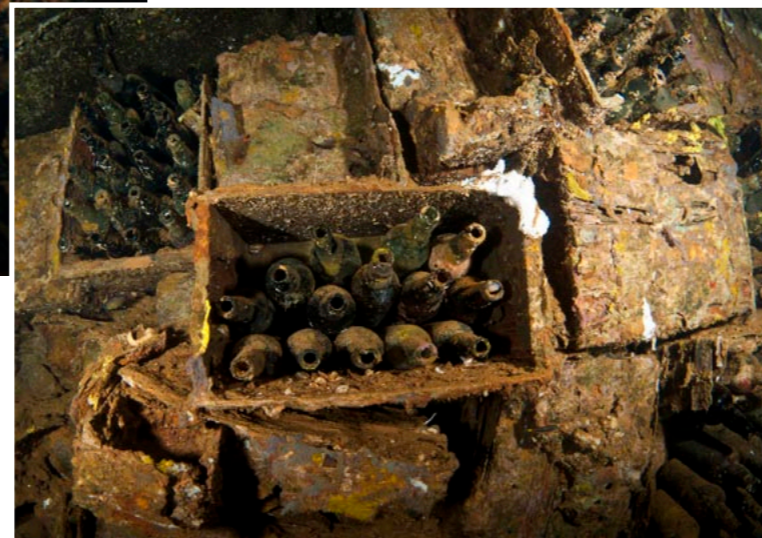
With so many wrecks in Truk Lagoon, one needs multiple trips to see them all, much less explore them adequately. The *MV Odyssey*, a 40m (132ft) luxury liveaboard with nine very comfortable private state-rooms, a spacious dive deck, large camera table, and fantastic meals makes it easy to dive as many of the lagoon



by three people. These tanks sped up to 30mph and had half-inch armor. The *San Francisco Maru* was built in 1919 as a freighter. She became a cargo ship in WWII.

Known as the million dollar wreck

because of her estimated worth of cargo, divers find many very interesting war artifacts on this ship. Hold #1 contains sea mines and detonators, hold #2 has several

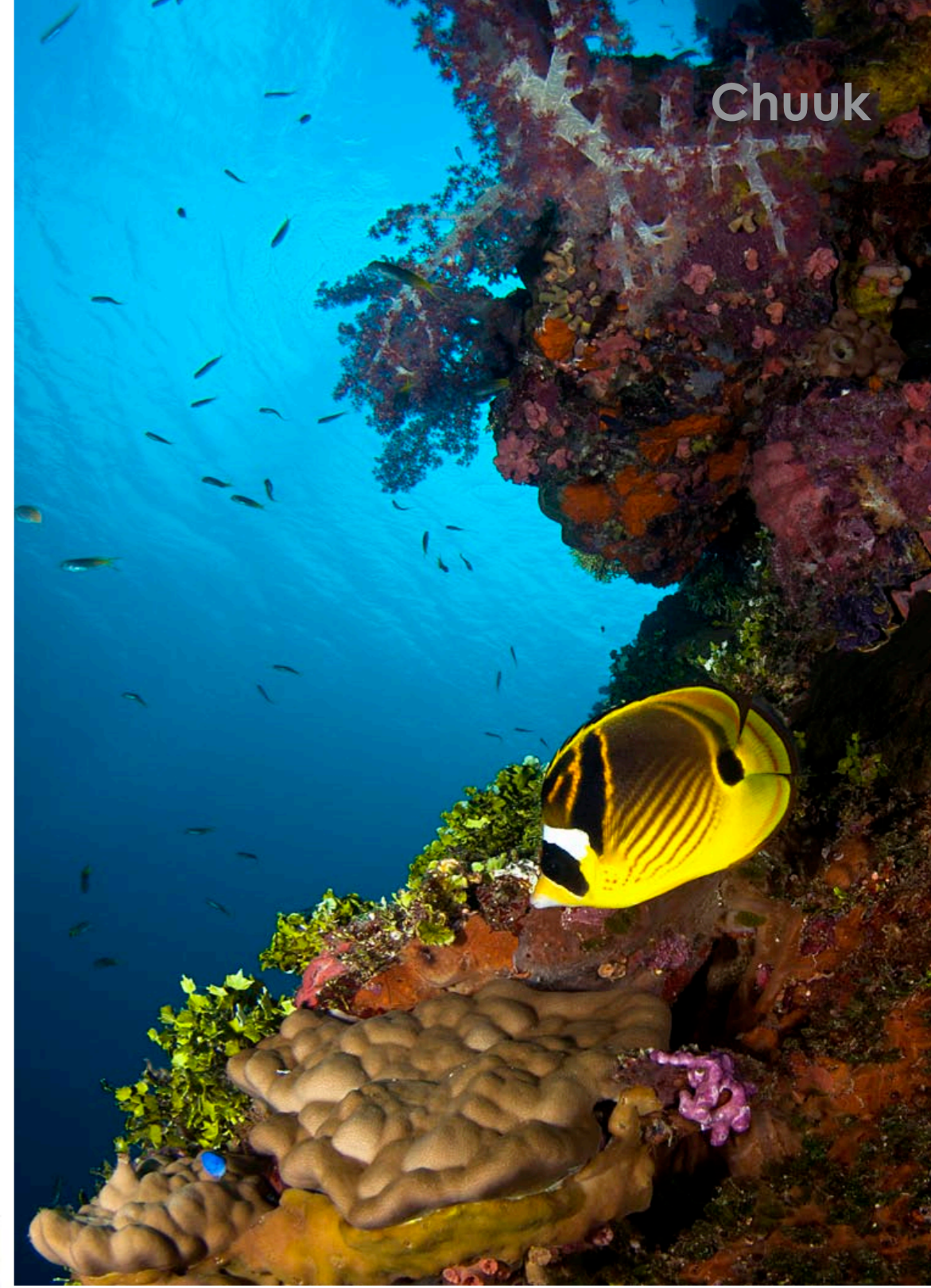
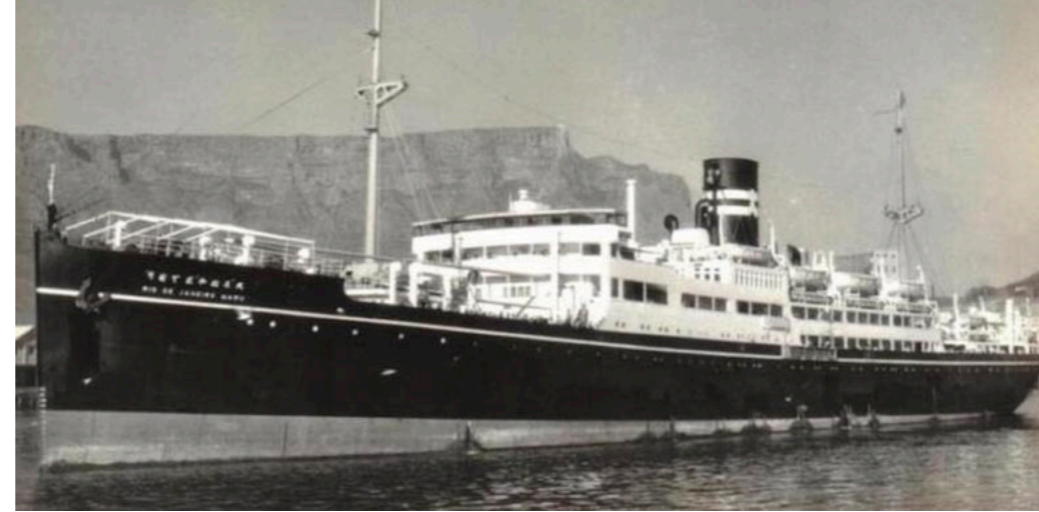


wrecks in a week as possible. Offering five dives a day and a fantastic and knowledgeable crew, I can't imagine a better way to make the most of a week diving Chuuk.

I've often heard people talk about diving Chuuk, and they think it is too advanced for them. It can be, but it doesn't have to be. For divers who do not want to go "deep and dark", the

outsides of the wrecks have become fantastic artificial reefs with hard and soft corals, anemones, large schools of fish, and plenty of the macro critters found in other parts of Micronesia (most of the time divers are too enthralled with the wrecks to search for them!)

Almost all the wrecks can provide a spectacular dive above 30m (100ft). And usually when the *Odyssey* dives the very



deep wrecks, they will provide an alternative wreck for those who do not want to go that deep.

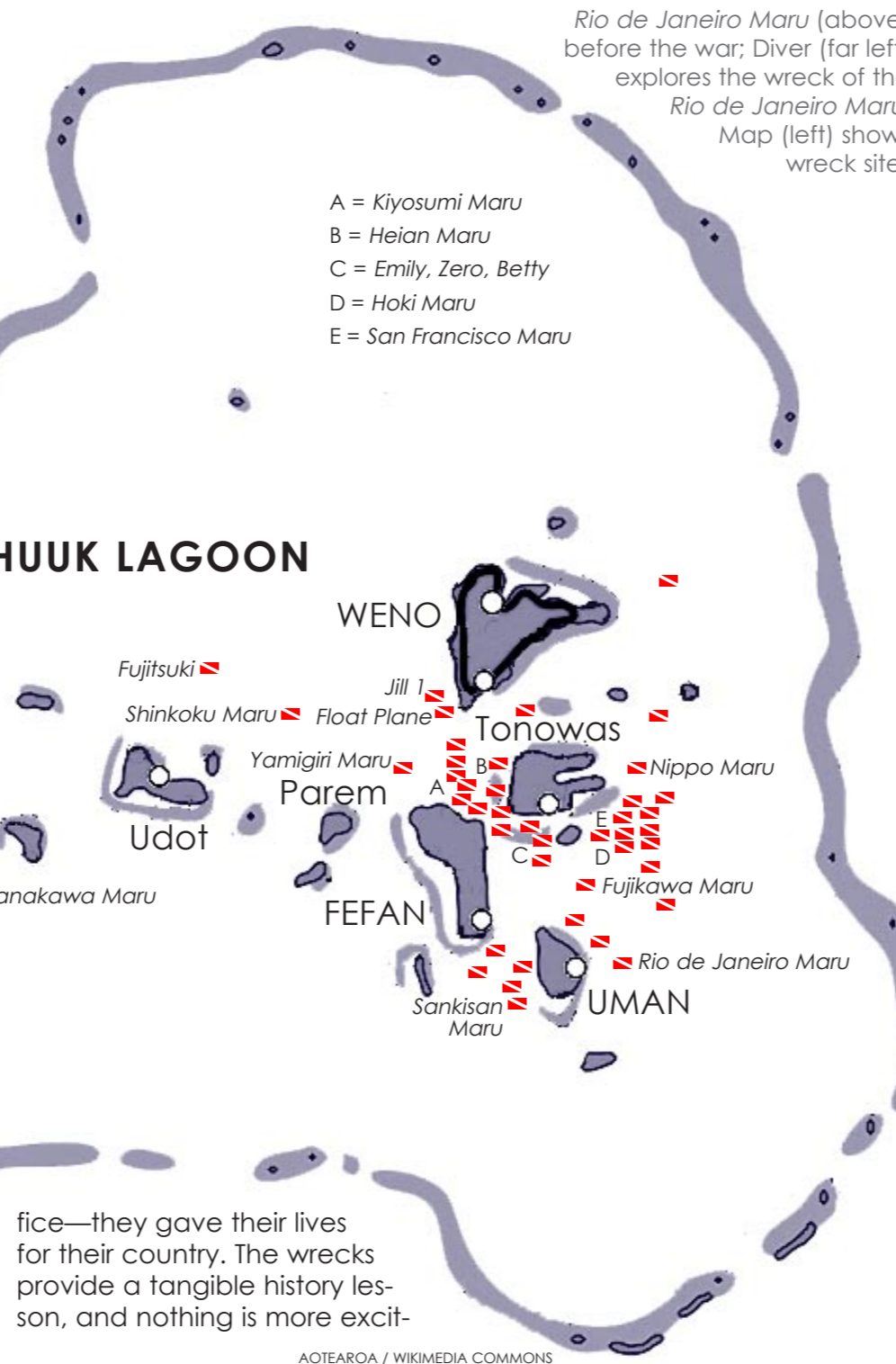
The experienced and well-trained *Odyssey* crew will also go above and beyond to make sure every diver on the boat gets the diving they are looking for. Dive guides can recommend easier dive plans for those wanting to stay shallower and outside the wreck.

If you do, however, want to go “deep and dark”, they will take you on mind blowing penetrations into engine rooms, cargo holds, and more. Aboard the *Odyssey* divers are given the opportunity to dive at their leisure or have one of several fantastic dive guides lead them. Technical diving is allowed on the *Odyssey* for certified or experienced tech divers.

Many lives were lost and ships sunk in the waters of Truk Lagoon. But underwater, the

ships have been reborn as thriving artificial reefs. Almost 70 years in the nutrient rich waters of Micronesia have made these

ships stunning and colorful marine habitats. Hard and soft corals cover the outsides of the ships and large school of tuna, barracuda and sharks swim by. The ships are also the grave sites of those who made the ultimate sacri-



Rio de Janeiro Maru (above) before the war; Diver (far left) explores the wreck of the *Rio de Janeiro Maru*; Map (left) shows wreck sites

—they gave their lives for their country. The wrecks provide a tangible history lesson, and nothing is more excit-

ing than being able to visit and explore them. ■

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

Sankisan Maru (top right)

SOURCES:
WWW.THORNFIN.NET
WWW.PACIFICWRECKS.COM
BATTLESTATIONS.EU/INDEX.PHP/EN/OUR-ENCYCLOPEDIA/NAVAL-BATTLES/144-OPERATION-HAILSTONE MORISON, SAMUEL ELIOT. *ALEUTIANS, GILBERTS AND MARSHALLS, JUNE 1942-APRIL 1944 (HISTORY OF U.S. NAVAL OPERATIONS IN WWII)*, 2011
BALLEY, DAN. *WORLD WAR II WRECKS OF TRUK LAGOON*, 2001

fact file



Chuuk, Micronesia



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

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 United States. Occupied by the Japanese prior and during WWII, Chuuk served as a major operational base for the Japanese Imperial Navy Combined Fleet and was the target for the United States military attack known as Operation Hailstone on 17-18 February 1944. 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. The islands are mountainous with tropical jungle. 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).

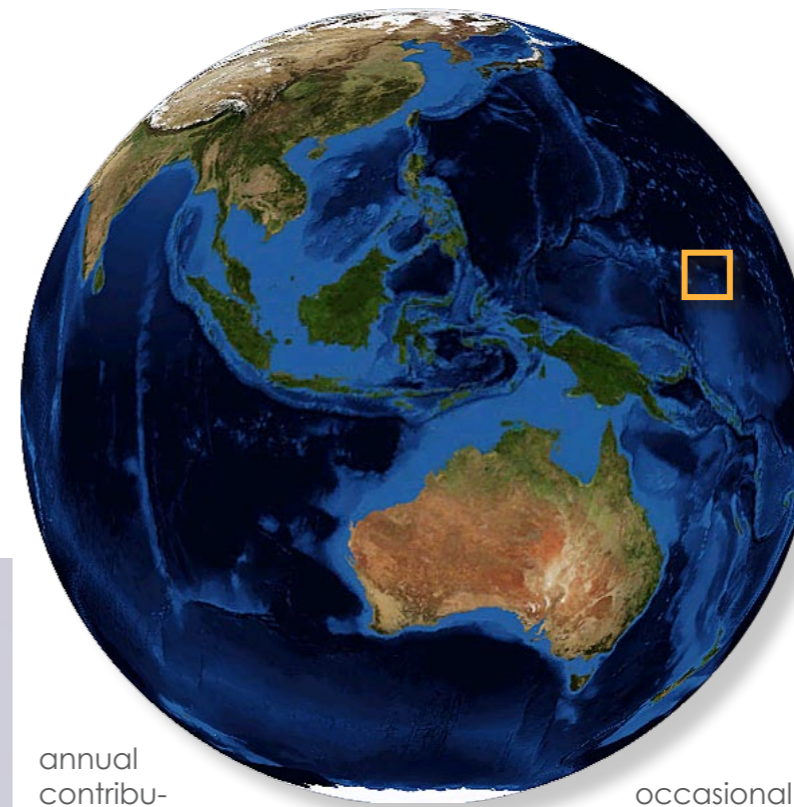
Environment Overfishing, climate change and pollution pose challenges.

Brick on wreck of the Heian Maru

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

RIGHT: Global map with location of Chuuk Islands

BELOW: Location of Chuuk Islands on map of Micronesia



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 106,487 (July 2012 est.) 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

Language Chuukese, English

Health In the FSM, 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. On Chuuk, there is a hospital in Weno that can take care of normal needs, although it's suggested prescription medication for the entire stay is brought with you. Major illnesses should be flown to Guam (~3 hours) or Honolulu (~7 hours).

Security It's not safe outside resort areas. It's not advised to be out at night, even in cars. The Odyssey provides transportation from and to the airport.

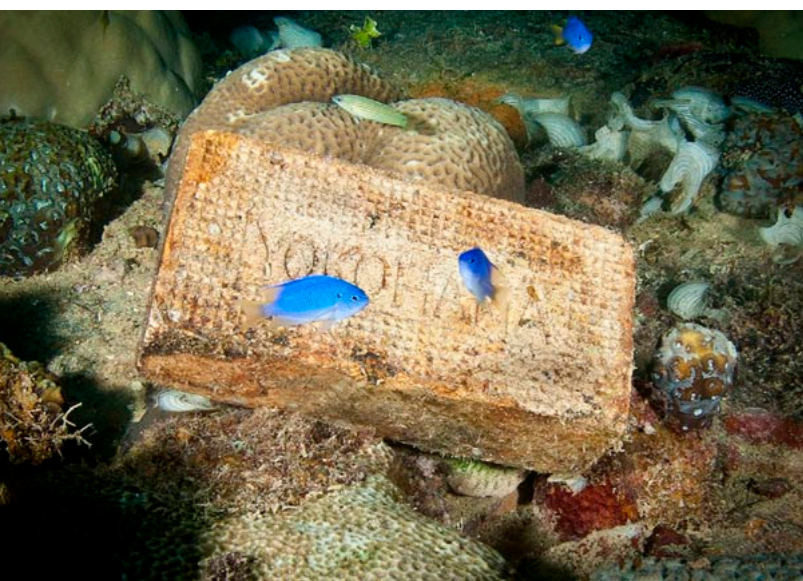
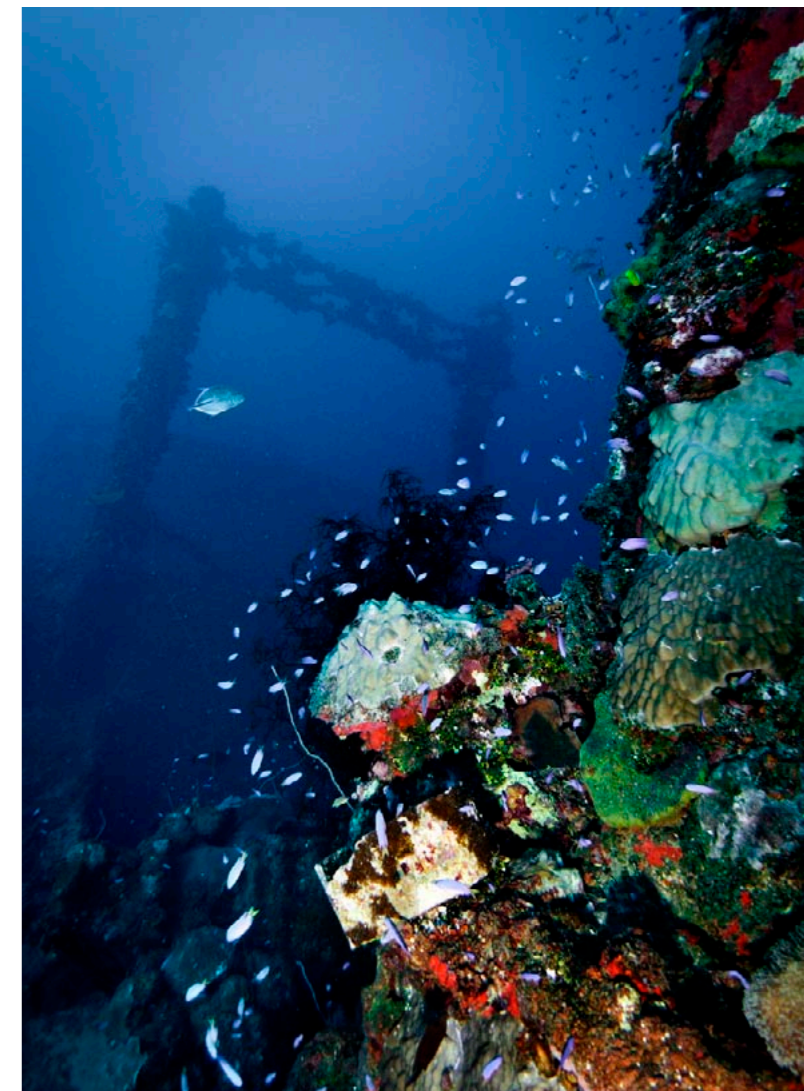
Nippo Mura wreck

Decompression chamber There is a chamber in Chuuk

Getting there United Airways services Chuuk with routing through Guam and Honolulu.

Entry/Exit \$20 U.S. cash departure tax collected at airport prior to departure

Web sites Tourism Micronesia www.visit-fsm.org





Try something different

Hockey Under Ice

Text compiled by Peter Symes
Photos courtesy of Manfred Dörner

The big puck is made from wood and styrofoam

Underwater ice hockey is played upside-down underneath frozen pools or ponds, using the underside of the frozen surface as the playing area for a floating puck. Competitors do not utilize any breathing apparatuses, but instead surface for air every 30 seconds.

The new game sport that originated in Austria has become increasingly popular among freedivers and extreme sports enthusiasts. It is played as a match between two teams where two to three players participate per team in a six-by-eight meter rink situated under a sheet of ice. At any given time only one player is submerged while the two others move between the manholes while catching their breath.

Much like on-ice hockey, the game consists of three periods, although each period is only ten minutes long, with a ten minute intermission between periods to allow players to warm their bodies. As for the spectators, they watch the under water action from a screen above the ice.

Considering they are not allowed to play with any kind of breathing apparatus, underwater ice hockey players need to have excellent breath-holding abilities. Since players can easily get disoriented during a game, become too exhausted to reach the hole or can't find it, four safety divers equipped with oxygen tanks are present to supervise the players during the game.

So far, there have been two Underwater Ice Hockey World Cups, both held in Weissensee, Austria. The first was held in 2007 and was won by a team from Finland. The second tournament, which was just held in 15-16 February 2013, was won by the home team from Austria, beating Germany in the final with a score of 9-6. ■



Hungary's

Molnár János

Exploring Budapest's Underwater Caves

Text by Antti Apunen
Photos by Janne Suhonen





Molnár János flows into Lake Malom (above). The water pipe in the bottom of the lake feeds a spa across the street (right)

A rusty tram clatters past us. An uninterrupted line of cars slowly moves along Leó Frankel Street. Businessmen in dark suits hurry to their desks. Women in high heels walk carefully on the cobbled pavement. Between the houses, the ferries on the Danube can be seen, drifting past the Isle of Margaret that divides the town. We are in the middle of the Budapest morning rush hour. Our team attracts attention from passersby. We are carrying a van load of diving bottles and boxes through a narrow iron gate. The stone wall next to the cave is soon covered by diving equipment.

Molnár János is one of the most extraordinary natural cave systems in the world. It is something even most of the city's inhabitants do not know about. The cave stretches out below the metropolis, within the depths of an inactive volcano.

Budapest is known for its spas. Their water originates from the volcanic earth. One of the most well-known springs is Malom (mill) Lake. The name *lake* is a slightly grand definition for a pond that becomes eutrophic in the summer. After a few hundred metres, it flows to the Danube. The lake was already known during the Ancient Roman period—divers have found Roman constructions at the bottom of the



pond.

The dry cave of Molnár János begins a few metres above the surface of Lake Malom. Divers enter the cave through a spring, the mouth of which is at a depth of four metres.

Doorway to the unknown

The earliest information about the caves is from 1858. János Molnár, a pharmacist, investigated the dry areas of the cave and analysed the



Lake Malom (above) overgrown with aquatic plants. PREVIOUS PAGE: Divers explore Molnár János under Budapest



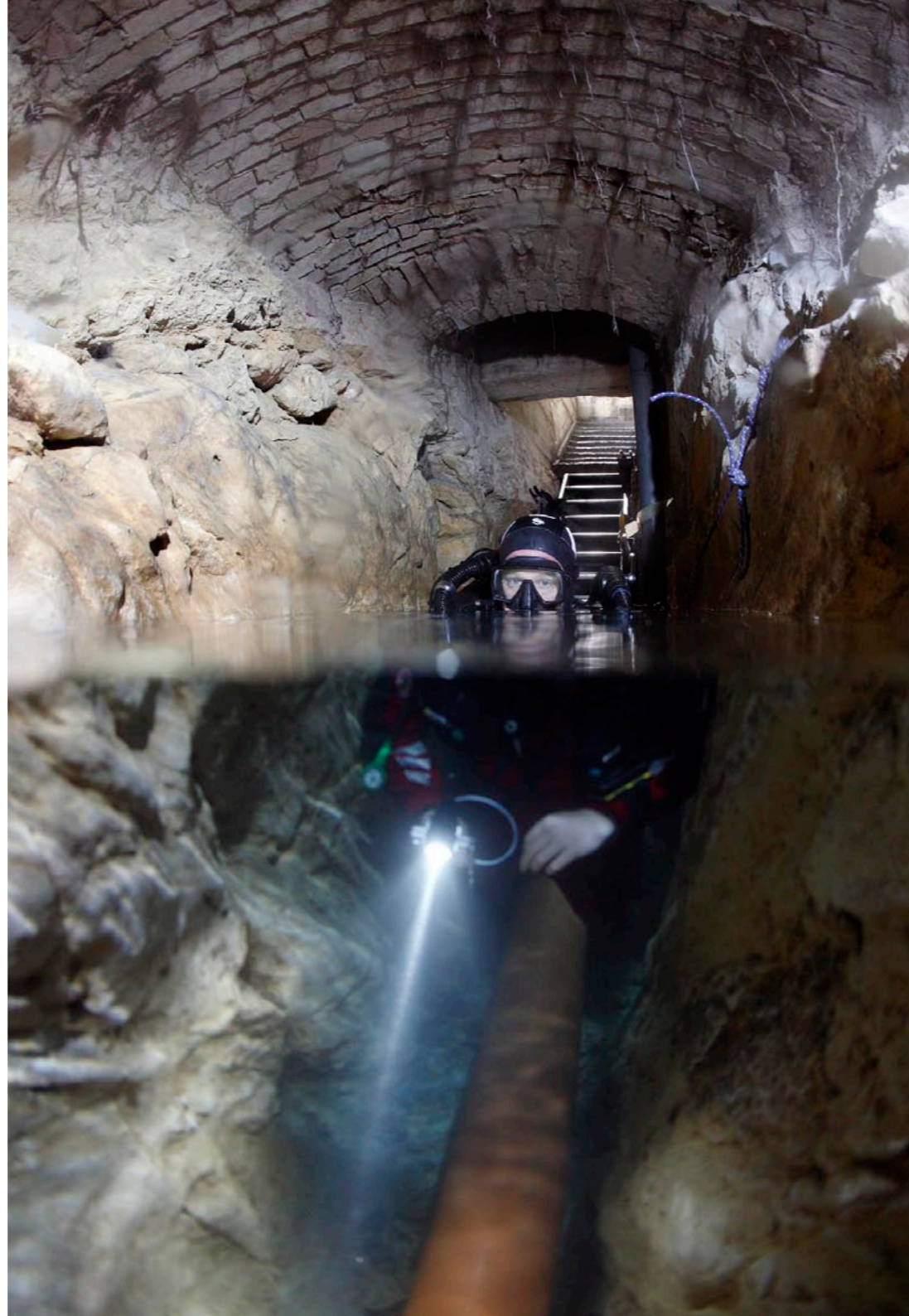


A few steps down, underneath a hatch (above), waits the entrance to the cave (right)

water of the spring. He examined the healing effects of the water. The cave was first dived in the 1950s. The charting began in the early 1970s. For over 30 years, divers only dived in the old part of the cave, which has 480 metres of tunnels.

Zsolt Gyurka is a local diver who plays a central role in the recent history of Molnár János. Without his perseverance, the largest part of the cave might still not have been found. The old cave was the only known part of the caves until 2002.

Like many other divers, Zsolt had been diving in the cave for years before he started to pay closer attention to one of the cave's walls. It was warmer than the others, almost hot in fact. There was something interesting behind the wall.



Zsolt began to carry a pneumatic drill with him. He managed to make a hole into the wall so that he could peek through it. There was crystal clear water behind the wall. And there seemed to be a lot of it.

A slow and nerve-racking charting began. Metre by metre Zsolt pulled the guiding line into the cave. He charted one tunnel after another, and today over five kilometres of the cave is known.

The delicate environment presents an even bigger challenge than the distances. Compared to typical limestone caves, it is really difficult and time consuming to attach the guiding lines in Molnár János. It is difficult to attach anything to rock walls that have been softened by acidic water. There are also no rocks in the cave around which lines can be tied. Drilling holes for the bolts destroys visibility in a moment.



Molnár János



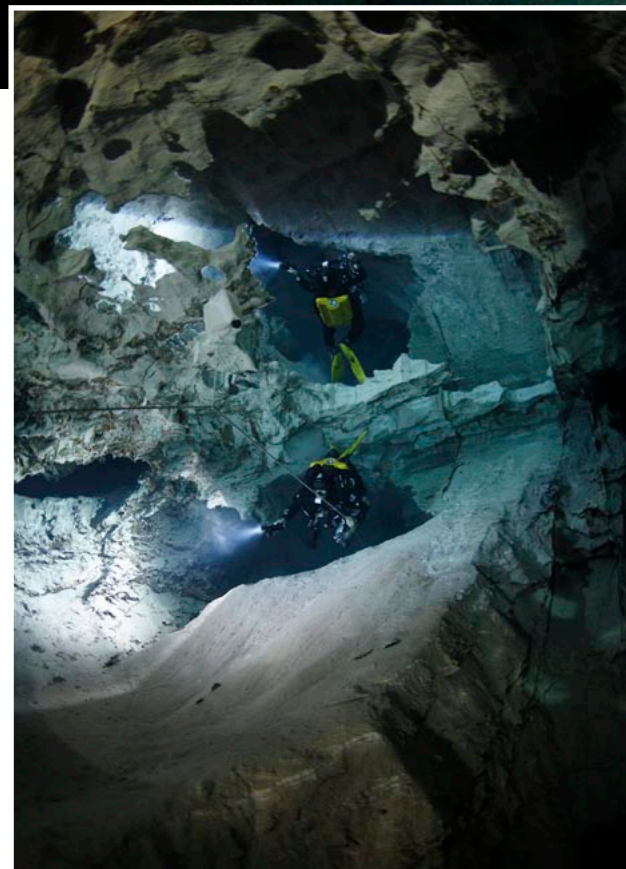
The cave

Today, over five kilometres of the caves have been explored. The biggest charted hall is over 80 metres long and 16-26 metres wide. In this hall alone, there is over 23,000 cubic metres of warm water. If an ordinary kitchen water tap was installed at the bottom, it would take four and a half years to empty it. There are hundreds of these halls in the caves.

Drilling in the surroundings of Molnár



Zsolt Gyurka discovered the entrance to the new part of the cave. He has laid kilometers of line into the cave (left); Divers follow the line into the chambers of Molnár János (top right)



Diver Harri Urho makes his way above the silty slopes (left); After a few days of open circuit diving, the visibility starts to slowly deteriorate (above)

János has revealed that there is a network of many caves crisscrossing between 150 and 250 metres deep underground. The tunnels of Molnár János continue towards the depths, but so far, divers have only reached the depth of 75 metres.

Molnár János would be even more extensive, had the moving earth not cut the tunnels off in many places. The caves almost certainly continue behind places where the fault lines have blocked the way, but they have no entrances.

There are several caves in the surroundings of Molnár János, but most of them are not suitable to dive in. They are either too hot or too confined.

Budapest's limestone earth developed during the warm and humid Eocene period

approximately 30-50 million years ago. The first animals like present-day mammals also developed at the same time.

Hungary is bordered by the Carpathian Mountains in the east and the Alps in the north. The rising Alps lifted the Buda mountains with them. The ground plate of the Pannonian plain sank eastwards. The ground cracked along the collision line of the mountains and the plain. Ground displacements can also be seen in many places in Molnár János, where the cave ends, as if it had been cut with a knife.

Caves develop when the earth moves. Water finds its way through even the smallest cracks, and the flow shapes the soft limestone. Acid rain, changes in temperature and gas rising from deep in

Silt has been washed away along the first few hundred meters of passage



the soil speed up erosion.

Acid rain develops when carbon dioxide adheres to rain water. The result is weak carbonic acid, which absorbs into the soil and dissolves limestone. It is the same acid rain that forests, and especially marble and limestone constructions, suffer from.

Caves are like underground rivers that accumulate ground water. The water flows in them and rises to the surface through the same springs that offer a natural entrance for divers.

Unique traits

Molnár János differs from all other caves that we have seen. For example, in the caves of Florida, the flow is powerful, and they are more linear in form. A cave often has one big tunnel, from which smaller

side passages branch off. In France, the caves are pipe-like tunnels. One tunnel can go on for several kilometres without considerable branches off it.

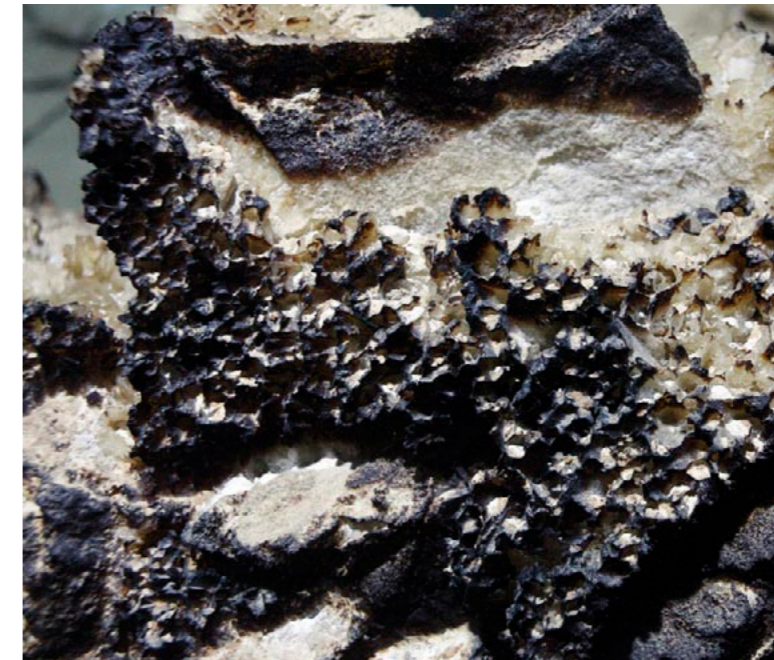
In France and Florida, the flow of water in the caves increases after rain. The water is quickly filtered through the ground and flows out through the caves. Particularly in France, the water becomes silty after rain. In Molnár János, the filtering is so slow that rain does not affect the currents of the cave. The conditions are stable and predictable.



The gases rising up from the lower earth layers contain hydrogen sulphide, which becomes sulphuric acid when mixed with

Crystal clear water fills huge halls along the way. Water coming up from below the cave is thousands of years old. The walls are decorated with fossils (below left) and crystals (below)

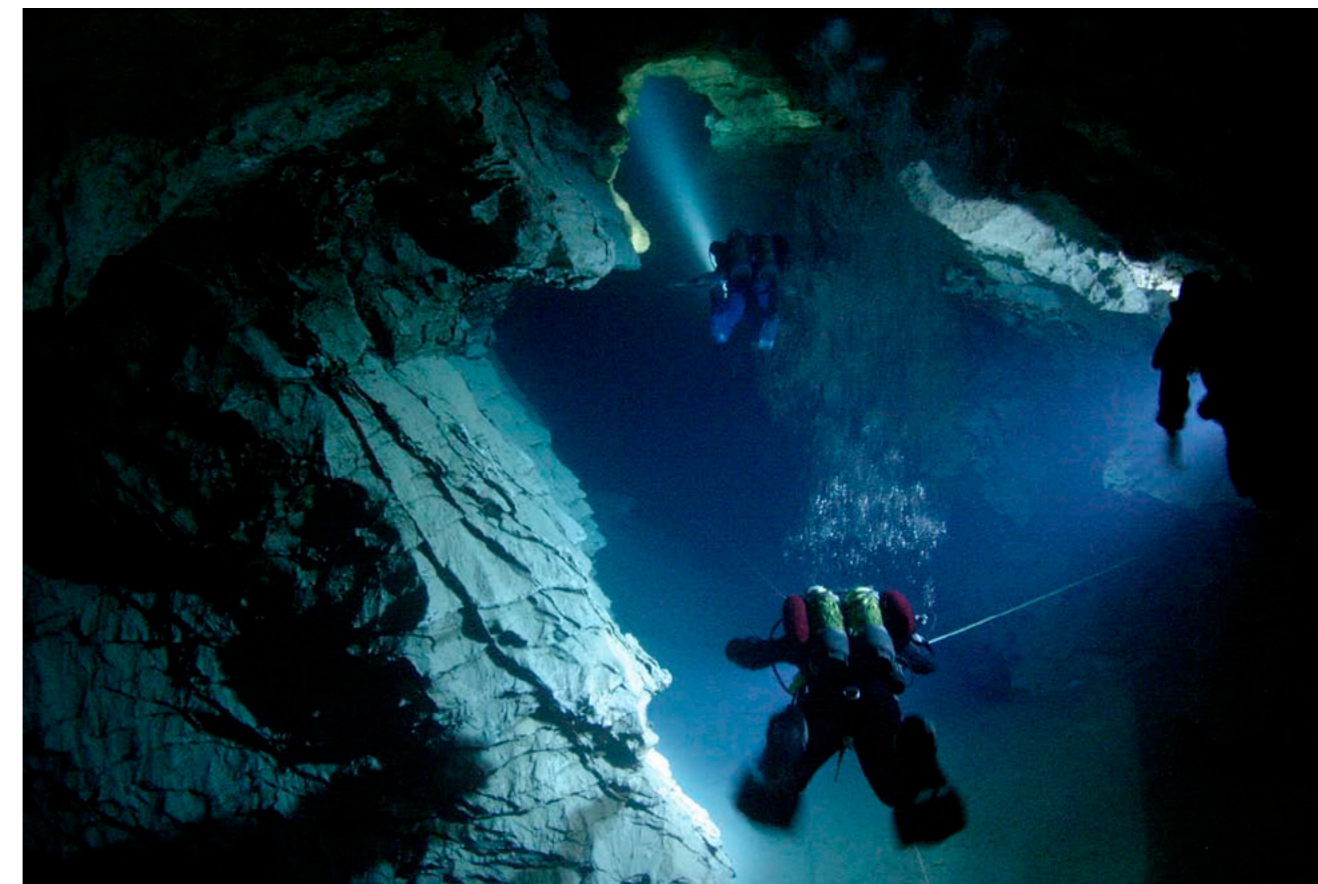
water. Divers call the water in Molnár János hostile. There is so much sulphuric acid in the water that it erodes material, especially rubber and metal. The metal surfaces of the diving equipment darken within a few days in the water.



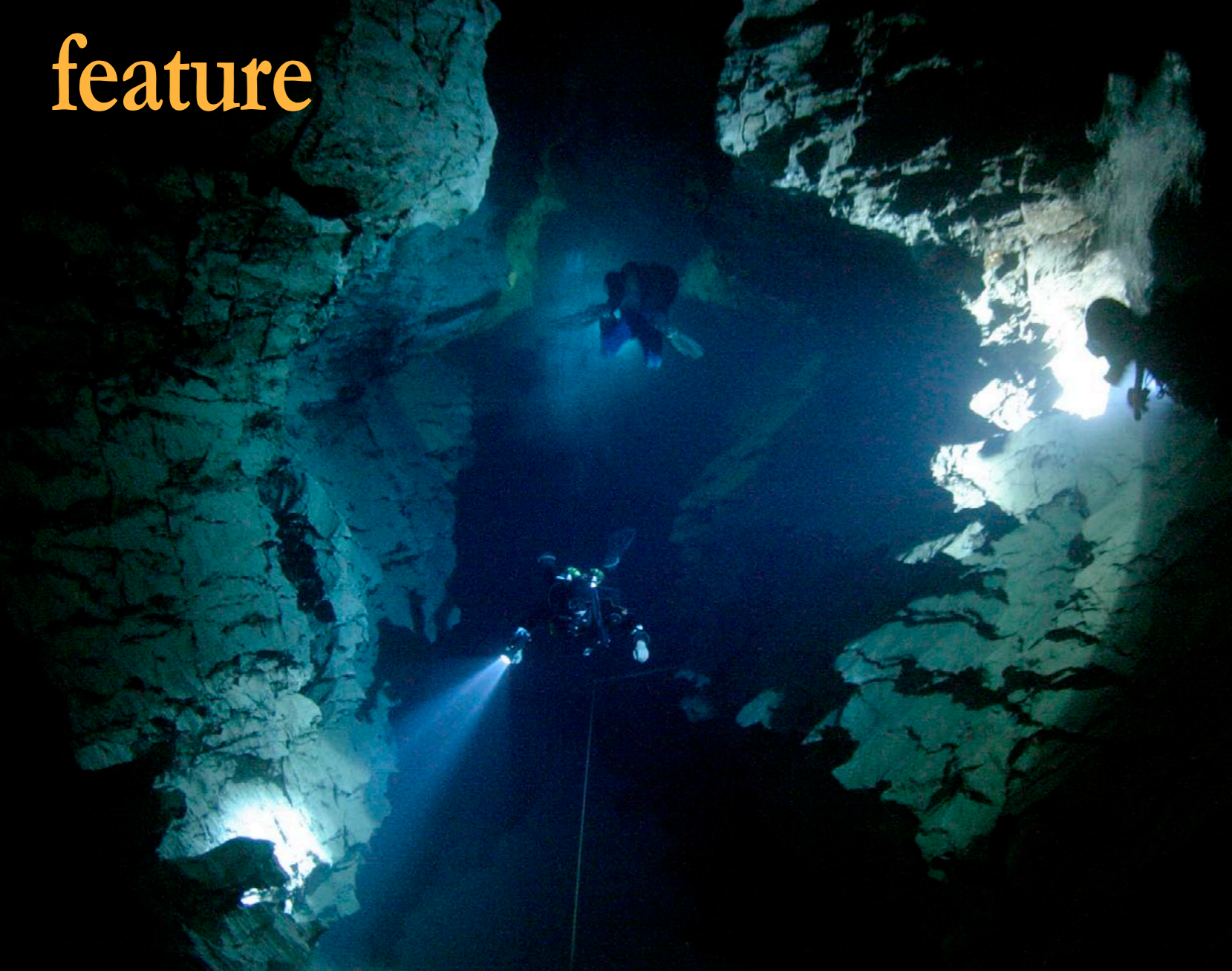
Geological time machine

In Molnár János, new caves are still being formed, but the speed is quite slow in terms of human lifespan. The humidity exuding from the Earth's surface gets mixed with the rising ground water that has rained down thousands of years ago. According to radiocarbon dating, the ground water in Molnár János is over 5,000 years old.

Unlike the new part of the cave, the old tunnel has been a popular place to dive. The short tunnel has been known for decades, and it is easy to dive in. The rock has become smooth in the narrow gaps. Also, the silt that used to cover the walls has gradually worked loose. That is why one can see the details in the limestone rock near the mouth of the cave. Fossils can be seen in the



Molnár János



Molnár János

Different crystals (left and below) are a result of changes in water acidity and composition of surface water and deep volcanic water meeting inside the cave; Divers enter a chamber in Molnár János (far left); Marine fossils in the cave formed when the area was under the sea millions of years ago (bottom)

the lower layers as carpets, as if lots of black building blocks had been thrown on the surface. In some places, the

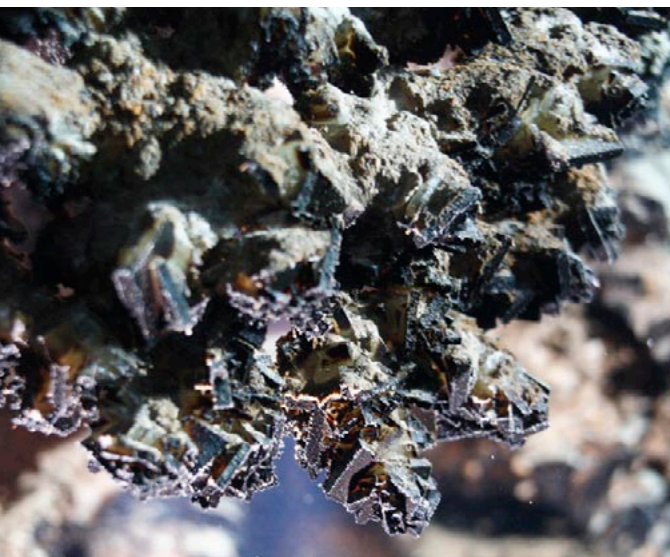
deep inside the rock. They stick out of the wall for a while until the limestone surrounding them erodes and the fossils sink to the bottom.

In Molnár János, the water flows very slowly. In the deeper part of the caves, the silt

oceans near the tectonic plates, there are similar hot springs through which hydrogen and hydrogen sulphides erupt.

One can see the history in Molnár János at a glance. Crumbled crystal pillars reveal how the crystals have formed over the course of the centuries, like the rings in a tree trunk. Even small changes in the acidity of the water can clearly be seen in the crystals.

In the uppermost layer of the caves, there are black barium crystals covered with manganese oxide. They reveal a geological change. The crystals are several centimetres long and have accumulated on the surface of



The crystals reveal the presence of various minerals, such as manganese, calcium carbonate and barium

walls, things like a tooth of a prehistoric shark.

The fossils in Molnár János originate from the time when the area was sea bed. The ground layer where the cave is located mainly consists of red algae, echinoids, coral fragments, bivalves, decapods and bryozoans. The mystery of Molnár János is what hides underneath the many metres of silt sand.

The most magnificent details are the crystals on the walls of the cave that are formed from orthoclase and barium sulphate. Orthoclase develops when silicate and calcium carbonate are crystallised in water. The particles of soft limestone have crumbled down to the bottom of the cave and become silt. Gradually harder fossils emerge from

sand that has run down from the upper levels covers most of the bottom, hiding its contours. The currents are so weak that they cannot carry the silt out of the cave. Only the stair-like walls remain, which the silt has settled on.

Molnár János is the only cave in the area where hot volcanic water is mixed with the cooler surface water flowing from the Buda Mountains. The temperature of the warmer, volcanic water is normally 27°C. There are no hot springs in the deeper parts of the caves. There, the temperature of the water is 20°C.

The hot currents of Molnár János sustain plenty of bacteria, which colour the walls of the cave red. They eat sulphate, which is abundant in the volcanic water. In the



manganese oxide forms a black film on the surface of the rock. The velvety layer is like soot. Diving in the manganese oxide rooms is an extraordinary experience, as the black colour absorbs the light and covers the details of the walls.

Under the layers of manganese oxide and barium sulphate, there is calcspar, or calcite—a form of calcium carbonate often found in chalky ground, limestone ground or marble. In the caves, there are many areas of crystal

Molnár János



front of me in order to get through a restriction. I pulled with both hands and wiggled when the box of my photographing light got stuck between stones. I found the right position and glided through the gap.

We continued for a hundred metres along the narrow tunnel. The walls were a few centimetres from my face. The narrow tunnel opened into a big hall. In front of me, there were stone blocks as big as houses. We made our way past them and followed



that have formed from crystallised calcspar.

The last to develop in the cave were the bacteria that are fed by hot currents from the depths of the earth. Bacteria reduce the acidity of the water.

Traditionally, interest in caves had more to do with geological history, but now researchers are interested in the bacteria living in conditions that were not supposed to support life. They offer medical science new alternatives for developing treatments.

NASA uses bacteria when it models life on other planets. In the last few years, it has been found that bacteria manage to survive in complete darkness and in temperatures of several hundred degrees. Light is not necessary for them, and their diet is still as primitive as when evolution

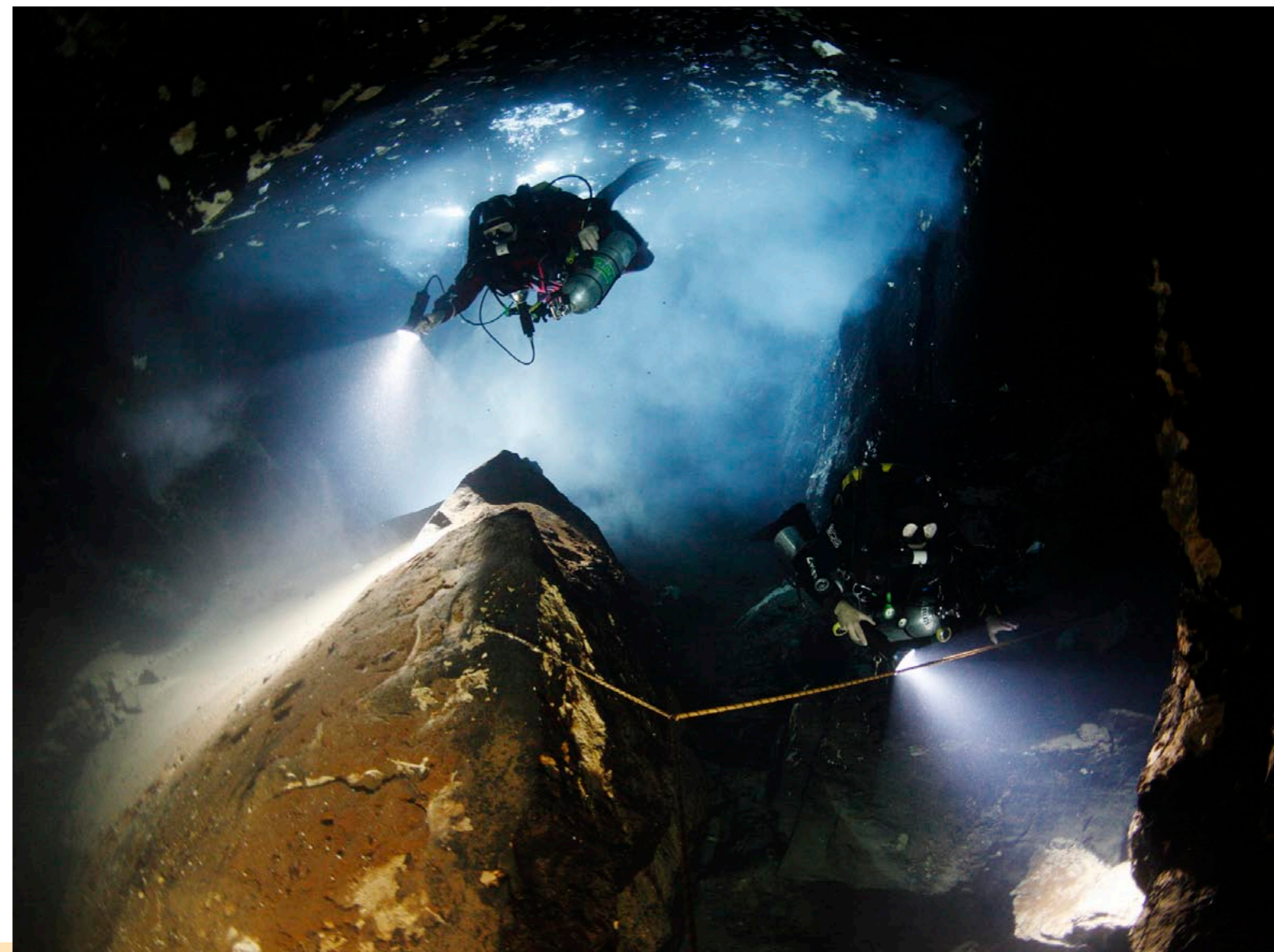
began. Even radioactive radiation, which splits human DNA fast, does not affect them.

I can only imagine how much even just one leaking sewer could damage Molnár János. The water in the caves has been preserved like the frozen water in the core of a glacier. Human influence does not reach here, yet. The water in which we swim pre-dates our chronology.

A dive into Molnár János

I pulled myself carefully along the projections of the walls and the line, trying not to stir the silt with my fins in the narrow gaps, as it would impair visibility immediately. I could hear only the random clinks of the stages against each other and the sound of my own breathing.

I detached my backup gas bottles and pushed them in



In deeper parts of the cave, the mud banks may collapse without much notice





Molnár János

We descended deeper into the cave. The water welling up from the hot springs hit the cold layer again in front of us. I sighed with relief, as the cool water rushed to my face.

The dry suit is an excellent invention for the ice cold waters of the north. Here, it protects during the long and deep dives,

which reaches several metres above the surface of the water. It was the biggest space above water in Molnár János.

We went beneath the surface again. There were hundreds of fossils in the vertical wall.

At first glance, the wall looked like solid rock, but when I pressed it

with my finger it gave away. My finger sank into the limestone like a hot knife through butter.

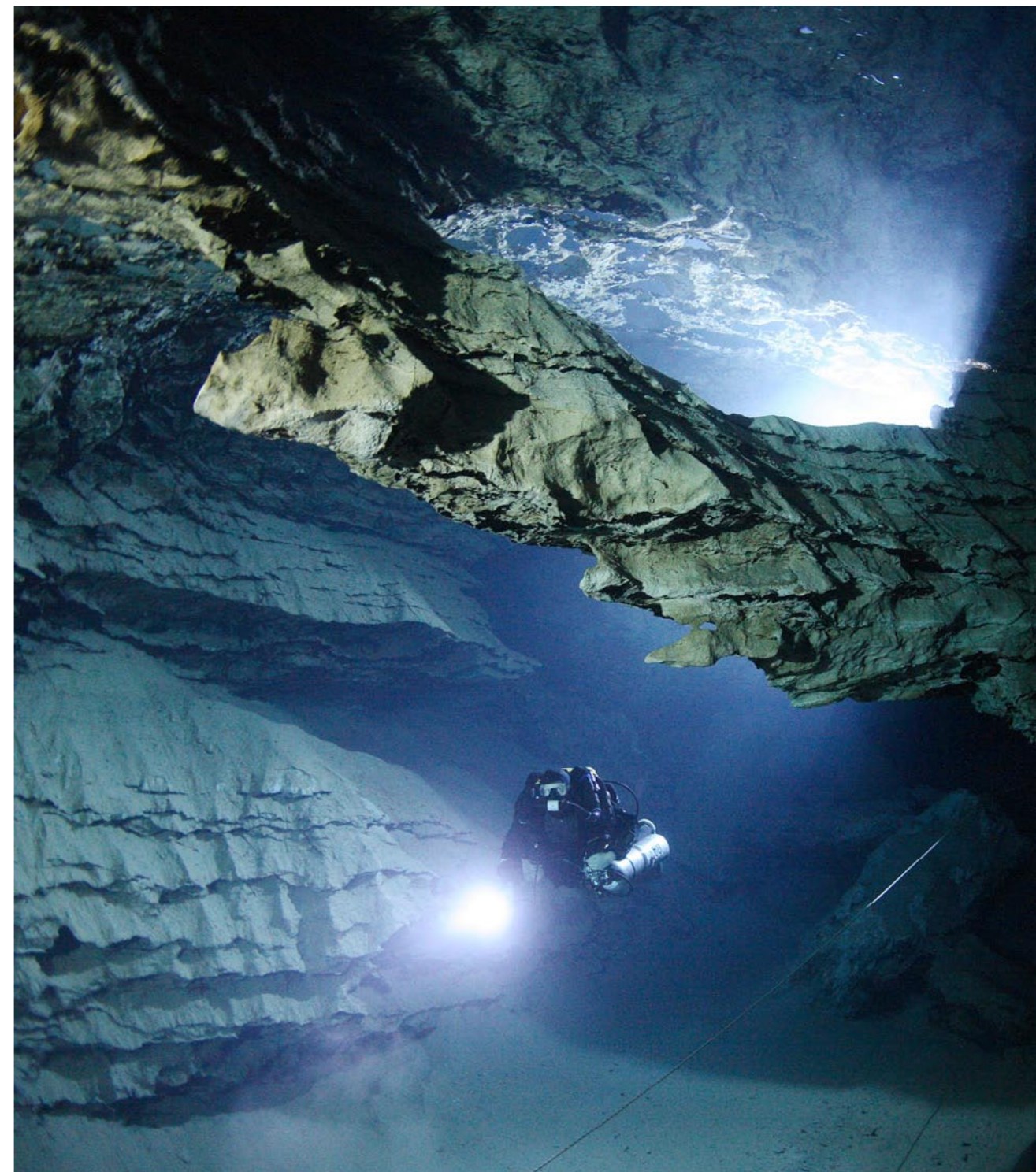
This is what makes diving in the narrow parts of Molnár János so difficult. It is difficult to find a hard rock surface; if you touch the walls, they crumble down in a cloud of silt.



The water in front of me was starting to ripple. On the thermocline, the karst water that filters from the surface mixes with the hot currents rising from the depths.

Visibility was momentarily lost, as we dived through the mixing layer of cold and warm water. A hot wave hit us in the face. The temperature rose to 27°C. The warm water rose from the depths of the Earth. Colours changed suddenly. The bacteria that thrive in warm water coloured the walls a rusty red.

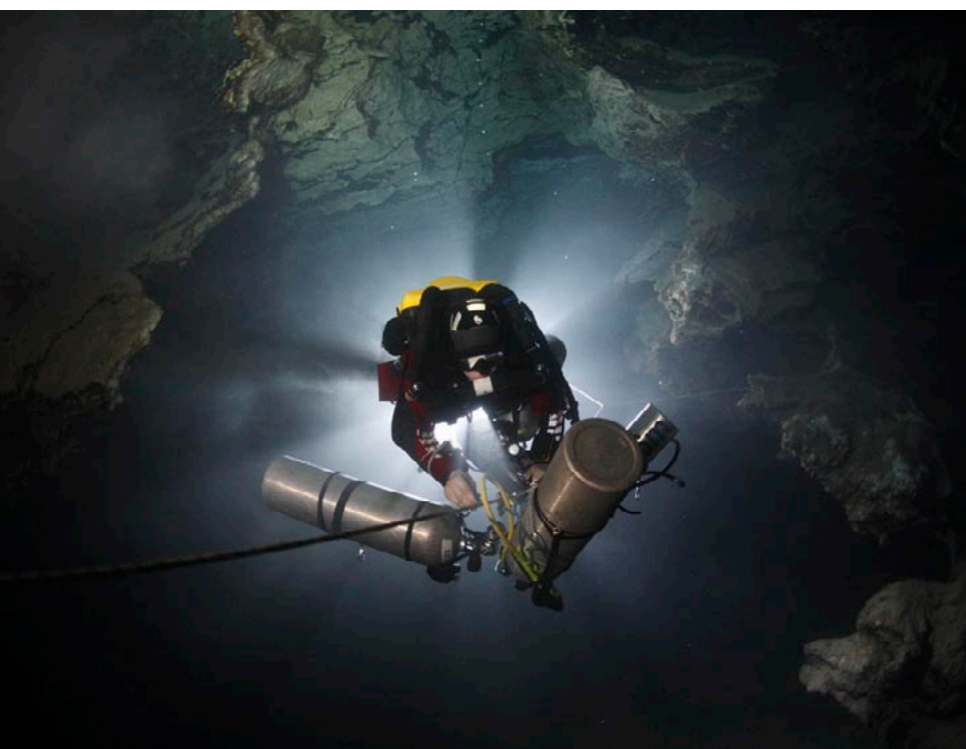
The surface of the water was dimly visible above us. There was a big hall called the carbon dioxide chamber,



Astonishing formations are preserved as the flow inside the cave is really slow

The walls may look like stone, but in many places will turn to silt by mere touch. Acidic water has softened the limestone walls to crumbling point; Divers float in formation passing shelves formed by erosion of layered limestone (top left)

the guiding line along the most suitable diving route. The rock in front of me looked as if it was only waiting for the touch of my finger to go hurtling down the slope.



but it is anything but pleasant in a hot bath.

We continued deeper into the depths of the Earth. In the deep parts of the cave, there were no hot springs or bacteria. The red walls of the big hall changed to a more even grey. Our gas-discharge lamps made the scenery surreal and blue. The water was gin clear.

The narrow tunnel at the beginning of the dive changed

to great cathedral-like halls, which could reach tens of metres high. In the walls, there were stair-like shelves covered in silt, which had fallen from above. The shelves had formed when the softer parts of the layered limestone eroded away. The hard layers have resisted water the longest. These 'stairs' are a typical sight in Molnár János.

Formations

Contrary to, for example, the natural caves in Mexico, there are no visible stalactite formations in Molnár János. Of course, the silt layer covering the bottom of the cave could be hiding almost anything under it, but it is quite likely that the sulphuric and carbonic acid have eroded any possible formations away.

The most distant parts of the cave have



been visited only a few times, if at all. When there is no current, nothing takes the silt away or detaches the loose substance from the walls.

The acidic water has eroded the stone unevenly. The walls and ceiling are covered in plates a few millimetres thick that are only held in place by silt and the pressure of the water. They are so weakly attached that the touch of an ascending, expanding air bubble is enough to detach plates as big as a car bonnet from the ceiling.

We descended to the depth of 30 metres. Although everyone pulled themselves as carefully as they could through a gap in front of us, a foggy cloud arose in front of it. I dived into the cloud and felt the direction of the line with my hands. On the other side of the gap, I found myself in clear water once again. The walls were lined with a velvety carpet, which absorbed all light. It was as if I had dived into a completely new, separate cave. The manganese oxide that clung to the

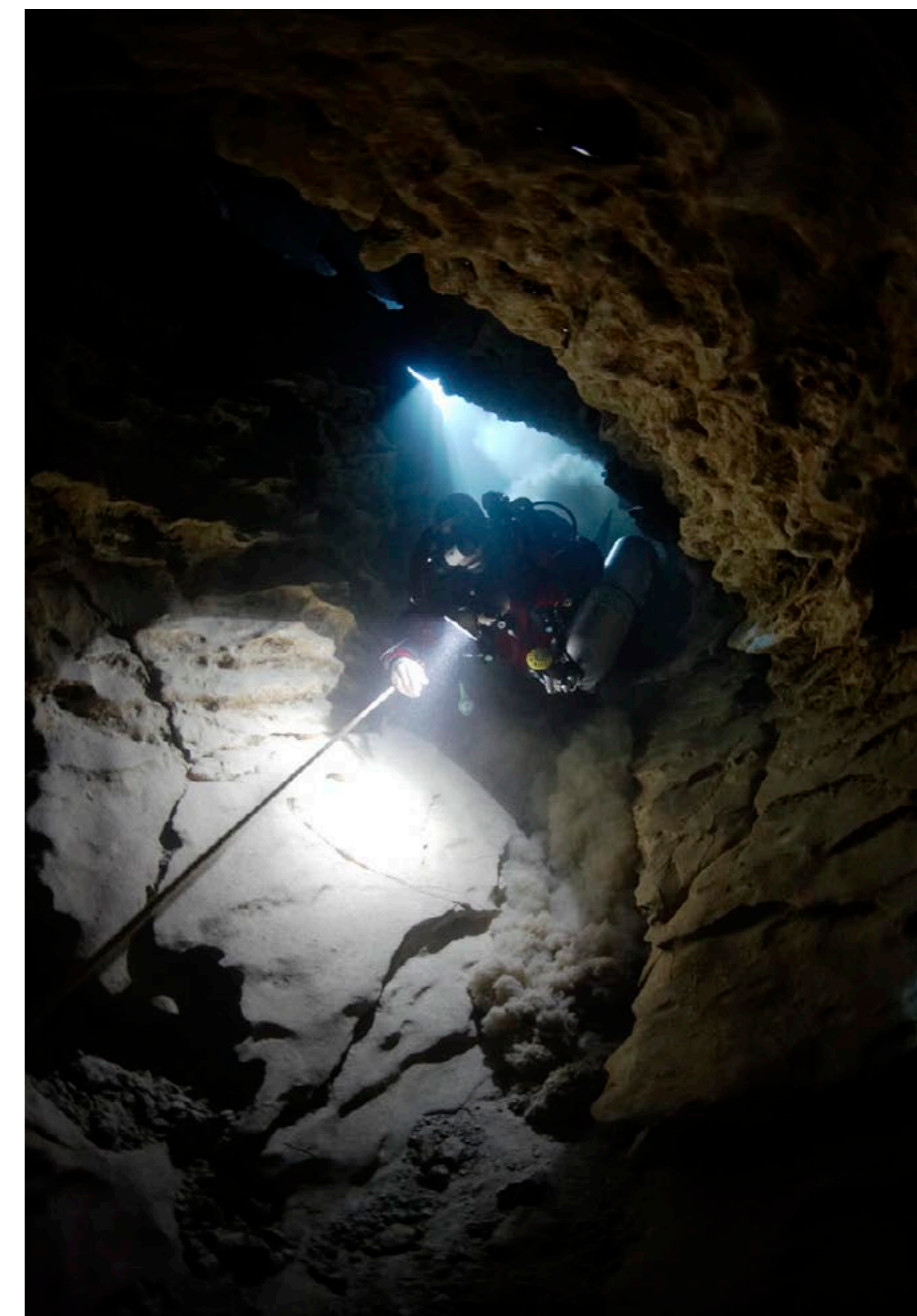
Molnár János

The floor has collapsed, but there is no access to the space just a few meters below us. We can only guess what we would find there

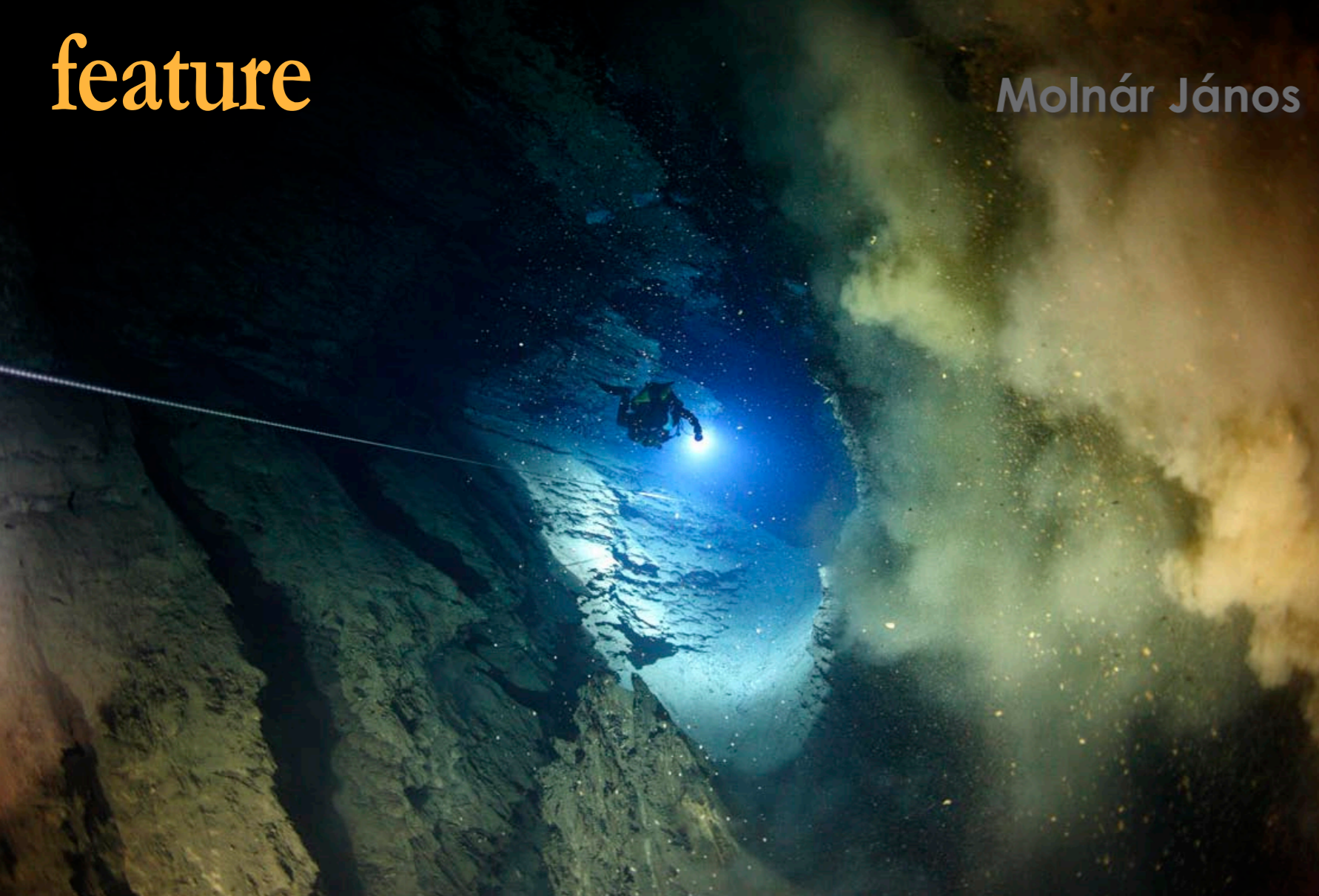
surface of the limestone looked like coal.

The bubbles hit the ceiling. The air formed hundreds of mercury-like bubbles, which

reflected the rays of light around the black room. We were in the middle of



Sturdy lines offer a way home if a mudslide destroys visibility



Rarely visited parts of the cave are hard to photograph. Even a small amount of bubbles will release plenty of silt, ruining the otherwise excellent visibility

would sink into them without feeling the hard surface, which can lead one forward. The forms of the cave did not have clear lines, so it would take an eternity to grope one's way out along the uneven walls. As the exit passage was not even a metre in diameter, finding it in a room with walls like cotton wool was a nightmarish thought.

I squeezed myself through the narrow exit passage once more and, as if by magic, the scenery changed. The silt cloud was left behind me, and I was in clear water again.

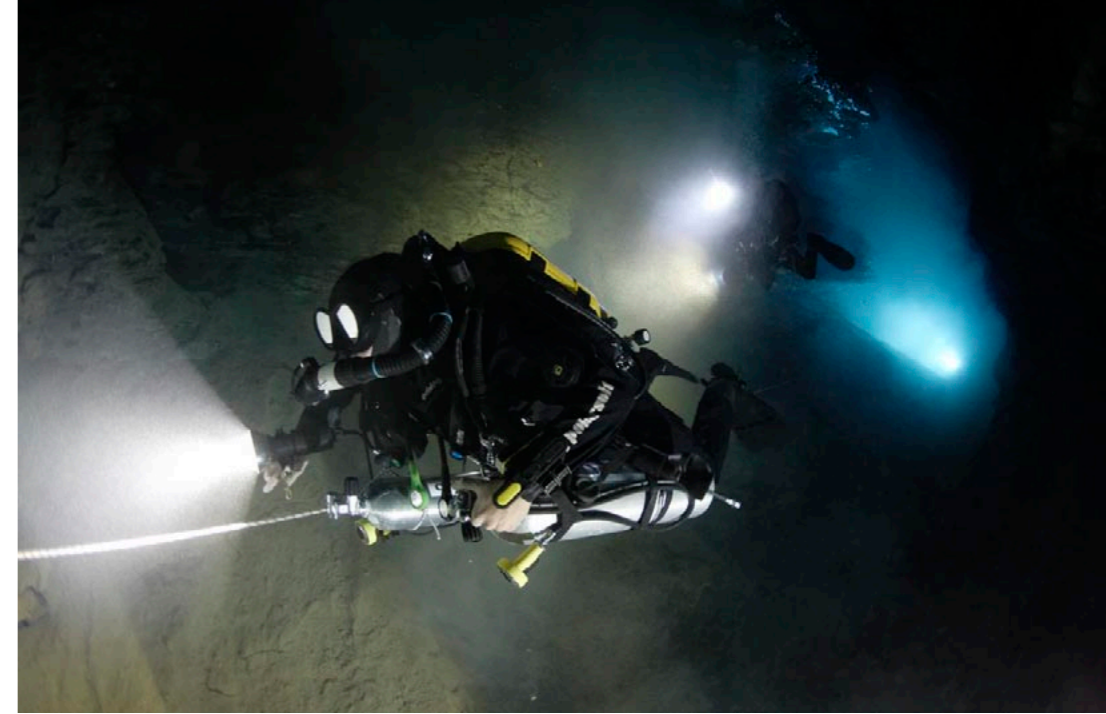
touched the silt on the bottom of the cave, and the casing of my diving equipment scratched the ceiling. I pulled myself forward with my fingers. I was not moving my fins, as to do so would further stir up the powdery bottom.

I turned back. The exhaled bubbles in front of me hit the ceiling and exploded as if in a slow motion film. An enormous silt cloud swallowed me up. I could no longer see the light of my lamp, which was only tens of centimetres from me. I was in complete darkness.

The acidic water has also softened the surface of the walls and ceiling so much that a hand

We continued our dive toward the furthest charted point of Molnár János. We were a kilometre from the mouth of the cave, at a depth of 22 metres. A shaft that fell vertically into the Earth began at the end of the hall. We descended the shaft to a depth of 50 metres. We had reached the furthest point. The tunnel ended at a wall. The other, bigger branch of the tunnel had been less charted, but the cave continued there at a depth of 70 metres.

We motioned upwards with our thumbs to signal that it was time to turn back. We headed for the exit. The walls disappeared in the darkness, and the long, narrow beams of our diving lamps lit the way forward. We rose up the shaft



slowly. The majestic walls fell back into darkness.

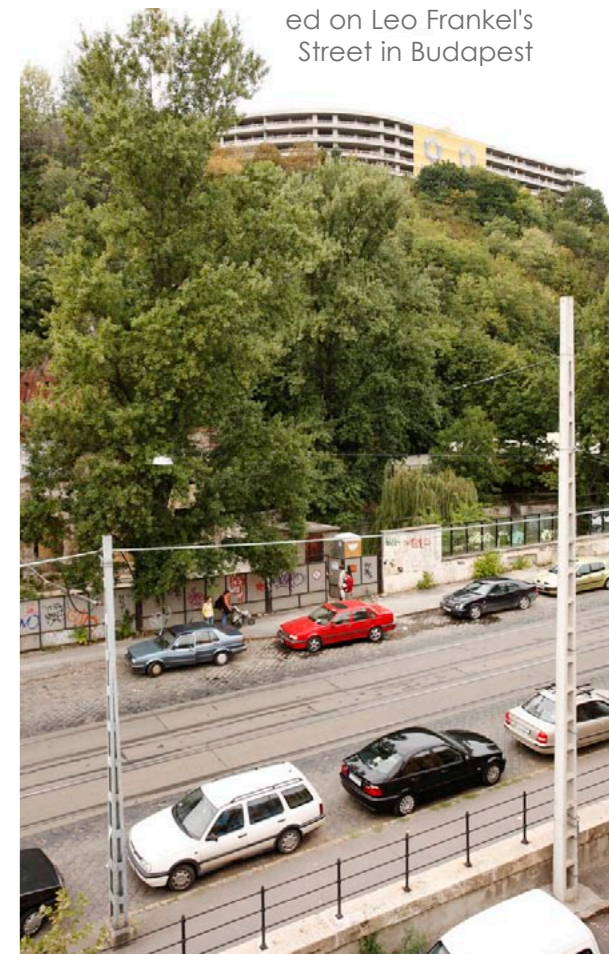
We swam back along the same route. Visibility was not as good as it was when we came. The air bubbles and touching the bottom in narrow gaps had detached silt, which had spread like a grey veil in the water. It would be weeks before the water was clear again.

A few hours had passed since we started the dive. I switched off my lamp and lifted my head above the surface. Daylight and the sounds of the city flooded the tunnel through the hatch. At best, we had been only 50 metres below the city. In my mind, I went over the journey in the depths below the city. We moved around, block after block, inside the rock. Most of the people walking on the pavement probably had no idea that there was a cave system full of water below their feet.

We climbed up the steel stairs into the bright daylight. A tram clattered past us again. In the heat of the midday sun, drowsy people seemed to wake up again for a moment when they saw us with our diving suits and equipment by the side of the road. ■

Having visited caves and seas all over the world, writer Antti Apunen and photographer Janne Suhonen, both based in Helsinki, Finland, have co-published a book, *Divers of the Dark*, and several articles on diving. Visit: Diversofthedark.com

Molnár János is located on Leo Frankel's Street in Budapest



Location of Budapest on maps (left)



a fireworks display, as the rays of light jumped from one wall to another.

We swam through a few big halls and descended to 35

metres. I squeezed through the narrow gap. I found myself in a space, which was approximately one metre high. The backup gas bottles hanging by my chest

NASA

turtle tales



Edited by
Bonnie McKenna

Turtle smugglers nabbed on Bali

Bali police prevented the smuggling of 22 turtles onto the island, bringing the total to 55 turtles saved from the restaurant trade. Police reported that guards patrolling Pandawa Beach in Kuta discovered the turtles, all tied and bound. The green sea turtles averaged one meter in length and were estimated to be a least 50 years old. The resale value of the turtles is fetching approximately Rp. 5 million (\$518) each.

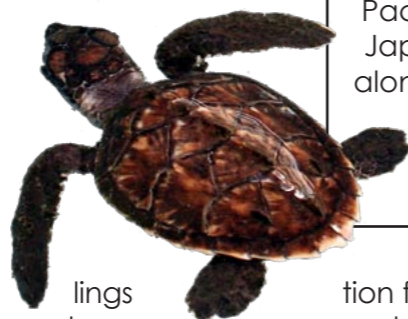
The smugglers were not caught; they fled when they saw the beach patrol guards. The smugglers are suspected of attempting to smuggle 33 turtles on to the island in December.

Soemarsono, the head of the Denpasar Nature Conservancy (BKSDA) voiced anger at the

continuing attempt to trade the endangered species and that the agency is planning a special operation against the smuggling operations. He declined to give any details, but said some of the targets had already been identified.

Soemarsono said that some of the seized turtles were suffering from dehydration and some had wounds. The BKSDA took custody of the turtles and will rehabilitate them before releasing them back to the sea.

There have been at least six turtle smuggling attempts in Bali last year involving hundreds of animals. Green sea turtles are protected under Indonesian law. ■



Sea turtles breathe new life

Sri Lanka has more than 20 turtle conservation centers. The majority of these conservation centers are along Kosgoda, Induruwa, Seenigama and Habaraduwa beaches on the southern coast. The first hatchery was set up at Kosgoda in 1978 with the financial assistance of a German national, Victor Hasselblad of world-famous Hasselblad cameras.

More than four million turtle

lings have been born at the Kosgoda Turtle Conservation Center and released into the sea. Five of the eight species of sea turtles frequent the beaches of the south coast of Sri Lanka; loggerheads, olive ridleys, hawksbills, greens and leatherbacks visit the coastline for nesting.

The fisherfolk on the southern coast now extend their coopera-

U.S. government sued over endangered loggerhead turtles

Three environmental groups sued the U.S. government for what they say is Washington's failure to take urgent steps to protect the endangered loggerhead sea turtles. The law suit said loggerheads were already pushed to near extinction and that the government has failed to comply with the deadlines set under the Endangered Species Act to establish protected areas for loggerhead sea turtles.

The suit, brought by the Center for Biological Diversity, Oceana and Turtle Island Restoration, cited destruction or degradation of nesting and foraging habitats, pollution, incidental capture, injury and death by commercial fishing fleets and other threats to the long term survival of this turtle.

Florida beaches have the largest population of loggerheads in the United States, but are facing continual threats to their habitats. According to the Center for Biological Diversity, Northern Pacific loggerheads that nest in Japan, cross the Pacific to feed along the western coast of the United States have declined by at least 80 percent over the past decade. ■

tion for the conservation of turtles and have given up killing turtles for their flesh. The hatchery buys the eggs from the fisherfolk who collect the eggs from nests at night.

According to the turtle conservation centers, human activities such as construction of tourist hotels, removal of foliage from the beaches, electric lights, beach erosion are some of the fact that are causing a dwindling number of turtles. ■

shark tales



Mako shark (*Isurus oxyrinchus*) darts by at astonishing speeds in the waters off the U.S. state of Rhode Island

Text and photos by Amanda Cotton

A sudden movement flashed under a canopy of waves, the shark's silver side reflecting brightly in the sun, as it passed quickly just below the surface from bow to stern.

"Get in now, Amanda! You're only going to have a couple minutes. Go!" yelled the guide.

"How big is she?" I asked but never heard the answer. Fear of losing the encounter trumped the fear of the unknown, as I eased myself into the water, ducking under the chum bucket and up along the side of the boat. Camera in hand, I was ready to shoot.

The waters off the state of Rhode Island on the northeast coast of the United States are quickly becoming a shark diving Mecca, being one of a few key destinations around the globe where one is almost guaranteed encounters with two very distinct and beautiful species of sharks—blue sharks

and mako sharks. This is largely due in part to underwater filmmaker and Rhode Island native Joe Romeiro of 333 Productions. Joe has been documenting the behavior, movement and hot spots of these sharks for years, and has quickly become the "go to" expert for profes-

sional cinematographers and photographers worldwide who seek footage and encounters with them.

A chance encounter with these large pelagic sharks are not only sought after by photographers alone, however. Every year, thousands of people gather on

docks and off the coast to participate in shark fishing tournaments held in New England's prolific waters. Although shark fishing tournaments continue to rally support in the Northeast culture, conservation groups have been outspoken in the need to end such practices in

other locations. In the Bahamas and Florida, for example, many tournaments have switched to full catch-and-release models and now support "Shark Free Marinas" where no dead shark is allowed on their docks.

In an environment where shark num-

Rhode Island

Mako Magic





Mako Magic

Mako shark (left); Another species commonly seen off of Rhode Island, the blue shark (*Prionace glauca*) comes in for a closer inspection of the underwater photographers (center)

space between herself and me at an astonishing rate. I had dreamt of this moment for many years. This day, I was living it in beautiful, vivid color.

My time with this amazing shark was a painfully short five minutes, but I savored every moment. Mako sharks come in hard and fast—a stunning swim by, a couple exploratory nips, and they are gone.

Crewmembers worked the bait hard from the boat, twisting and pulling it through the water to keep the shark

interested. Still positioned close to the boat, as Joe had recommended, I pulsed with excitement, as the mako came blazing in towards me, over and over again. Fire after fire, my strobes lit up the ocean, as the shark darted around my dome port in a crazy swirl of energy.

She was stunning, a beautiful sight to behold. Shimmers of iridescence—brown, blue, purple and violet—danced across the mako's back and along her sides under dappled sunlight, as she moved effortlessly through the water.

The mako was not without

scars, though. Across her side, the shark bore the painful marks of an encounter with another shark. Short lacerations ending in a gaping wound sprinkled her side. Pink flesh stood exposed, as the shark arched her body through the ocean. Perhaps due to her size, around four feet, she was attacked by a larger mako, or another shark species, or these were simply mating scars. Regardless of these wounds, her unrelenting power was unmistakable.

With one small thrust of her tail, the mako powered through the water zipping from one bait fish to

bers are declining at an alarming rate, moves to protect these animals prove invaluable to the welfare of the oceans. This leads to the question: why aren't we fighting to protect the sharks of New England?

The Mako

Positioned tight against the side of the boat, I scanned the water column for a glimpse of the legendary fish that has brought me here—the Mako. Known for their speed, agility and unyielding posture in the water, makos are high-energy powerhouses that can grow up to 12 feet in length and weigh over 1,100 pounds (499kg).

At an estimated top speed between 50 to 60 miles per hour, this shark is one of the fastest fish in the sea. Within seconds of entering the water, I found myself face to face with one.

A flip of her tail jettisoned the shark toward the boat and in my



general direction, but she was completely disinterested in the lone diver with whom she shared the water. Fixated on her every movement, I tracked her in a nauseating trail of twists and turns.

Eventually turning, she darted forward, following the oil slick back to the boat, and moved in quickly to explore my dome port. I couldn't help but shriek in delight, as I watched her close the gap of



A blue shark (*Prionace glauca*) noses in closer to inspect the dome port of the author's camera housing



shark tales



Underwater photographer encounters blue shark (right); Sun ripples off the back of a mako shark as it quickly swims past the camera (below); Mako sharks are fast moving sharks, making photographing this species particularly challenging (bottom left)



the other on either side of me. Makos are known for their short, but quick bursts of speed.

It quickly became apparent to me why Joe wanted my back up against the boat. The shark's lightening speed made her difficult to follow, and her forward gapping nips from an open mouthful of protruding teeth could lead to serious ramifications quite quickly, if the shark had so chosen.

These sharks are not for the faint of heart. Encounters with this species are fast-paced, adrenaline-filled gut checks that demand you give the shark a healthy amount of respect while in the water with them.

In a matter of seconds, the scene fell silent, as the mako made one

last sweep, turned and headed straight down into the depths of the Atlantic Ocean. Sitting there motionless, staring down into the depths, I hoped for



one last glimpse of her, but she didn't return. My time with the mako was over.

The ocean gives us these gifts, these encounters that I cherish with every fiber of my being. Whether it's those five minutes spent with the mako shark, or the hour-long encounters experienced with whale sharks off Isla Mujeres, these animals

never cease to amaze me. Every moment spent in the ocean with the immense diversity of marine life leaves me eager for more. I come away from these experiences forever changed and longing to fight harder to protect the oceans and all life that lives within them.

In an amazing twist of fate, I received word from Joe two weeks later that my mako had been spotted 12 miles from the location we first encountered her.

To the best of his knowledge, this was the first ever double sight-



A blue shark moves in close to the photographers in the water; blue sharks are quite inquisitive



shark tales



Take a look at the teeth on this mako shark (above); A blue shark follows the bait up to the surface of the water. Bait, or chum, in the water allows for close encounters with the sharks (below)

ing of the same mako shark in these waters. This news was all the more exciting knowing that a local shark tournament started the day after my departure from Rhode Island, just south of the area we were diving. In honor of this joyous event, Joe proclaimed I should name her. I chose *Nani*, meaning "beautiful" in Hawaiian.

Underwater diversity

The waters off the coast of Rhode Island are magical. On previous trips, Joe has encountered countless blue sharks and mako sharks, basking sharks, leatherback sea turtles, mola mola, hammerhead sharks, tiger sharks and more. Frequent sightings over the last few years of white sharks in the area have led researchers and

photographers to Rhode Island in search of this species as well. The wealth of marine life in this area can serve many generations to come with opportunities to interact with the Mother Nature on her terms.

As divers, ocean enthusiasts and



neighbors on this small planet, we must take it upon ourselves to protect the oceans that hold these vast amounts of endless treasures. Without education and protection, we stand to lose a vital component to the health of our aquatic ecosystems and our planet as a whole. ■

Based in Florida, Amanda Cotton is a professional photographer specializing in underwater imagery. An avid scuba diver and ocean advocate, her work has been published in National Geographic, Discovery, Times Publishing, CNN, Natural History Magazine, Earthweek, and Science Daily. For more information, visit: www.acotton-photo.com



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OCEANIC





Edited by
Kelly LaClaire

Oceanic whitetips roam long distances

New research on migratory behavior of oceanic whitetip sharks can help shape conservation strategies.

"Although these sharks are relatively safe from fishing in Bahamian waters, our study shows their long-range roaming takes them across the boundaries of different countries and into the high seas where they still encounter fishing gear set for other species," said Dr Demian Chapman, an assistant professor in the School of Marine and Atmospheric Sciences.

The oceanic whitetip shark, *Carcharhinus longimanus*, is a circumtropical pelagic apex predator that is poorly studied compared to many other large sharks. Several studies have shown substantial population declines in oceanic whitetips, most likely related to mortality associated with the global shark fin trade.

From 1962–1997, only 73 oceanic whitetips were conventionally tagged and just four recaptured as part of the U.S. National Marine Fisheries Service Cooperative Shark Tagging Program, too few to elucidate any migratory patterns

Roamed 2,000km

The researchers attached pop-up satellite archival tags to one male and ten female mature oceanic whitetip sharks off Cat Island in The Bahamas in May 2011, and monitored the sharks for varying intervals up to 245 days. The tags recorded depth, temperature and location for pre-programmed periods of time. At the end of the time period, the tags self-detached from the sharks and reported the data to orbiting satellites. Their findings show that

some of these sharks roamed nearly 2,000 kilometers from the spot where they were caught, but all individuals returned to The Bahamas within a few months.

Once considered among the most abundant apex predators on Earth, overfishing has caused huge declines in oceanic whitetip sharks, and the species is listed as "Critically Endangered" in the Northwest Atlantic and Western Central Atlantic, and "Vulnerable" globally by the International Union for the Conservation of Nature. ■

SOURCE: PLOSONE.ORG



THOMAS EHRENSPERGER

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WORLDWIDE LIVEABOARD ADVENTURES

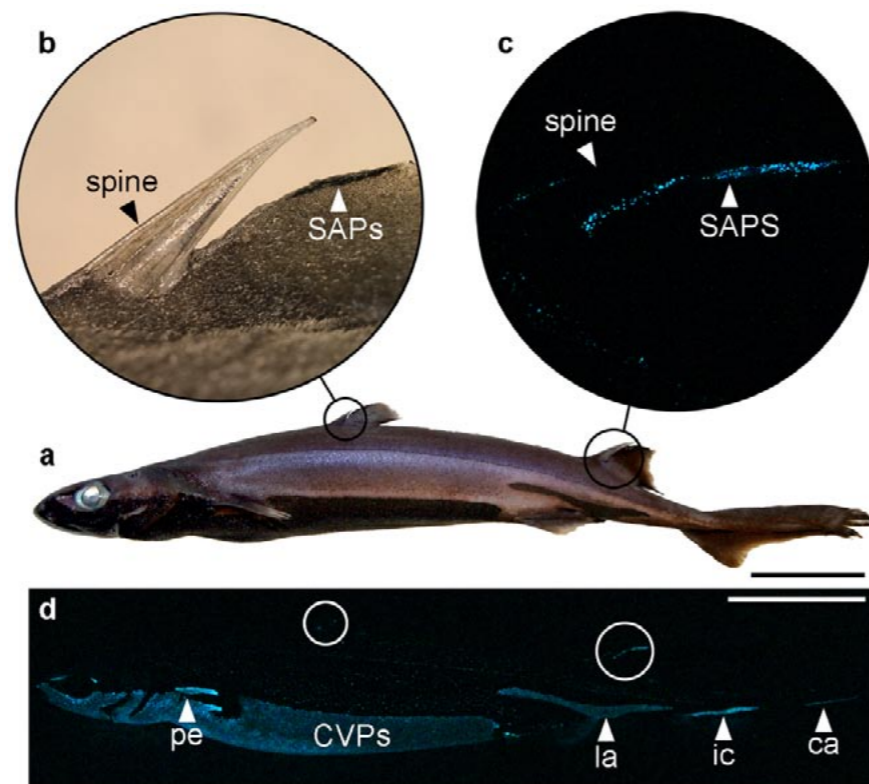
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Shark species wards off predators with its own built-in “light sabers”



JÉRÔME MALLEFET / CC BY-NC-ND 3.0

Velvet belly lantern sharks may not very big but they are hands down the coolest sharks in the known universe. Let's face it, any animal with glowing dorsal spines that look like light sabers right out of the movie *Star Wars* has to win that award.

According to a study recently published in the journal *Scientific Reports*, these diminutive deepwater sharks (they live at around 600 feet and usually don't get longer than two feet) have glowing, transparent spines illuminated by a row of light-producing cells along their dorsal fins and back.

Researchers believe the glowing cells help keep the lantern shark from being eaten, warning predators that any attack could be more trouble

than it's worth. If the hypothesis is true, this would be the first fish in recorded history to use bioluminescence to actively ward off predators, said researchers at the Catholic University of Louvain in Belgium. Several other species of sharks have defensive spikes, although none of them have been shown to glow.

Even more remarkable, if that's possible, is that these sharks also have glowing cells along the bottom of their bodies allowing them to blend into their surroundings, making it difficult to be spotted by creatures from below—the counter-illumination preventing the shark from casting a shadow.

This strategy seems contradictory at first glance, but according to researchers, it is

actually a perfect balance. The light along the belly of the shark is used to make it invisible from potential predators attacking from below because the light they give off matches the sunlight streaming down and keeps their silhouette hidden, while the glowing and pulsing spines warn predators attacking sideways or from above.

The lantern shark has several rows of literally thousands of bioluminescent cells along its back and near its dorsal fins. These spiny cells emit a self-produced, long-lasting, blue-green luminescence by way of chemical reaction. As of yet, scientists are unsure how this chemical process works and further study is needed. ■

SOURCES: BBC, LIVE SCIENCE





Edited by
Kelly LaClaire

Shark warrior strips naked to protect sharks

Lesley Rochat, also known as the Shark Warrior, is traveling the world to freedive with sharks and film them for her international award winning conservation campaign called, Rethink the Shark.

To raise awareness for an anti-shark net poster, Rochat stripped naked in protest. Though the one time model and actress turned freediver and activist has gone to all kinds of extreme lengths to disseminate her cause, this is the first time she has gone totally naked to do so, tying herself up in gill netting, to make her point as visually powerful as possible.

"I have proudly joined women who have through the ages gone naked to protest against numerous issues of concern. For example,

women have gone naked against bull fighting, against war, against the fur trade, and now against the senseless slaughter of our sharks and other marine life in the Kwazulu-Natal shark nets in South Africa."

She recently visited Florida, an area of high shark attack frequency, as part of her research. Florida is known as the 'shark bite capital' of the world but the state shuns shark nets and refuses to place them in swimming areas in an attempt to help protect the animals declining world-wide numbers.

But South Africa, Rochat's home, still uses shark nets to line well-populated sections of its coast, which kill many sharks and other innocent

marine animals every year.

"These nets are wiping out our tiger shark population, which people come from all over the world to dive with. They are of high value in the shark diving eco-tourism industry. Florida, despite its high shark attack statistics is a very positive example for South Africa to follow," said Rochat.

The Rethink the Shark program points out that on average less than ten people are killed by sharks every year, and as part of the campaign, Rochat recently got in the water to freedive with large tiger sharks—considered highly dangerous and one of the more aggressive species in the world. "It's important for me to walk my talk and show people that sharks are not monster man-eaters with insatiable appetites for humans," she said, "but rather beautiful animals we ought to respect and protect."

Rochat has dedicated her life to helping save sharks and runs the non-profit organization, AfriOceans Conservation Alliance in South Africa, which she founded in 2003. Her efforts have been recognized internationally, and she is an inductee of the Women Divers Hall of Fame. ■



Grey nurse shark

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Vanessa Mignon (Australia) Portfolio Honorable Mention

Edited by
Kelly LaClaire



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Whale shark

Your vacation snapshots can help marine scientists

Every year, thousands of amateur photographers on vacation take pictures of whale sharks and share them on public sites across the Internet. Recently, a new study by Imperial College's Tim Davies of London investigated the suitability of photographs taken by the public for scientific identification of whale sharks. He and his team did this by comparing results using tourist images with results based on surveys by marine researchers specifically aiming to track the sharks.

Davies said that data was used for assessments of life history and conservation status of whale sharks in the Maldives and investigated the potential problems of using tourists' photos for population tracking.

In order for a shark to be clearly identified, any photograph must capture the distinctive pattern of spots located directly behind the

gills. This unique marking serves as a fingerprint and is used for identification. Researchers wanted to see if holiday photos could be gathered and used to trace the movements and history of certain whale sharks in a specific region.

Davies was thrilled with the study's outcome: "We showed that they can be used to produce accurate estimates of abundance," he said.

The public images were sourced from The ECOCEAN whale shark photo-identification library, a global repository for whale shark images as well as photo sharing sites Flickr and YouTube.

Images were then matched using identification software. Individual whale sharks could be identified from 85 percent of 310 publicly sourced photographs—an amazing figure.

Speaking about the results,

Davies said: "Globally, this outcome provides strong support for

the scientific use of photographs taken by tourists for whale shark monitoring. Hopefully, this will give whale shark research around the world confidence in using this source of free data. In the Maldives in particular where whale shark tourism is well established and very useful for collecting data from throughout the archi-

pelago, our results suggest that whale shark monitoring effort



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should be focused on collecting tourist photographs.

"Our results go beyond the boundaries of whale shark research, demonstrating the power of 'citizen science' in ecology and conservation research," added Davies. "Theoretically, researchers can now use publicly sourced photographs with greater confidence."

The results may have implications for other species too.

"This is good news for whales and dolphins, cheetahs and other spotty or stripy cats, some sharks and rays and even geckos," continued Davies. "Hopefully, as more data come in from tourists over the years and from further across the archipelago, we will be able to build up our understanding of the Maldives population and monitor its status closely." ■

SOURCE: SCIENCE NETWORK (WEST AU), IMPERIAL COLLEGE LONDON

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Identifying photographs must capture the distinctive pattern of spots located right behind the gills





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

Getting Fit & Looking Good

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

While not all divers are genetically predisposed for the 'Baywatch look', most divers and water sports enthusiasts want to present their personal best in a wetsuit, swimsuit, shorts or tanks. As the weather warms from winter to spring and we get ready to show a little more skin, getting outdoors for a total body workout is rejuvenating and provides great advantages for divers. It is best to stay in shape all year, but for divers who have an off-season, commencing training at least 12 weeks prior to scuba diving creates a good fitness-for-diving foundation. Training the entire body for at least 12 weeks, along with good nutrition, is also an opportunity for divers to simultaneously sculpt a shapely physique.

This workout is designed to strengthen and condition the entire body with five unique exercise combinations. Particular

focus is on the lower body performing one task while the upper body does something else and the torso provides stability. This workout improves physical ability and helps to reduce risk of injury for divers at the surface, getting in and out of the water, donning gear and moving around on boats and through surf.

Scuba diving benefits

- Treading water and rough seas conditions
- Climbing up and down boat ladders from the water or between decks
- Maneuvering around mooring chains and lines during ascent, descent and waiting to board
- Holding onto a diver in an emergency and for rescue activities
- Assisting another diver with gear
- Holding onto gear while moving through surf
- Donning and removing gear and fins

in the water

- Pulling wetsuits on and off

Tips for Success

- Practice each movement separately before combining the upper body and lower body exercises.
- Perform one static and one dynamic movement when first combining upper and lower body exercises. (For example, stay in the squat position and continue rowing for one minute.)
- Begin with 10 to 15 repetitions of each exercise and work up to one minute.
- Never hold your breath (even if you don't get the breathing right at first).
- Always contract the abdominal muscles (pull in the belly button).
- Practice the exercises without weights.
- Eat well, drink plenty of water and get proper rest.
- Wear proper clothing, footwear and sunscreen.

Precautions: This workout is designed for healthy shoulders, knees and backs. In any case, DO NOT lift heavy weights for shoulder movements and follow proper form using both the descriptions and pictures.

The Workout

Exercise: Triceps Extension with Heel Press Abdominal Crunch

Major Muscles: Triceps, Quadriceps, Abdominals

Begin in the starting position as shown. Press the lower back into the mat and pull in on the belly button contacting the abdominals. Inhale deeply through the nose. While exhaling through the mouth, extend the elbows and knees until the hands and feet are above the shoulders and hips. Inhale and

exhale again, while contracting the abdominals enough to slightly raise the hips and buttocks off the floor and pressing the heels upward. Inhale while simultaneously bending the knees and

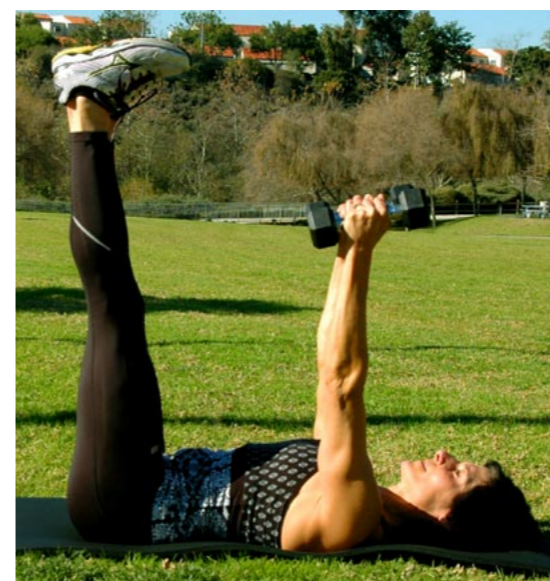
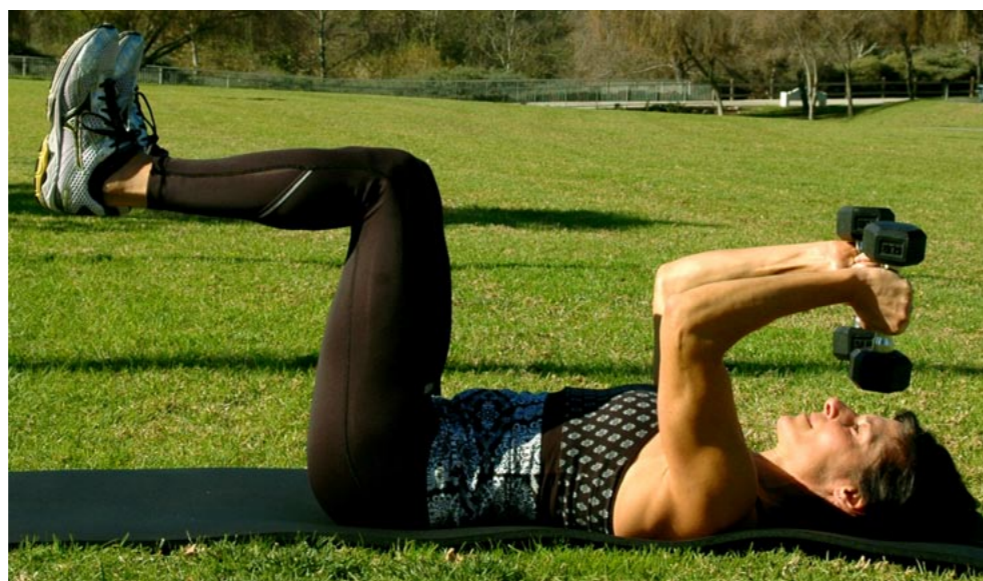
Triceps Extension with Heel Press Abs ending position



elbows returning to the starting position. Repeat for one minute. Note: This leg extension movement also actively stretches the hamstrings and lower back.

Exercise: Chest Fly with Bridge
Major Muscles: Chest, Glutes, Hamstrings, Lower Back

Begin in the chest fly with bridge starting position as shown. Pull in on the belly button contracting the abdominals. Squeeze the glutes (buttocks). Inhale deeply through the nose while simultaneously lowering the arms out to the side and the hips toward the mat, until the elbows and buttocks are about an inch off the mat. Exhale through the mouth while contracting the abdominals and raising the hips and arms, returning to the chest fly with bridge starting position. Repeat for one minute. Note: Proper form for the chest fly portion of this movement at the bottom is for the hands to be outside the elbows with the arms slightly curved. Raise the arms as if reaching around a barrel bringing the hands together at the top.



Triceps Extension with Heel Press Abs starting position



Row with Close Stance Squat starting position (below); Row with Close Stance Squat ending position (bottom left)



Exercise: Row with Squat
Major Muscles: Legs, Glutes, Back, Biceps
 Begin by wrapping one or more exercise bands around a tree, pole or piece of exercise equipment. Stand with the feet slightly in front of the hips with arms extended holding onto the handles of the exercise bands as shown. Notice the hip, knee and elbow joints are slightly flexed and the shoulders are slightly retracted to resist the bands. Pull in on the belly button

contracting the abdominals. Inhale deeply through the nose while simultaneously sitting back into a squat position and pulling on the exercise bands. Bend the knee, hip and elbow joints until right angles are achieved at each joint and the ankles. The knees should always be behind the toes (ideally over the ankle). The elbows stay close to the body alongside the waist. Exhale through the mouth while simultaneously contracting the glutes, and extending the knee, hip and elbow joints returning to the standing position. Repeat for one minute.

Exercise: Stationary Lunge with Biceps Curl
Major Muscles: Legs, Biceps

Stand in an extended stride position with feet about hip width apart, one foot in front and one foot behind the body as shown. Arms are positioned alongside the body as shown. Pull in on the belly button contracting the abdominals and extending the spine to stand tall. Inhale deeply through the nose while simultaneously lowering the body and raising the weights. Bend the knee, hip, ankle and elbow joints as close as possible to right angles. This is the equivalent of a single-leg squat and the front knee should always be behind the toes (ideally over the ankle). The elbows stay close to the body alongside the waist. Exhale through the mouth while simultaneously contracting the glutes, and extending the knee, hip, elbows and ankle joints returning to the starting position. Repeat for one minute in this position, then switch legs front-to-back and repeat for another minute. **Precaution:** Never continue to perform this exercise with your front knee in front of your shoe laces or your hips behind your back knee. STOP and reposition. This exercise can be challenging for some. To begin, you may eliminate the biceps curl and/or the weight, and hold

Stationary Lunge with Biceps Curl starting position (right); Stationary Lunge with Biceps Curl ending position (lower right)



onto the back of a park bench to master the stationary lunge before progressing to the combination.

Exercise: Wide Stance Squat with Overhead Shoulder Fly
Major Muscles: Legs, Shoulders, Inner Thighs (Adductors), Glutes, Calves

Stand in a wide leg stance. Position arms out to the side at shoulder height with palms up. Before starting the movement, look down briefly to check that your hips, knees and toes are aligned. Inhale deeply through the nose while reaching

Wide Stance Squat with Overhead Fly starting position (right); Wide Stance Squat with Overhead Fly ending position, front and side view (lower right)

back with the bottom and simultaneously raising arms in the upward direction of choice. In the lower position, the knee, hip and ankle joints are as close as possible to right angles, as shown. At the bottom of the squat, squeeze your glutes (buttocks). Reverse the direction of the squat and arms while exhaling through the mouth on the way up. Repeat for one minute. Note: Do not lock out your knees at the top of the range of motion. Always look up (never look down) when performing a squat. Sometimes it is helpful to imagine a chair or bench that is too far behind you and reach for it when performing the squat. Keep your body weight distributed evenly through all the muscles of the body, keep your abdominal muscles contracted.

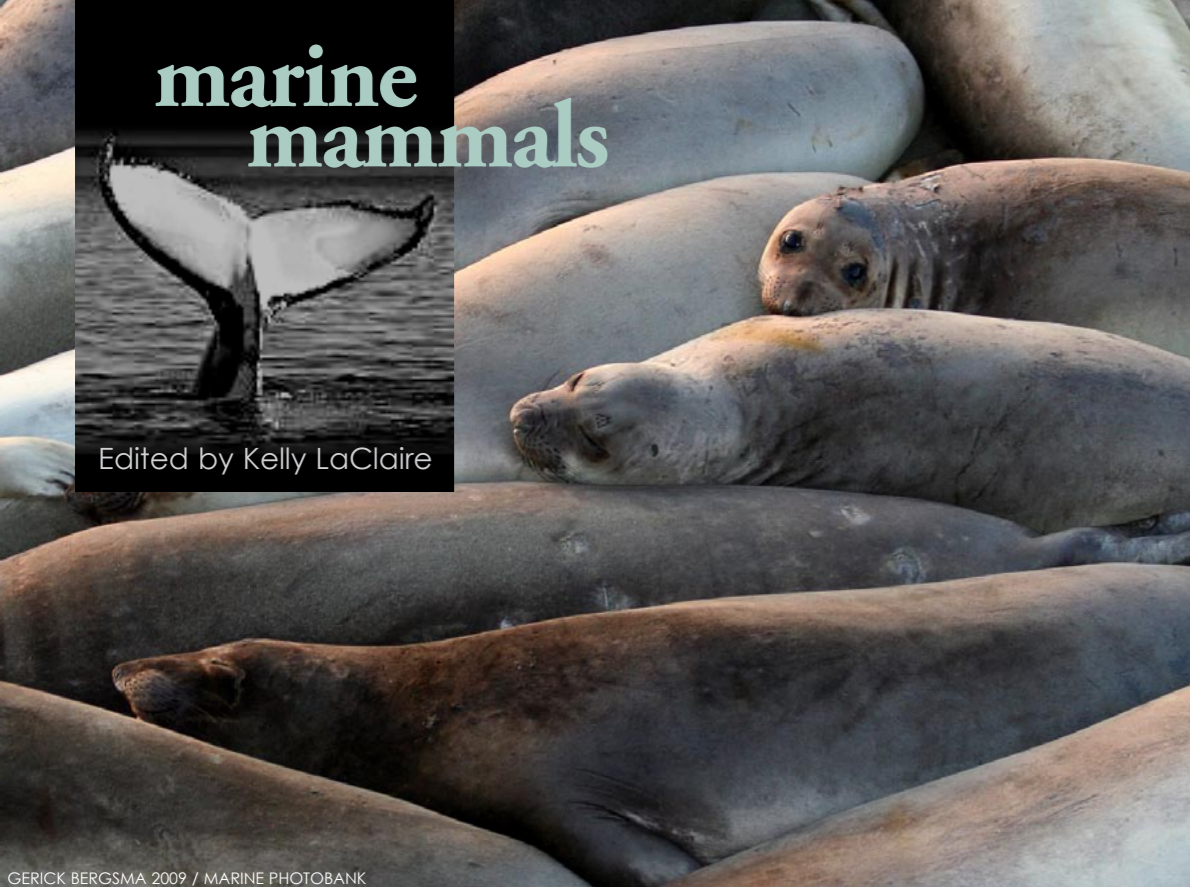
Fitness model Loren Kurz is a long-time friend, fitness professional and business associate. She has been weight training for 25 years, runs marathons and a variety of other road races, played competitive women's soccer for many years, and has been a challenger on American Gladiator.

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



marine mammals

Edited by Kelly LaClaire



GERICK BERGSMAN 2009 / MARINE PHOTOBANK

Seals sleep half a brain at a time

An international team of biologists has identified chemicals in the brain that permit seals to be half awake and half asleep at the same time. Findings of the study published in the *Journal of Neuroscience* may explain how the brain can be alert when awake and off-line when asleep.

"Seals do something biologically amazing—they sleep with half their brain at a time. The left side of their brain can sleep while the right side stays awake," said researcher John Peever of the University of Toronto. "Seals sleep this way while they're in water, but they sleep like humans while on land. Our research may explain how this unique biological phenomenon happens."

The discovery was made when fellow researcher, Jennifer Lapierre, measured how various chemicals changed in the sleeping and waking side of the brain. Lapierre, who is the study's lead author, found that an important chemical in the brain, acetylcholine, was low in the side of the brain that was asleep and high in

the side that was awake. The finding suggests that acetylcholine may be responsible for alertness in the side of the brain that is awake.

However, another brain chemical, serotonin, was found in equal levels on both sides of the brain when the seals were awake and asleep, the study revealed. This finding surprised the research team composed of scientists from the University of Toronto and the University of California in Los Angeles, as serotonin was long thought to be a chemical that caused brain arousal.

The findings of the study may have implications in human health, according to senior researcher Jerome Siegel of the Brain Research Institute at UCLA. "About 40% of North Americans suffer from sleep problems and understanding which brain chemicals function to keep us awake or asleep is a major scientific advance. It could help solve the mystery of how and why we sleep." ■ SOURCE: UNIVERSITY OF TORONTO

Dolphins call one another by name

A recent study of bottlenose dolphins has found that when these social animals become separated, they will call out specific names of their loved ones. According to the study published in the journal *Proceedings of the Royal Society B*, dolphins are the only animals other than human beings that do this. While we use words, dolphins use whistles.

It was known through earlier research that bottlenose dolphins named themselves with a "signature whistle". In this whistle was encoded information describing the individual. What is now known is that they call the names, the signature whistles, of other dolphins as well.

Lead author of the study, Stephanie King of the University of St. Andrews Sea Mammal Research Unit told *Discovery News*: "Animals produced copies when they were separated from a close associate and this supports our belief that dolphins copy another animal's signature whistle when they want to reunite with that specific individual."

From wild bottlenose dolphin populations residing near Sarasota Bay, Florida, King and fellow researchers col-

lected acoustic data between the years of 1984 to 2009. They also studied four adult male dolphins in captivity at The Seas Aquarium in Florida. These captive males had names given to them by their keepers, but also developed their own signature whistles they used to interact with other dolphins.

"A dolphin emits its signature whistle to broadcast its identity and announce its presence, allowing animals to identify one another over large distances and for animals to recognize one another and to join up with each other," explained King. "Dolphin whistles can be detected up to 20km away (12.4 miles) depending on water depth and whistle frequency."

Dolphins have a complex, sophisticated communication system, and researchers have found that the animals add an individual "tone of voice" when whistling

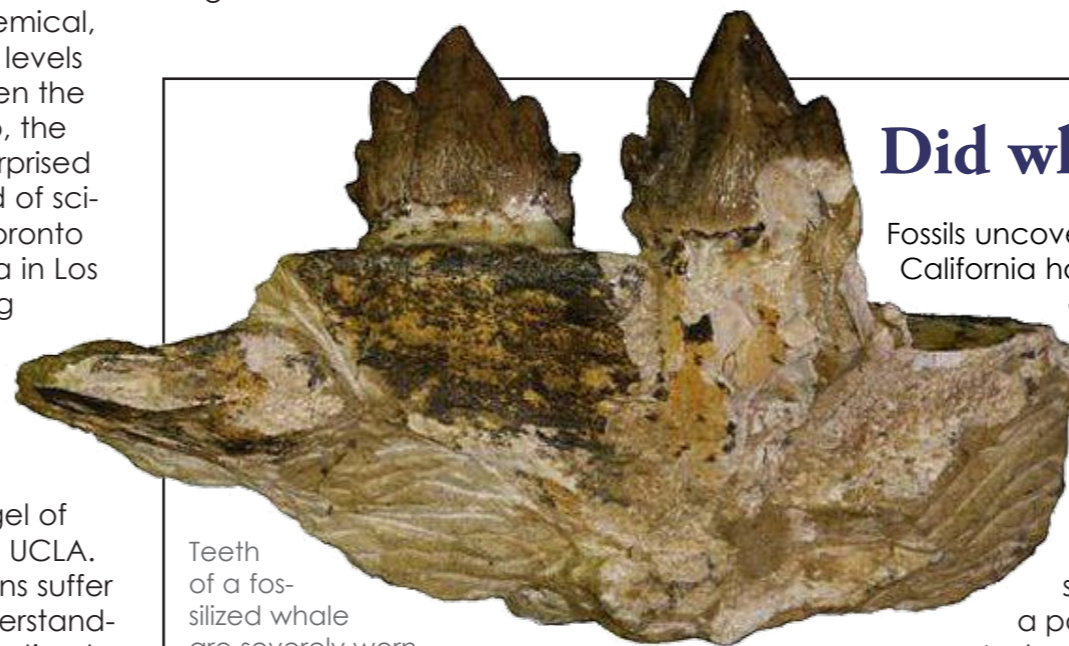


PETER ASPREY / WIKIMEDIA COMMONS

another dolphin's name. They were not just mimicking one another.

"Interestingly, captive dolphins can learn new signals and refer to objects, and it may be that dolphins can use signature whistle copies to label or refer to an individual, which is a skill inherent in human language," King said.

In further research, King and her colleagues will be using sound playback experiments to find out how dolphins in the wild respond upon hearing their own signature whistle played back to them. ■



Teeth of a fossilized whale are severely worn down, suggesting that this previously unknown species of whale may have eaten large animals like sharks. Photo by Dr. John D. Cooper Archaeological and Paleontological Center, USA

Did whales eat sharks?

Fossils uncovered in Southern California have revealed four previously unknown species of ancient whales, one of which may have eaten sharks.

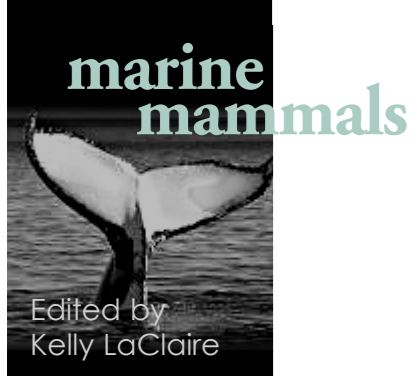
One of the species, dubbed "Willy", is much larger than the others and may have eaten sharks, said Meredith Rivin, a paleontologist at the Cooper Archaeological and Paleontological Center in Fullerton, California, and part of the team that studied the fossils.

Most mammals have four kinds of teeth, each shaped for specific tasks. In most

mammals there are wedge-shaped incisors, a pointy canine, and premolars and molars with bumps and valleys that fit together like a mortar and pestle when they chew. Not all whales have teeth, but those that do, such as killer whales, have rows of simple peg-like teeth, each one looking the same as the next.

Although these four species of whale don't appear to be direct relatives of modern baleen whales, they may represent transitional forms between the earlier toothed whales and toothless baleen whales, Rivin said. Modern baleen whales like fin whales have teeth only as embryos; the teeth are reabsorbed long before birth, she added. ■





Science and industry team up to help whales

The waters off the U.S. northeast coast are home to many species of whales. It's also a major shipping area for large vessels producing a lot of noise. According to ongoing research, the constant humming from turbines and engines is making it difficult for the animals to communicate with each other, which in turn is affecting their ability to find food and mates.

But the ships are not just disrupting communication—they also collide with whales from time to time. Over the past few decades, these collisions have been



Northern Atlantic right whale

increasing, and the National Oceanic and Atmospheric Administration has reported more and more incidents of whale parts being discovered stuck to the hulls of commercial boats.

Scientists and industry leaders in the area are working to reduce the noise levels experienced by whales from North Atlantic shipping and have recently persuaded large companies to change their routes in and around the Boston area.

The new route will reduce the likelihood of whales and ships interacting by 81 percent while only increasing shipping time by a few minutes. Port authorities have found this to be a workable solution to the problem. Sea captains can now use a special iPad App that helps them to understand the locations of the whales in real time and alerts them to slow down. The change in

operations has helped to lower the underwater din. Scientists hope it will also limit the number accidental collisions.

Thousands of jobs depend on the commerce in Boston, yet many companies are responsibly telling their captains to use the Whale App and the route change. 1,500 vessels use the port each month, and shipping companies realized something effective can and must be done.

Andy Hammond, chief executive director of the Boston Harbor Pilots Association, said the industry has realized that a little inconvenience can do an awful lot good for whales.

This kind of cooperation between environmentalists and big business proves what can be done when people on both sides of the fence come together and work to find common ground.

So just how loud is it down there? Dr Mark Baumgartner of the Woods Hole Oceanographic Institution described the din as a constant, thunderous drone. "How would you like to have that in your bedroom, your kitchen, your work all the time?" asked Baumgartner. "That's what the acoustic environment for whales is like all the time."

■ SOURCE: BBC

Whaling makes no economic sense, study says

According to a new Japanese study on commercial whaling in Japan, declining consumption of whale meat and a money-losing operational structure are to blame for making it an "economic loser". The study, conducted by E-Square Inc, a consulting firm based in Tokyo, was commissioned by the International Fund for Animal Welfare (IFAW).

Patrick Ramage, IFAW's whale program director, told Japan Times that the study findings were "based largely on the government of Japan's own data this industry is in the red". The industry's situation gets tougher each year, he added.

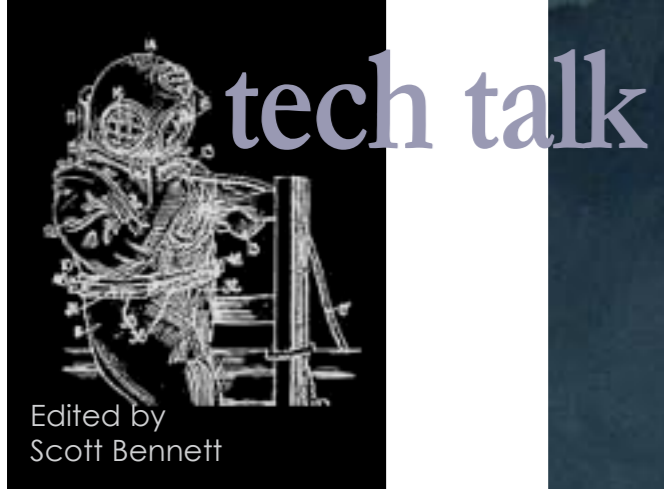
The purpose of the study was to foster a more constructive debate on policy by demonstrating how commercial whaling is unsustainable economically. The 31-page report also showed that taxpayer money is being used to support the floundering industry. In addition, findings showed that whale meat consumption has in recent years become very limited, down to just 4,000 tons per year, approximately, from a peak of 400,000 tons in annual consumption in 1962. Meanwhile stockpiles of whale meat are growing ever bigger, from 990 tons in 1997 to 4,284 tons in 2011, according to the research.



cinema of dreams



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Edited by
Scott Bennett

Text by Pascal Bernabé
Photos by Grégory Vernoux,
Vitya Lyagushkin. Translation
by Margarita Solotskaya

—*Learning to dive the Earth's interior: is it that difficult?!*

Two buddies are holding the line. The second is holding the arm of the one leading the way, communicating with him by means of touch. With visibility nil, the first buddy protects his head and face with his hand in case of contact with a wall or rock. Suddenly, for some unknown reason, the line moves and goes out of their hands. They search for it but to no effect. Their mistake: they were not holding the line properly. Will they panic? No. Their nearby instructor stops the exercise. The entire scenerio took place on dry land

Near the diving center, a guideline was stretched and positioned between some trees. Following a classroom explanation of methods and emergency procedures, the

techniques are performed on a land drill prior to their underwater implementation. The exercises enable students to master techniques, correcting and commenting on them right during the exercise. These

are often treated in the ludic fashion, allowing time to joke and relax. Zero visibility is simulated by bandages that can be easily removed, providing a very interesting learning instrument.

Is overhead diving a marginal and difficult activity?
No, not at all. In fact, it's the other way round. Along with the rebreathers, the technical discipline with the greatest

development is diving in overhead environments. While rebreather diving currently induces fewer concerns today, overhead diving remains worrying for many potential students. Many harbour groundless fears,



Learning Cave Diving *Is it difficult?*



Safety drill

like getting wedged into narrow galleries, zero visibility and freezing water to name a few.

The courses take place with a minimum of several metres visibility in galleries with more than comfortable dimensions. Water temperatures vary from 13-14°C in the Lot region of France, up to 26°C in Mexico, with Croatia (18°C) and Florida (22°C) in the mid-range. In the Jura in



ing to be very demanding. The course's goal is to introduce divers to this new

environment and allow them to continue down this road in total safety. However, being claustrophobic is a definite hindrance!

What are the different stages?

The first level is Cavern, a two-day discovery of overhead diving without going deeper than 60m. Maintaining sight of daylight at the entrance allows the ideal conditions to discover this type of diving.

The second level is the introduction to Cave. This is the first level where students penetrate a cave to within 60m from the entrance point with the absence of daylight. These two levels do not involve any restrictions, complex navigation or poor visibility.

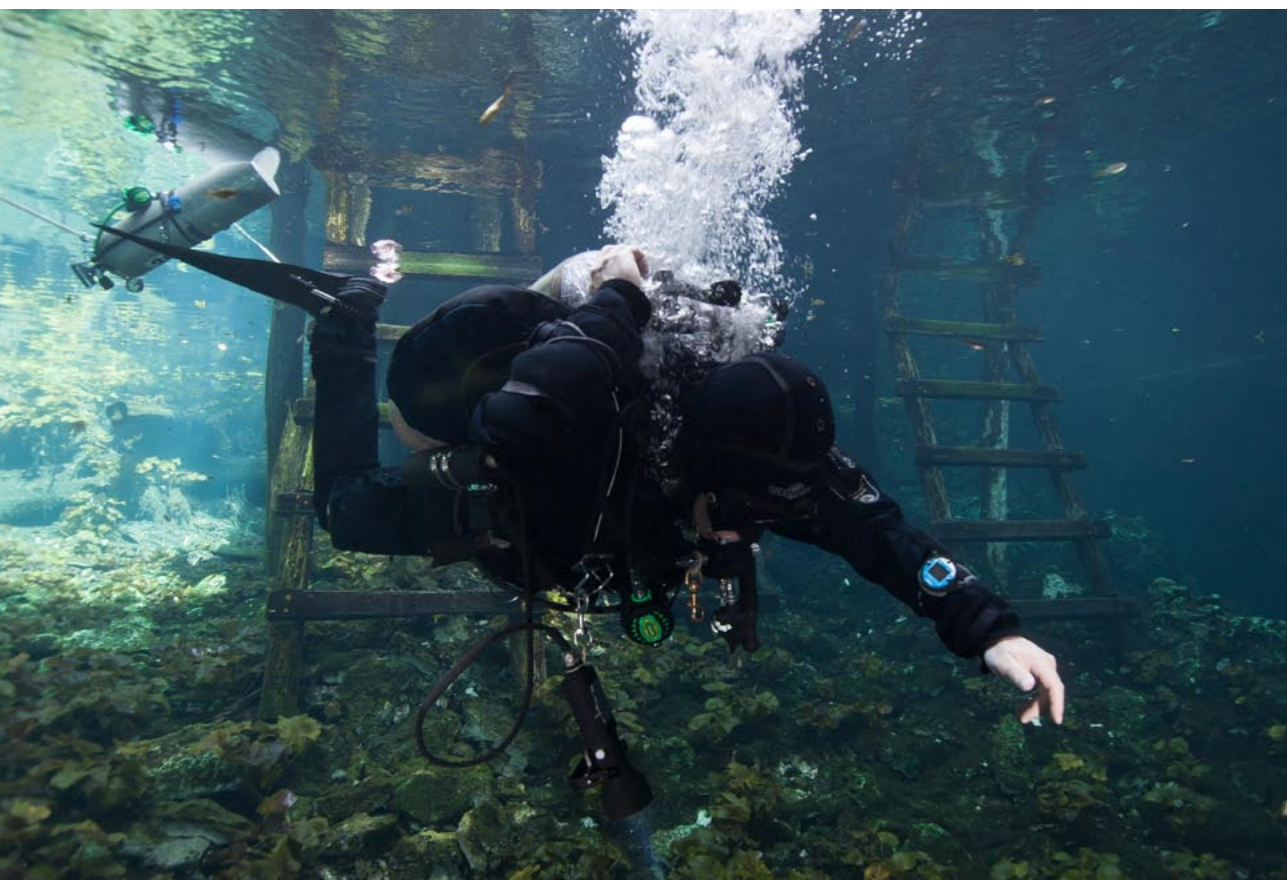
At NACD (National Association for Cave Diving) and NSS-CDS (National Speleological Society-Cave Diving Section), the next level is Apprentice cave diver followed by (Full) Cave Diver. The majority of other diving agencies have grouped these two last levels together in the final training of self-sufficient divers in the overhead environment (Cave or full cave diver), usually over four days. It is possible to make a combination of these courses

over several days or a week.

You can find this type of curriculum, originally issued by NACD and NSS-CDS, at the agencies like TDI or IANTD. These courses can be taken in open-circuit or with a rebreather. These are two different courses, and can be optionally followed by cave specialty courses: sidemount, stages, scooter or topography.

DIR agencies like GUE, UTD or InnerSpace Explorers have a slightly

different curriculum. From the very beginning, divers must pass basic skill training including Hogarthian configuration, buoyancy and horizontal anti-silting position in the water (trim), frog kick, safety drill (assisting with long hose of 2m length), valve drill (closing the valves in case of leak), team positioning during progression or communication (like a star). In this way, these skills are already mastered before the special



Leaking gas

Switzerland and northern Italy, the water is a chilly 7-8°C, going even lower to 4-6°C in the Russian Ordinskaya Cave. However, the water is generally not that

cold. A drysuit and good undergarment ensures there is no problem.

A frequent fear is the course's difficulty, with some people imagining the train-



Out of gas

Cave Diving



Air sharing and touch contact

cave training, like level 1. In the "classic" curriculum, all these skills are integrated during the course.

What cave training is about

One peculiarity of the overhead training is to use the accident analyses and statistics from the 1970s. In 1979, Shek Exley wrote his *Basic Cave Diving: A Blueprint for Survival*, a small manual of 46 pages based on real accident cases in the Americas.

This featured scrupulous analysis and the lessons necessary to avoid them. In Europe, the accident

and incident statistics were always utilized, as it was a small community. Conversely, it's a rather good method to obtain a realistic training. At present, the overhead diving instruction retains the most concise and organized pattern of all.

In most cases, the cause of most accidents is due to a diver's lack of training. This is increasingly due to executing dives that do not correspond to a diver's training (complex navigation, use of the rebreather, scooter and lack of experience in general). The first thing learned is how to deal with

the guideline, as it is the main reason or an aggravating factor in about one-third of problems. These include the absence of a guideline, lost line with minimal visibility, entanglement, how to deploy, follow and retrieve the guideline, finding the guideline in minimal visibility and to not tangle the line.

After this follow the rules of gas consumption and gas management known as the rule of thirds. Today, however, the rule of fourths is utilized, meaning a fourth on the way into the cave, a fourth

go quietly, amid the noise and haste...

[3 hours @ 20m - no deco]

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Image by Ray van Eeden of Prodivers, Kuredu, Maldives

on the way out and a half for safety margin.

Then comes the depth (don't dive deeper than 30-40m with air), the equipment and particularly the lights (one primary light and two backups). Solo diving is not recommended, even if students learn how to make it out alone

in case of buddy loss and bad visibility.

During training, the students also learn how to read the place, especially in order to find the exit (rock erosion pattern, waves on sand...) and to avoid the dangers (collapses, restrictions). Communication is another

keynote, with hand signals, primary light, touch contact being employed.

Most of the basic notions are studied from Cavern to Intro to cave level. The Full Cave course covers advanced dive planning depending on the environment, decompression, navigation within



Rescue training



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Scooter diving in Orda Cave. Photo by Vitya Lyagushkin

main and secondary galleries, complex navigational elements using arrows and cookies to communicate on the guideline and locating the exit.

All these subjects are studied along with academics, land drills, their implementation in the water including emergency procedures in a team (out of gas, rescue) and in certain cases individually (lost line, lost diver).

The number of cave divers is growing consistently, with agencies offering more advanced rebreather courses and trimix in caves with TDI. Today, there is even an association fully dedicated to the cave exploration instruction—IDREO (International

Diving Research and Exploration Organization). Courses include Cave Explorer 1 level (a full cave course equivalent) and the more advanced Cave Explorer 2 level, which examines all possible cave techniques along with the options of using a rebreather and trimix in cave exploration.

Above all, comprehensive education ensures participants can safely enjoy unforgettable excursions in an overhead environment! ■

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. See PascalBernabe.com

Running some guideline in a land drill



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AND WRECKS EXPLORATION 60 - 100M

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Making the Shot

Text and images by Aaron Wong

—A rare look behind the making of an iconic image. From conception of the idea to the execution, you will be surprised how little of it was left to chance.

The sudden rocking of our truck shook me out of my slumber. I struggled to focus on my watch. Has it already been one-and-a-half hours since we set off, after loading the tanks? Looking out of the window at the jungle trail sort of threw me deeper into my world of confusion. Are we going diving? Being based in tropical Asia, diving to me usually means swaying palm trees, sunny skies, and white sandy beaches. So the 20°C air and dusty jungle trail was at the total opposite end of the spectrum for me. Dressed in thick jackets and snuggled in a truck with tanks banging in the back, we headed out to dive the famous cenotes of Cancun, Mexico.

Found mainly in the Yucatán Peninsula, cenotes are freshwater caves that are formed by the dissolution of rock and the resulting subsurface void, and the subsequent structural collapse of the rock ceiling above. Over millions of years, these caves can grow to amazing sizes with water visibility sometimes reaching 70 meters. It is a dream location for any underwater photographer, for sure.

I was on an assignment to cover a



Original sketch before the expedition

story for an article and had been getting some great shots in several cenotes for over a week. But today's shoot was totally different. I had heard of some cenotes that still contained human remains from the days of the Mayans.

Cenotes were considered sacred grounds for the Mayans, and it is known that they conducted human sacrifice for which they would throw the victims into the cenote to please the rain gods. Brutal as it may seem now, such was the culture of these unique people who thrived in this region from 250 AD to 900 AD.

I was told that most of these remains were at least 700 years old. The thought of coming face to face with a 700-year-old skull was an adventure in itself, let alone the chance to photograph it.

I had the idea of the shot sketched out months before the trip. Sketching my ideas on paper is something I do all the time. It gives a clear visual reference to my team in regards to what I want to achieve. That, to me, is the first step to a successful shoot.

This particular shot required a back light from a distance and a model diver in the background. It was clear from the start that it wasn't going to be a simple point and shoot scenario. Shots like this don't just happen without some level of planning. So, I put together a team of support divers, called some





photo & video

Skull of a deer amongst the human remains (right); Rappelling 25 meters in the cenote (below)

local guides who might know of such a cenote, got my model—David, who is of pure Mayan decent (it seemed only fitting)—and off we went.

The expedition

They say that getting there is half the fun. Or is it? As it turned out, some of these cenotes were way off the beaten track. Most were owned by the original family who owned the land. These were mostly not open to public, let alone photographers with big cameras. Even if they did allow divers, there were those who did not allow cameras, as these cenotes were still considered sacred to the Mayan decedents who still lived there.

How else do you explain 700-year-old remains that are left untouched all this time? In some ways, I'm glad they are not open to public or divers.

We finally found a cenote that allowed us in, and yes, it was one of those places in the middle of nowhere— hence, the

one-and-a-half-hour drive! Being so isolated meant that we had to bring all that we needed—twin tanks, gear, cameras, lights and all.

The truck finally stopped at a small village at the end of the trail where we could drive no more. We rigged up our equipment and had to hike the rest of the way. Passing by the villagers, we must have seemed like visiting aliens.

I was expecting some walking, but I wasn't counting on it to be almost a mile long. I can assure you that carrying tanks and a full camera rig with spare lights through uneven jungle terrain isn't exactly a fun thing to do. Whoever said that getting there was half the fun surely hadn't been here!

We arrived at a small opening in the ground in the middle of the forest where the locals had built a small platform and simple rope systems for access. I went to the edge expecting to see water, but instead, what greeted me was a 25-meter drop. That sort of

explained the need for ropes.

Looking closer, I realized it wasn't just a shaft but a big cavity in the ground measuring some 35 meters across. It then dawned on me that the very ground I was standing on at the edge actually had nothing underneath it but a 25-meter drop! We were standing on 'ground' that was a mere three meters thick! It kind of sent



a chill down my spine.

If not for this small two-meter opening, I would never have guessed the ground around me covered with trees was just a 'crust'. It makes one wonder what else lies beneath.

We had to strap on harnesses and repelled down one at a time. My guide went down first followed by me, two other support divers, and lastly, my camera rig. It isn't everyday you get to see your camera rig, strapped in whatever way possible, lowered down to you with a thin rope 25 meters over head. I wished I had a spare camera with me just so I could photograph that scene!

The cavern opened up to its full width, as I repelled past the three meters of surface rock. I could see the roots of the

trees above dangling from beneath, some even making it to the water 25 meters below. It was a magical sight, and it made me feel so small in this world of giant trees and rocks.

Looking at all the effort it took just to get the camera here, it was as extreme as underwater photography can get. Waiting in the water for the rest of the crew and equipment to arrive was a surreal and almost eerie experience. Knowing that human remains lay beneath me didn't help either. I was almost afraid to move my fins!

Looking up at the small opening above, I wondered if this was the last thing these unfortunate sacrificial victims saw some 700 years ago. Who were they? Prisoners of tribal conflicts or volun-



cinema of dreams



www.seacam.com





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Original 'out take' from the shoot, before lights were properly adjusted

within the debris wasn't easy.

Once we located the right skull, everyone moved back to prevent any stir ups. My model knew exactly where to position himself based on our pre-dive briefing. He stayed perfectly still as a support diver positioned directly behind him.

I hovered slightly above my final shooting position, as I knew I only had one chance at it before the area around the skull got stirred up. I tested the lighting and exposure for awhile, and when I was totally ready, I signalled

to everyone, descended slowly to less than an inch from the skull, fired six shots, and it was all done.

It was tough getting so close to the skull without touching it the slightest bit. Let's put it this way: it had been sitting in its final resting place in peace for 700 years, the last thing I wanted to do was disturb it!

As I moved my camera away, I took a moment for a really close look, eye to eye. I thought for a moment that I might be the closest anyone has been looking into those eyes in all this time—a mere three inches away. It raised more questions than fear, but I knew better than to overstay my welcome and

The Shot

left the skull in its dark watery tomb.

Getting out of that cave was a muscle wrenching tug of war for the support team on the surface, and a painfully constricting experience for us. The harnesses weren't designed

for comfort, and when your entire body weight including your scuba gear rested solely on the harness, it was far from comfortable—something the guys found out the really nasty way!

Slowly but surely, we all immersed from the hole, back to the world of the living. It was one of those shots I wouldn't soon forget. Considering the logistics and conditions, it was amazing how much effort it took for good pictures. I am glad I managed to capture a great shot out of it all, and I am grateful to the team who helped make it happen.

Now, all that was left was the one-mile hike through the jungle back to our truck, followed by a one-and-a-half-hour drive. One suddenly remembers that old saying again, that getting there is half the fun, but there's nothing mentioned about the getting back part of it! ■

Aaron Wong is a widely published underwater, fashion and commercial photographer based in Singapore. For more information, please visit: www.aaronsphtocraft.com

As I moved my camera away, I took a moment for a really close look, eye to eye. I thought for a moment that I might be the closest anyone has been looking into those eyes in all this time—a mere three inches away.

teers from within the community? It was a powerful place to be in—a place of such history and untold suffering. It made me feel even smaller.

In the cenote

We descended to about 20 meters and searched through the maze of branches and logs. It was pitch black and our touches did little to help, as the slightest movement stirred up the sediment.

Unlike the ocean, this was a

stagnant body of water, which meant that any sediment that was stirred up took forever to clear. The slightest movement kicked up rotting leaves that covered the bottom. Think of it as fine tissue paper in still water. It was a tough challenge to get around, and it took perfect buoyancy

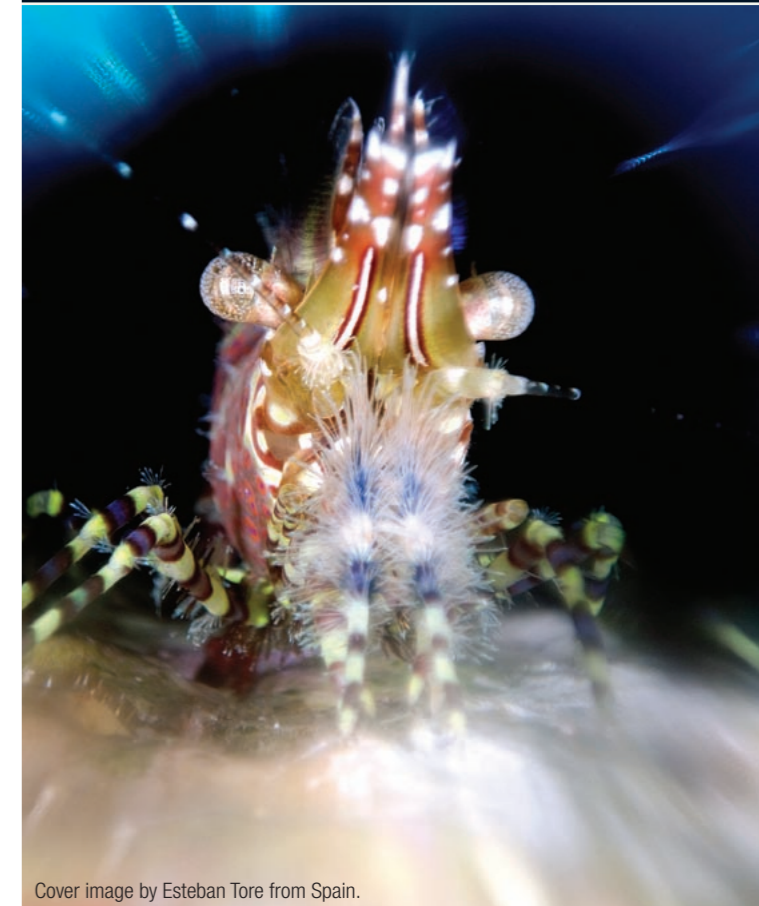
control to a whole new level. I was told there were seven sets of skeletons within this cenote. Finding the right one in the right angle for the shot

It isn't everyday you get to see your camera rig, strapped in whatever way possible, lowered down to you with a thin rope 25 meters overhead.



Aaron Wong exits cenote after the photo shoot

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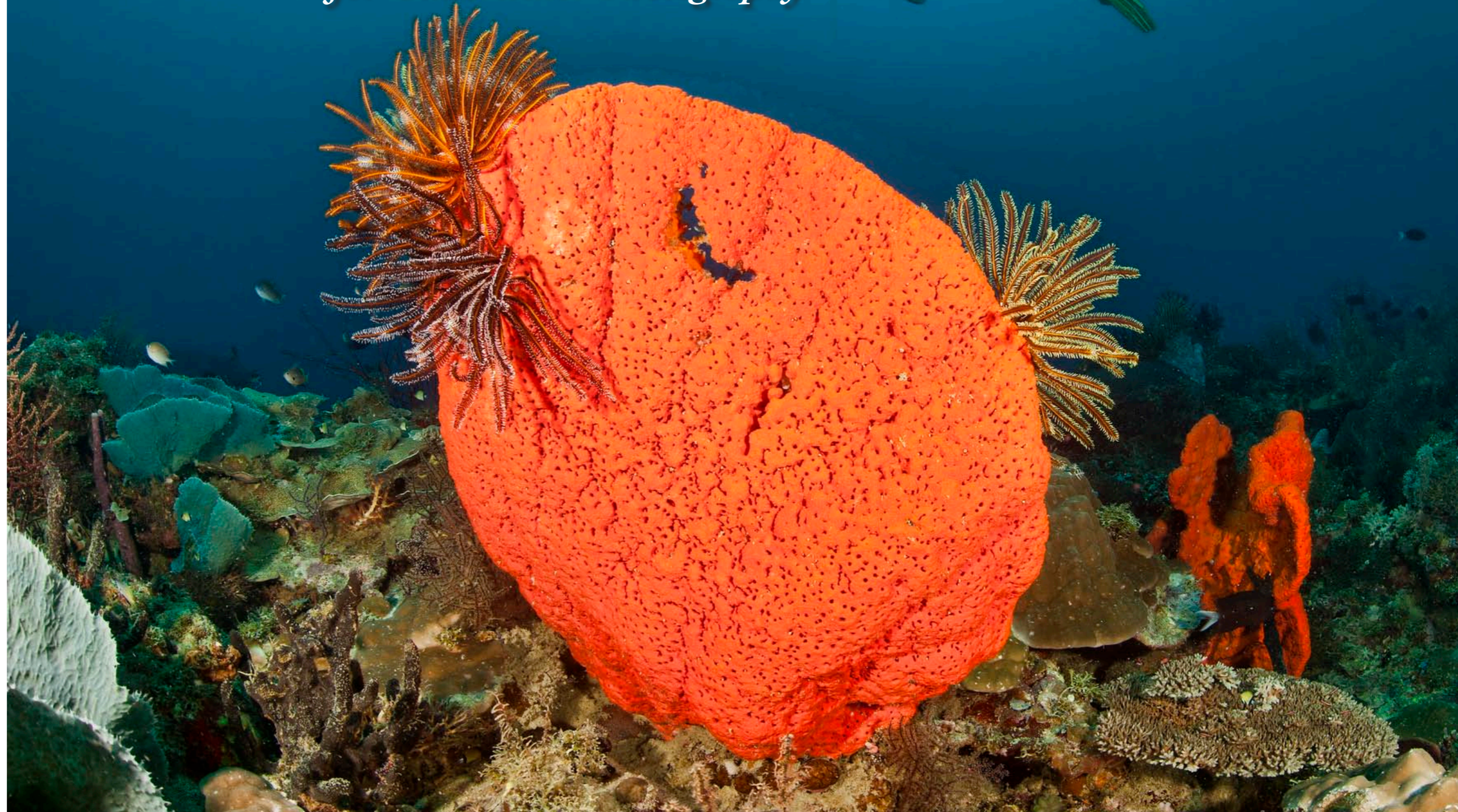
photo &
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Text and underwater photo
by Don Silcock. Product images
courtesy of the manufacturers

In the first article of this series, we looked at the often confusing technology and buzzwords behind mirrorless cameras, and then in the second, we explored the lenses available for this new genre of camera that are suitable for underwater photography. The technology clearly has a lot to offer underwater photographers due to its excellent functionality and small form factor. However, the review of available lenses quickly narrowed down the choices of camera manufacturers to Olympus and Panasonic with their shared Micro Four Thirds technology or the Sony NEX range. Unfortunately, while Olympus lenses can be used on Panasonic cameras and vice-versa, they are not compatible with the Sony cameras. So, we have a situation similar to the perennial one for underwater photographers with DSLR's: which is best, Nikon or Canon?

Housing Mirrorless Cameras

for Underwater Photography





So, if you are looking to go mirrorless, you are faced with a choice: Sony or Micro Four Thirds. A definitive discussion on their relative merits is really beyond the scope of this article. Just like the Nikon and Canon debate, both are very good and highly unlikely to hold back your creative abilities. However, there are a number of excellent websites available to slate your thirst for knowledge, and I would personally recommend checking out Tom Hogan's Sansmirror (www.sansmirror.com) as an excellent starting point.

I recently went through the whole process of deciding which mirrorless camera to buy and have chosen to 'invest in' (which sounds better than 'buy', when you have to explain the expenditure to your wife) the Olympus OMD camera and a selection of lenses.

The rationale I used to justify my investment was that I wanted a lightweight photo kit for travel photography from which I could select items to provide a small macro kit for underwater photography and a back-up to my DSLR rig. The OMD ticked all the boxes for both travel and underwater photography. I am now the proud owner of a black body and a

Nauticam Fisheye port for Panasonic 8mm



number of Olympus and Panasonic Micro Four Thirds lenses.

Housing choices

If the availability of lenses significantly reduces the choice of camera manufacturer, the availability of housings to take them underwater has an even more dramatic effect. At the top end of town, there is vigorous competition for the DSLR housing market, ranging from Ikelite with its very cost-effective one-size-fits-all polycarbonate housing to the top-of-the-range Austrian manufacturers Seacam and Subal with their uber-quality aluminium housings. In between are Aquatica, Nauticam,



Nauticam macro port for Panasonic 45mm

Hugyfot, Nexus and several others, all of whom make excellent housings.

Interestingly, though, of these, only Nauticam appears to be interested in the mirrorless market and are actively pursuing it.

Reading between the lines, it appears that the rate at which mirrorless cameras are being released is beyond the capa-

bility of most of the housing manufacturers to keep up with, while still developing housings for the new DSLR's. Even Ikelite, whose housing business model is based on using the same basic box reconfigured for different camera models, state on their website that they will not be developing housings for the popular Olympus OMD, nor any of the Sony NEX models, nor the Panasonic mirrorless cameras.

It would seem that the people in charge of these companies have reached similar conclusions and decided to focus their available resources on the relatively "slower moving" DSLR cameras. The wisdom of this decision will become apparent over time, but it is a big call when the market for underwater DSLR housings seems likely to reduce, as the popularity of mirrorless housings grows.

Hobson's choice

A Google search for

Nauticam Olympus OMD housing



Olympus 60mm macro lens



"Olympus OMD underwater housing" will quickly identify your options, and there are only two horses in the race: Nauticam and Olympus themselves, with their own PT-EP08 housing.

Rumors abound that Hong Kong-based 10Bar, which has produced a range of housings for other cameras, will

duce one for the OMD. But, for now, they are not in the race.

Similarly, Japanese housing manufacturer Acqupazza appears to be looking at making a housing for the OMD.

Of the two main horses though, Nauticam had what I wanted: a small, light housing for macro photography, which could double-up as a backup for the DSLR rig I use for wide-angle.

My "investment"

Part of the rationale for choosing the Olympus OMD was the availability of two first-class dedicated macro lenses: the Panasonic 45mm and the Olympus 60mm, which correspond to 90mm and 120mm in the 35mm format. Reviews of both these lenses have been full of praise for their capability, and so it was obviously very important to me that I would be able to use them underwater.

It was the availability of the dedicated Nauticam port for the Panasonic lens together with



photo & video



Panasonic 45mm macro lens



Panasonic 8mm fisheye lens

a 20mm extension ring that allowed it to be used with the 60mm Olympus that finally convinced me to buy the Nauticam OMD housing. Once I had crossed that bridge, I started to look at what I needed to use the OMD as a wide-angle backup.

Unfortunately, unlike DSLR's with which you can buy one dome port for a fish-eye lens and then various extension rings to use it with different wide-angle zooms or primes, with the Micro Four

Thirds lenses, you need different domes. After considering the Panasonic 7-14mm (14-28 equivalent) and Olympus 9-18mm (18-36 equivalent), I opted for the Panasonic 8mm fisheye lens, with its bright f3.5 maximum aperture and close-focus distance of just four inches. The 8mm is a really small lens, and its dedicated Nauticam dome is equally petite and easily slipped

in my carry-on. I have yet to use any of this equipment underwater, but can hardly wait to do so. Overall, I seem to have achieved my objective and now have a small, light, but highly functional and dedicated macro rig that takes up less space than my DSLR macro ports used to. Plus, the 8mm fisheye lens and port give me a back-up should something happen to my DSLR wide-angle rig!

the results possible with the D800, but for underwater macro photography, I think

the OMD has everything I need. That said, I intend to try it and see what the OMD is capable of. Subsequent articles will detail these capabilities, but the next article in this series will cover underwater macro photography with mirrorless cameras. ■

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System expansion

My new wide-angle DSLR rig is the highly regarded Nikon D800, combined with the Nikon 16mm fisheye lens and the 16-35mm zoom lens. I bought the camera because of the exceptional dynamic range capability of its sensor. I cannot see anyway the Olympus OMD, or any other mirrorless camera, can come close to achieving

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



Olympus OMD mirrorless camera



Edited by
Don Silcock

Sony NEX-3N

Sony has announced details of its new NEX-3N mirrorless camera. The Sony NEX-3N has a 16.1 megapixel APS-C sized CMOS sensor with an ISO range of 200 to 16000 and comes with a built-in flash plus the capability to shoot HD movies at AVCHD 50i/25p. The NEX-3N is similar in size to a compact camera with dimensions of just 110mm x 62mm x 35mm and a weight of just 269g. Sony claims that it's the smallest, lightest camera with an APS-C sensor. The predecessor of the NEX-3N was the NEX-F3, which did not attract the attention of housing makers and so was not used for underwater photography. But with the more compact form factor of the NEX-3N, that may change.

The Sony NEX-3N will be available from March, with prices still to be announced.



10Bar's Canon EOS-M Housing

Hong Kong-based underwater photography manufacturer 10Bar has released a new housing for the Canon EOS-M mirrorless camera. Few details are currently available for the new housing, apart from the price; it sells for US\$850 with a 17mm lens flat port or US\$1000 with a semi-dome zoom port.
www.10bar.com



Ikelite's Nikon D5200 Housing

Ikelite responded quickly to the release of the Nikon D5200 DSLR and was first to market with a housing for the new camera. The D5200 is positioned at the top end of Nikon's "entry-level" camera range, but is packed with features and functionality. It looks more like a mid-range camera and is a sign of what is to come from Nikon, with their DX cameras. It looks likely the aluminum housing manufacturers will skip the D5200 leaving Ikelite as the only housing option for a very viable underwater DSLR. The Ikelite housing for the D5200 comes with the standard features including their propriety circuitry for TTL via hard wired strobes, access to all key controls including the video controls. The housing will be available in early March for US\$1500.

Retra's New Prime Light Shaping Device (LSD)

Slovenian manufacturer Retra has announced a new version of their popular light shaping device (LSD) called the Prime. The new Prime LSD uses the same lens technology utilized used on the high-end LSD Pro, but is simpler and cheaper. The Prime is supplied with 13 standard light projection shapes and is compatible with a wide variety of strobes. The LSD prime is available now and retails at €349.00 (≈US\$460).



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Nauticam NEX-6 Housing

Nauticam has announced their new housing for the Sony NEX-6 mirrorless camera. The new housing provides access to both the Sony control wheel and control dial via the thumb to give control of the aperture and shutter settings when using the NEX-6 in manual mode. The camera's new mode dial is also accessible on the top of the housing. The housing features a re-engineered camera saddle, dual fiber optic strobe triggering ports and a dedicated ISO button. Nauticam has also produced a 7-inch dome port for the Sony 10-18mm f/4 WA zoom and the Macro/Zoom Control Port 45 to support the Sony 16-50mm f/3.5-5.6 retractable zoom. The NA-NEX6 is from February 15 at a U.S. retail price of \$1,650



Inon close-up lenses

—The UCL-100M67 and UCL-100LD
The lenses can deliver super macro imaging capabilities with optical glass lenses in three elements of three groups and an anti-reflection coating on all four inner surfaces. Both lenses also feature larger apertures to minimize vignetting even when using a camera with a 28mm lens at the wide end of its zoom range. The lenses are available in a 67mm threaded format as the UCL-100M67, or in an Inon bayonet format as the UCL-100LD. The Inon M67 series close-up lens can be stacked on either version, making for really super-macro.



Nikon D7100

Nikon has announced the imminent release of their successor to the very popular D7000 DX format DSLR. The new D7100 has a brand new 24.1-megapixel DX-format CMOS sensor, and interestingly is supplied without an optical low pass filter (OLPF), which should result in higher resolution than similar size sensors, albeit with a risk of increased moiré in fine patterns. At first glance, the new D7100 would appear to be a basic upgrade of the D7000, some 2.5 years after it was first released. But this is not just the 24MP sensor from a D5200 packaged into a newer body, it's a brand new high resolution sensor, packaged together with Nikon's proven EXPEED 3 image processing engine, and features a native ISO range of 100 to 6400. The D7100 also has a new 51-point AF system and a new Multi-CAM 3500DX AF module. For metering, it uses Nikon's 3D Color Matrix Metering II, 2,016-pixel RGB sensor and Scene Recognition System. Interestingly, Nikon has provided the camera with a 1.3x crop mode, which provides an extra telephoto boost (2X) with 15.4 megapixel resolution—something that should be really beneficial to underwater macro photographers. Physically, the D7100 is very similar to its



predecessor, and, with the exception of the new movie button on the top-plate, the key controls appear to be basically the same. So, there is every chance that it will fit into D7000 housings. Finally, Nikon has been describing the D7100 as the company's 'flagship DX model', which raises the question of whether the D400 (when it eventually arrives) will be DX or full-frame FX. The D7100 will be available in March 2013 for the suggested retail price of US\$1599.95

Nauticam G15 Housing

Nauticam has announced the release of its NA-G15 housing for the Canon G15 high-end compact camera. The Canon G15 is the latest in the very popular G Series and sports several features that will be popular among underwater shooters. Significant improvements on the G15 are a dedicated record button for video, capable of shooting at either 1080/24p or 720/30p, a faster zoom lens with a f/1.8-2.8 variable aperture should be helpful for low light and shallow depth of field imaging. Canon says that the autofocus is now the fastest of any compact, 53 percent faster than the G12. The Nauticam housing promises to take full advantage of all the above features including the ability to use a variety of wet-mate lenses to get 100° or 150° FOV and various macro diopter strengths.



Daniel Jean-Baptiste



P O R T F O L I O



Triggers, by Daniel Jean-Baptiste
Hand-painted silk, 30 x 40 inches

PREVIOUS PAGE: *Reef Fish*, by
Daniel Jean-Baptiste. Hand-
painted silk, 25 x 35 inches

Lotus Garden, by Daniel Jean-Baptiste
Hand-painted silk, 25 x 20 inches

Jean-Baptiste

Text edited by Gunild Symes
All images by Daniel Jean-Baptiste

Born on the Caribbean island of St. Lucia, self-taught artist Daniel Jean-Baptiste, captures on sumptuous silk the brilliant, vivid colors of the vibrant marine life that thrives in the sea around his native homeland. In an interview with the artist, we find out more about the man, his art and his unique perspective and experience with the underwater world.

X-RAY MAG: Tell us about yourself and how you came to create your marine themes on silk.

DJB: I am a natural self taught artist whose whole process of creating was something that arrived in my being when I was nine years old. I experimented in water colour while growing up in a small fishing village in St. Lucia. My introduction into the silk medium that I use today happened in 1982 when I got hired as an artist for a Canadian display company—Display Arts of Toronto—to produce large format hand-painted silk banners

for shopping centre interior decorations. Today, the work that I produce as a fine artist is more refined and very different compared to my early commercial work.

X-RAY MAG: When you create your art works, what drives your artistic vision?

DJB: I have a deep passion to create work that has never existed before. It has to be a creation that has its origins from my life. I am only interested in depicting the world as I experience it—just all beautiful and vibrant. I want the viewer to see paradise everywhere.



portfolio

Jean-Baptiste

X-RAY MAG: What about the sea and its creatures inspires you?

DJB: I was very lucky to have grown up in a small fishing village. I spent every free moment on the old wooden jetty fishing and diving with all these

earthly wonders. I was so addicted to the ocean that I always tried to avoid school in order to enjoy life. My work reflects that time in my life when I was so excited to discover new fish, scary crabs and to swim in what looked like liquid diamonds. The effect of light on



Under the Bahamian Sea, by Daniel Jean-Baptiste. Hand-painted silk, 60 x 50 inches



Caribbean Gold, by Daniel Jean-Baptiste. Hand-painted silk, 30 x 40 inches

the sea floor and on the skins of fish has always been something that has fascinated me.

X-RAY MAG: Are you a scuba diver or do you snorkel?

I have never scuba dived, but I am a snorkelling expert; I can dive down to 50 feet easily.

X-RAY MAG: What sources do

you use to form or inform your underwater images?

The best information on my marine subjects is found first hand in the water—just observing them as they live. Photos from any source are also welcome, as well as more information from other sources including videos, photos and even written descriptions.

X-RAY MAG: What are your favorite dive sites?

All my dive sites are around St. Lucia. The best is Anse Chastanet, then Anse Cochon, the Pitons reserve, and then there is Maria Island, with its pristine flat waters.

X-RAY MAG: What do you want to tell or show the viewer about

the marine environment?

It is not so much what I want to tell them, but to make them feel and to see the beauty of marine life. If I can have a turtle-eating village know the beauty captured by the light dancing on the turtle's carapace, then maybe they might start to act differently towards conservation. You can only be



portfolio



Jean-Baptiste

Seahorse, by Daniel Jean-Baptiste. Hand-painted silk, 12 x 15 inches (left)

Tranquility, by Daniel Jean-Baptiste. Hand-painted silk, 37 x 77 inches (far left)

Sunshine Angel, by Daniel Jean-Baptiste. Hand-painted silk, 16 x 20 inches (bottom left)

Caribbean Bottlenose, by Daniel Jean-Baptiste. Hand-painted silk, 23.5 x 40 inches (below)

one of two things: either you are destructive or you are creative—and love is always creative, and so, I would like my work to create love.

X-RAY MAG: Describe your artistic process. What inspires your creative process and how are your art works created?

My work is created from my day dreams and from experiences I have had, even at the fish market. An idea arrives on its own, and I will develop that creation from many pencil sketches. I do not like producing photo-replicated work. I have to struggle to create a scene that no one has done before, and this is very difficult to do but very rewarding when successfully produced.

X-RAY MAG: How does your art relate to conservation or environmental issues facing our oceans and reefs?

The only way conservation is going to be effective is through making people aware of their actions, by bringing them an understanding about the delicate nature of the sea, but mostly by creating a bond that goes beyond just a food source or a garbage dump. Most of the world have never enjoyed the oceans, but maybe my





Anse Chastenet by Daniel Jean-Baptiste. Hand-painted silk, 23.5 x 36 inches

art can be an introduction to this massive stranger.

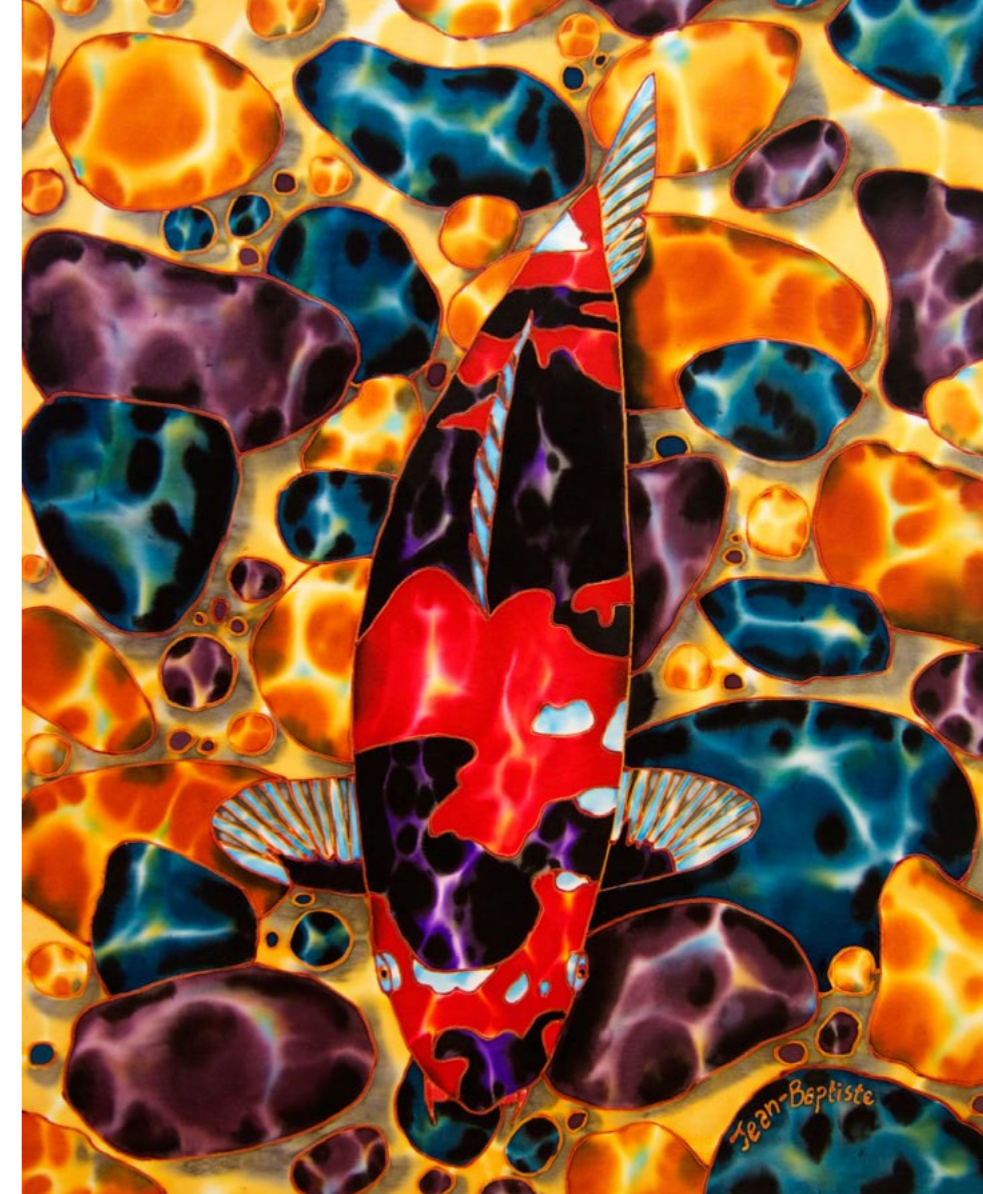
X-RAY MAG: What's important in your art?

I feel that it is important as an artist to

create a distinct style that can always be known as yours. I want the viewer to feel my soul, which has been breathed into each piece. I want you to feel excited about the art, just as much as I am insanely happy to paint them. I just want to

wake up a small part of the awareness of beauty and life. ■

For more information and to order prints or purchase originals from the artist, visit: www.jean-baptiste.com



Black Red Koi, by Daniel Jean-Baptiste
Hand-painted silk
25 x 20 inches (top right)



Caribbean Octopus, by Daniel Jean-Baptiste
Hand-painted silk
16 x 20 inches