



GLOBAL EDITION
September 2021
Number 107



Indonesia
Raja Ampat

Tech
Cave Diving

Caribbean
Turks & Caicos

UW Photo
On a \$500 Budget

Contributors' Picks
My Favorite Underwater Portraits

M E X I C O
Cozumel

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COVER PHOTO: *Endangered Australian Sea Lions, Jurien Bay Marine Park, Western Australia, Australia*
by Celia Kujala (sealpeace.com)

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My ongoing dilemma

Diving is a very giving activity.

It provides an invigorating getaway from daily work, chores and tedium. It lets us escape the proverbial treadmill, allowing us to immerse ourselves, literally and mentally, in nature. I do not know about the rest of you, but I find that diving effectively resets my mental state, releases stress and tensions, and helps keep me grounded in a world full of stressors and worrisome news.

When we read about diving, or perhaps daydream about the next dive trip, we indulge in a bit of escapism, which may help get us through the day—particularly, on a grey and cold winter morning in the beginning of the week.

Consequently, a dive magazine should sustain those nice dreams, and to that end, provide some pleasant and positive “infotainment.” We should help you look forward to your next immersion, encourage you to continue to get training, and become more knowledgeable about the aquatic environment.

Diving can indeed provide us with unequalled adventures, close encounters and interac-

tions with wildlife, like no other activity that immediately comes to mind. And it can take us to some stunning places on our beautiful blue planet.

That said, in this regard, there have often been times when I have struggled with both the content and the penning of these editorials—and this is one of them—because all is far from well.

I have been doing this for quite some time. By formal education and former occupation, I am a biologist specialising in aquatic ecology. So, for all my professional life, I have kept a close eye on how humanity has gone about protecting the environment and being good stewards of the planet.

In retrospect, there has sadly been more bad news and negative trends than good over the decades. Climate change is accelerating and big swathes of coral reefs, including the Great Barrier Reef, are succumbing to rising temperatures. Natural habitats have been lost, or severely degraded, and countless species are threatened by extinction.

It has culminated in the 2021 UN report on climate change—from the International Panel on Climate Change—which shook me to my core to read. The UN Secretary-General António Guterres said the report was nothing less than “**a code red for humanity.**”

It left me despondent... at least for a while. Then, I collected myself. Giving up is not an option, and our generation has a responsibility to get this mess cleaned up.

This time around, the IPCC report seems to have resonated much more strongly with the political and financial establishment, at long last. The mood and will to act seems to be changing. So perhaps with the joint efforts of all nations, we can turn this ship around before it is too late.

Keep campaigning, shop sensibly and elect politicians who take climate change seriously. Be a driver of necessary change.

— Peter Symes
Publisher & Editor-in-Chief



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Edited by
Peter Symes

from the deep NEWS

Some coral reefs are adjusting to ocean warming

Some coral communities are becoming more heat tolerant as ocean temperatures rise, offering hope for corals in a changing climate.

Ocean warming is causing declines of coral reefs globally, raising critical questions about the potential for corals to adapt. In the central equatorial Pacific, reefs persisting through recurrent El Niño heatwaves hold further important clues; We have previously reported on Red Sea coral resilience to climate change.

Using an 18-year record of coral cover, spanning three major bleach-

ing events hitting the Phoenix Islands Protected Area (PIPA), a new study finds the impact of heat stress on the coral communities lessened over time. The authors of the new study suspect heat-tolerant offspring from the surviving corals are repopulating the reefs, allowing the community to keep pace with warming seas, at least for the time being.

Extreme events can weed out thermally sensitive coral species, shifting communities toward dominance by stress-tolerant taxa. Such shifts can lead to increased resistance to future bleaching events but may compromise diversity and the recovery rates of coral populations.

"It's easy to lose faith in coral reefs," said first author Michael Fox, a postdoctoral scientist and coral reef ecologist at the Woods Hole Oceanographic Institution (WHOI). "But in PIPA, which is protected from local stressors, and where reefs have enough time to recover between heatwaves, the coral populations are doing better than expected."

In the new study, researchers monitored coral communities at four islands within PIPA, an area encompassing over 400,000 sq km of coral reef and deep-sea habitat. After the 2002-2003 heatwave, the surveyed sites lost more than three-quarters of their coral cover. The reef was beginning to recover when the 2009-2010 heatwave hit, sparking fears of widespread bleaching, but two years later, coral cover had increased by more than five percent.

The new study could help coral reef managers identify coral communities most likely to survive in the warming ocean, improving conservation and restoration outcomes. Identifying and facilitating the conditions under which coral survival and recovery can keep pace with rates of warming are essential first steps toward the successful stewardship of coral reefs under 21st-century climate change. ■

SOURCES: GEOPHYSICAL RESEARCH LETTERS, WOODS HOLE OCEANOGRAPHIC INSTITUTION

SCOTT JOHNSON / SEASCAPES IMAGES



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Edited by
Peter Symes



Do tourist boats stress out whales?

Researchers are studying whales' stress levels in their hormones by sampling cortisol in water droplets from the whales' spray, also known as the blow.

Do whale watchers bother whales? A number of studies on tourism's impact on whales, which were based on behavioural observations, have concluded that tourism caused only minor disruptions to the mammals.

For example, in 2015, a study led by Marianne H. Rasmussen, director of the University of Iceland Húsavík Research Centre, found that whale watching as currently practised does not seem to be having any long-term negative effects on the life expectancy of minke whales.

JAY CULOTTA / PIXABAY



On the other hand, a 2011 study showed that whale-watching activity near Reykjavik was disrupting minke whales. A 2006 study, titled "Estimating Relative Energetic Costs of Human Disturbance to Killer Whales

(*Orcinus orca*)" published in *Biological Conservation*, showed that frequent disturbances on the whales' important activities could lead to more energetic costs over time. Another 2006 study showed that levels of dolphin-boat interactions in the region of Fjordland, New Zealand, could not be sustained by the bottlenose dolphins, and that the interactions have both short- and long-term effects on both individuals and their populations. So, which is it?

To find out, a group of biologists from Whale Wise

use drones to collect samples from the water sprays of whales and tested them for traces of cortisol, a hormone related to stress that can determine the physiological stress levels of the whales. The researchers aim to collect samples before a whale-watching boat arrives and then afterwards, then compare the two samples to determine the direct impact of that encounter on stress levels.

According to the International Whaling Commission, whale watching has contributed a significant amount to the world economy and has employed thousands of people since 2009. In Iceland alone, more than 360,000 whale watchers were registered in 2019, three times the number a decade ago. ■ SOURCES: PHYS.ORG, THE JOURNAL OF WILDLIFE MANAGEMENT, TOURISM IN MARINE ENVIRONMENTS (JOURNAL), UNIVERSITY OF ICELAND



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Malaysia Scuba Diving Association (MSDA) has initiated a Food Drive Campaign to provide support to diver friends who have lost work, business or have no source of income. We are hoping to collect much-needed donations to help the struggling dive community.

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Edited by
Peter Symes

Emergency hyperbaric treatment availability affected by Covid-19 crisis

Medical facilities, which were usually available to treat injured divers in an emergency, may not be available until the current medical crisis passes. For the recreational diving community, this is a critical safety issue.

The standard of care for many diving illnesses is recompression. Treatment delay is one of the most significant risk factors for a negative outcome when treating divers with decompression sickness or arterial gas embolism. Hence, an injured diver must be brought to the most appropriate, available treatment facility with as little delay as possible.

Finding an available hyperbaric facility close by may, however, not be as straightforward in these times when many chambers are being used to treat Covid-19 cases. Many hyperbaric facilities are not open during the nights or weekends because they have regular daytime business hours and do not staff their units after hours. Also, some facilities do not wish to treat divers, as wound-healing therapy is much

more profitable than emergency hyperbaric treatment for pressure-related dive injuries.

It is therefore essential to know where suitable recompression facilities are located, but also that they are able to be used to treat injured divers. Hence, facilities that you may end up being referred to may not be local to your dive location.

For example, as previously reported, in the southeastern United States, hyperbaric chambers from

New Orleans to Tampa have been filled with Covid-19 patients, and facilities are unable to offer emergency hyperbaric services to other patients such as divers, who have had to be sent out of state, further delaying treatment.

So what a safety-minded dive traveller must do is to determine if treatment facilities at or near one's favourite dive location are, indeed, available on a 24/7 basis, and if not, take risk-aversion up a notch. ■



The decreasing availability of treatment facilities willing or able to provide emergency hyperbaric treatment when we need it most increases our risk as divers.



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ALFRED KOLL / PIXABAY

Mexico's Cozumel

— *Conservation & Stewardship of Coral Reefs*

Text and photos by Brandi Mueller





As our boat headed to the dive site, it was hard to imagine the previous year. With the island of Cozumel to my back, the 180-degree-view of water in front of me was filled with dive boats. While sometimes in the past I would be annoyed to see so many other divers, it was a relief to see all the boats, and it gave me a bit of hope for the future of the dive industry as the pandemic (hopefully) comes to an end. If it is open, they will come.

While tourism was way down throughout 2020 and the first half of 2021, from what I saw around me, it seemed to be making quite the comeback in Mexico. Dive boats were full, restaurants busy, taxis abundant. The first cruise ship returned during my week in Cozumel, and while there is a risk of too many divers and tourists causing harm or damage to the reefs and environment, Cozumel seems more than ready to get back at it, in the safest way possible.

In normal times, the popular dive location usually receives around 1.8 million tourists a year. While Cozumel is the largest Caribbean island in Mexico, it is only 48km (30mi) by 16km (10mi), and is located 81km (52mi) south of Cancun. In the past, the dive community and government have recognized that keeping the environ-



ment healthy is important not only to the planet, but to continued tourism, which brings in much of the island's economy.

Back-rolling into the warm water, it was immediately evident why Cozumel is such a popular place to dive. A gentle current made it effortless to swim past the colorful reef, which seemed



Lobsters on a ledge (above), coney grouper on reef (top right), French angelfish among sponges (top left), spotted drum (center) and gray angelfish (previous page) at Cozumel in Mexico



overgrown with huge sponges and sea fans, busy with fish. I saw yellow stingrays and flounders that were perfectly camouflaged in the sand.

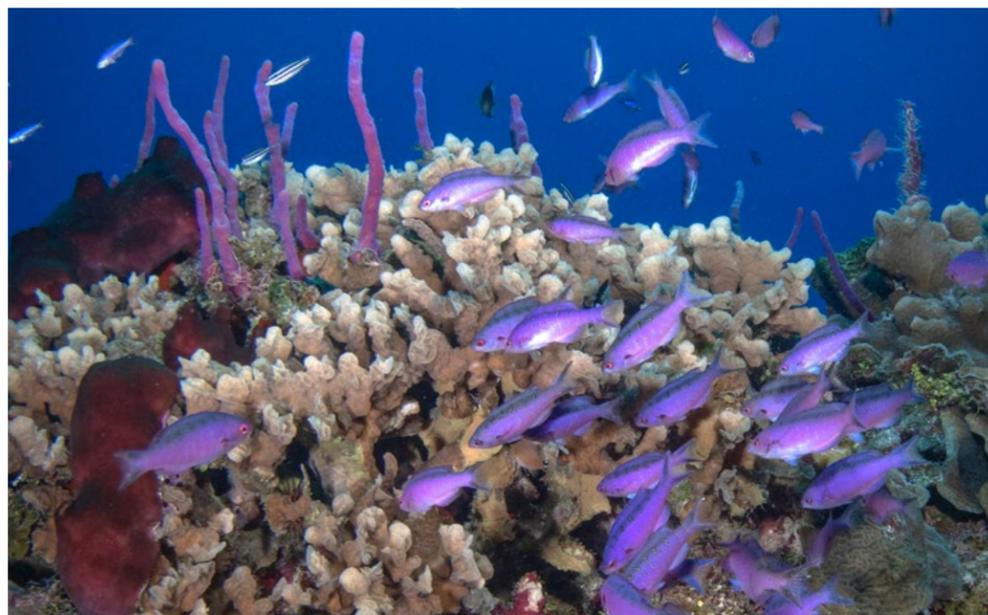
Cozumel takes the protection of its reefs and environment seriously, and for good reason. Diving, snorkeling and fishing provide vital income and jobs for much of the

island's population, and the locals seem to understand that no reefs mean no tourists, which means no money. Parque Nacional Arrecifes de Cozumel (Cozumel Reefs National Park), established in 2006, covers most of the southern part of the island, consisting of around 12,000 hectares (29,600 acres) of sea and coastline. It is estimated over 105 coral and over 260 fish species can be found here. There is a daily fee (currently US\$4.50) for those entering the park, which is used to support the national park system in Mexico.

The marine park's rules prohibit:

- Standing or touching coral reefs
- Fishing, collecting or disturbing any marine organism
- Use of sunblock that is not biodegradable
- Gloves or knives
- Feeding any fish or animals
- Disposing of any waste or dumping fuel, oil or any liquid substance ¹

¹ [HTTPS://THISISCOZUMEL.COM/THINGS-TO-DO/DIVE/368-MARINE-PARK-RULES](https://thisiscozumel.com/things-to-do/dive/368-marine-park-rules)



Proactive guides

Throughout my week, I was impressed multiple times at how the dive guides not only preached the marine park's rules and protection measures, but they also practiced them. I saw two separate incidences where divers were having some issues in the water, one falling into the bottom and the other kicking the reef. In other places, I have seen this happen, but the dive guide just goes

on with the dive—maybe saying something back on the boat after the dive. But in both times this occurred in Cozumel, the dive guides of Salty Endeavors politely showed the diver what was wrong (cloud of sand, sinking, etc) and fixed the problem as soon as they saw it.

In one case, weight was removed (and carried by the dive guide for the rest of the dive), so that the diver was no

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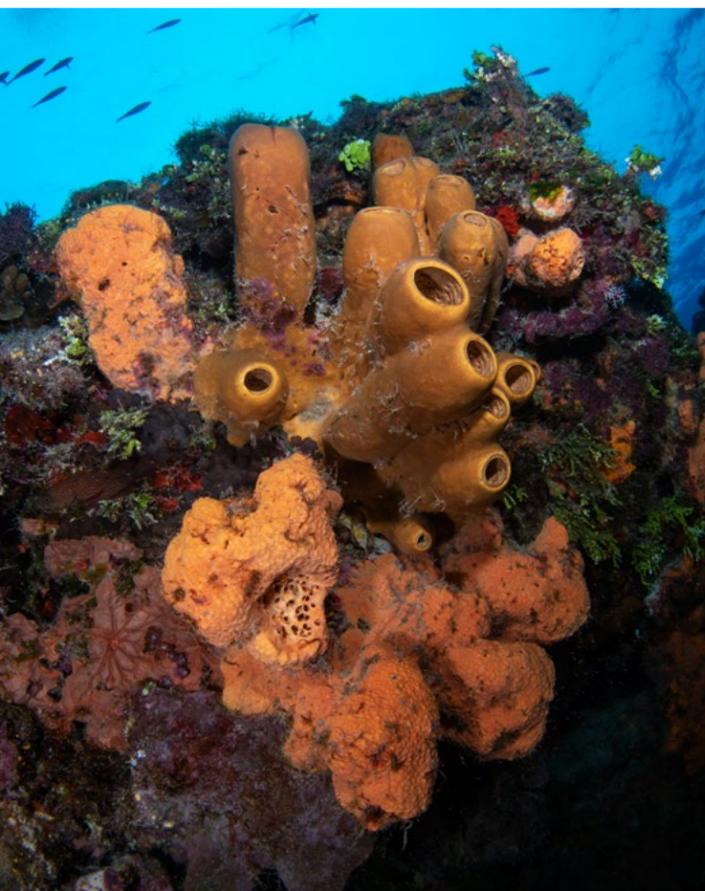
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Parrotfish (above); School of Creole wrasse on reef (left); View of Cozumel from Punta Sur (top left); Tube blenny (far left)





Bright orange sponges on reef (above); Hawksbill sea turtle resting under a ledge (top)

longer overweighted and bouncing off the bottom. In the other case, the dive guide just pointing out to the diver his fins and where they were made the diver aware of his surroundings and stopped the issue. Back on the boat, the dive guides also talked with these divers in a way that impressed me, because it was not pretentious or scolding, but respectful, talking through what was going on and how to solve the problem. (I can recall other situations in the past when dive guides yelled at divers. Making someone feel bad usually does not help the problem, but only makes them mad, and they do not learn how to fix the problem, preventing issues from occurring again the next time). I was impressed.

Palancar Caves

On my second day of diving, we visited the beautiful Palancar Caves, which have lots of large coral structures and swim-throughs with bright orange tube sponges and deep maroon sea fans. A school of snappers were in formation as we swam under a coral ledge, and they hardly moved as we passed them. At another point, a hawksbill sea turtle was resting on a ledge, also unconcerned by our presence.

Toadfish

Our next dive was a shallow reef with a little less current. I had the splendid toadfish on my bucket list of fish to see. Thought to be endemic to the island, they have since been documented off Cancun and as far south as Honduras, but in Cozumel they were more common.

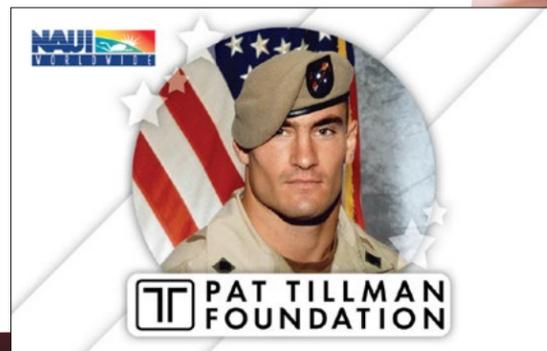
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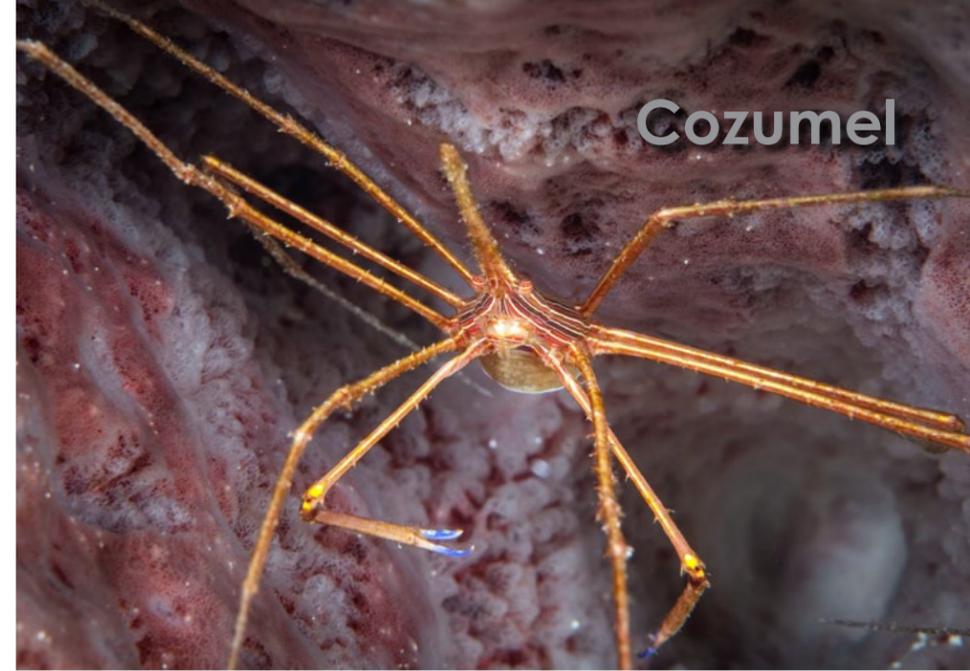
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Splendid toadfish with mouth open to be cleaned by shrimp (left); Splendid toadfish babysitting offspring nestled under its chin (above); Flamingo tongue (top center); Arrow crab (top right); Painted elysia nudibranch or *Thuridilla picta* (far right); Fairy basslet (bottom right); Slender filefish (right)

although I took a few photos just for the sake of proof (and in case we did not see any more toadfish later), I knew the photos would not be top quality, because the fish is quite small. But it seemed like every few feet,

our dive guide was pointing them out.

Photographic challenge

Planning to shoot macro the next day in hopes of seeing more toadfish, I did not even bother to look at my images until two days later. Back in my rental unit, I was zooming in and cropping quite a bit to bring the toadfish front and center, and saw something strange under the whiskery projections of the fish... they looked like baby toadfish! Knowing nothing about toadfish reproduction, I did a quick Google search and pulled up a few other

images and a video showing how adult toadfish babysit their offspring until they are large enough to crawl out of their parent's hole and go off on their own.

Super excited about this find, I sent Henry, Salty Endeavor's owner, the photo to ask if this was common. It apparently was not, and he asked if I knew where we saw it. I did not remember. We had seen so many on that dive that I did not know which hole this photo was from. We went back the next day to look but did not find any with babies. But now I will look closer every time I see a toadfish.

This lucky find made me think about how the more we know about the ocean and marine behaviors, the more we can find (and the better photographers we can become). I knew enough to have an eye out for these awesome critters

rarely seen anywhere but in Cozumel. However, I did not know enough to look for this special behavior, and it was only by accident that I got a very rough

image of it. Now, I have something to go back for!

With macro lens ready the next day, I may not have seen baby toadfish, but we found plenty of macro critters. Flamingo tongues and arrow crabs were common. There were fairy basslets, slender filefish and the dive guide even pointed out a tiny Painted Elysia nudibranch (*Thuridilla picta*). We also saw



As one of those "so-ugly-they-are-cute" animals; they have a wide, flat face with black and white zebra-like stripes. The fish peek out from burrows where the reef meets sand, and if you are lucky enough to see more of the toadfish's oddly shaped body, you can see its fins stand out because they are bright yellow.

I had seen photos and heard there was a good chance to see them, but there are no guarantees in the ocean. However, on this dive, we saw at least seven! The only problem was I was shooting wide-angle with a fisheye lens, and



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several other toadfish, which were cool, even without babies.

Easy diving & dining

Not only was I enjoying the beauty of diving Cozumel, I also was enjoying the ease of it. Current is very common at most dive sites. While it can vary from day to day and from dive site to dive site, it is expected, and all dives are done as drift dives. The boat drives up to a great area of the reef, the divers get in the water, and they drift until it is time to come up. The boats follow the divers' bubbles and the dive guide's signal buoy, which is deployed on the safety stop, and then the boat picks up the divers wherever they end up.

Getting on the dive boat, also named *Salty Endeavors*, was easy too. It picked up

passengers right on the resort docks of where they were staying or at the main town pier. I was staying in an apartment rental in town, so I met the boat at the town pier. Being close to the center of San Miguel de Cozumel, the main and largest town on the island was nice to visit for the variety of res-

taurants and the experience of walking around, checking things out.

I sampled a variety of the available dishes in town, including tacos, of course. But I also had some fantastic sushi, Italian and Indian cuisine, and I dined at several cute coffee-shop cafés with all-day breakfast options, healthy salads and sandwiches.

Glimpses of normalcy

At times, it felt surreal walking among other tourists, eating in restaurants and generally acting normal, as if the pandemic was a thing of the past. Masks were required unless eating or drinking, even outside while walking around, but that seemed a minor inconvenience to be able to travel again. We also wore them when boarding the dive boats, but soon after, they were removed because we were outside with lots of airflow on the boats.

Covid requirements

Covid requirements are changing constantly, but at the time of my trip in June 2021, no test or proof of vaccination was required to enter Mexico. Upon return to the United States, a negative Covid test was required within three days of flight departure, and it could be either an antigen or PCR test. I saw testing facilities

Diver in swim-through off Cozumel (above); Dive boat heading out to a dive site (top left); Dive boats at Puerto Abrigo, with the stone fortress in the background (top right); Delicious sushi and empanadas were available in town (center); Homemade kiwi Italian soda with glass straw (right)



Barred hamlet (above); Rock beauty in sponge (left); Channel clinging crab on reef (top center)



throughout town, many offering 30-minute antigen tests. Many of the larger resorts had the ability to do testing on-site. There was also a mobile testing unit at the airport where you could get an antigen test before flying, by arriving at least three hours before flight departure (for a PCR test, more time was required).

On my last dive of the trip to Cozumel, I found myself almost in a trance of peacefulness. A slight drift made it so that I did not have to kick, and the water just moved me past the lovely reefs. It felt like a real-life nature documentary. I was relaxed, admiring so much beauty, feeling grateful both for the preservation efforts Cozumel has undertaken and for being underwater again to experience and enjoy it. ■

Thanks go to the dive center Salty Endeavors in Cozumel for their support and hospitality. For more information, visit: cozumelscuba.com

American underwater photographer, dive writer and regular contributor Brandi Mueller is a PADI IDC Staff Instructor and boat captain living in Micronesia. When she is not teaching scuba or driving boats, she is most happy traveling and being underwater with a camera. Mueller's book, *Airplane Graveyard*, featuring her underwater photos of forgotten American WWII airplanes at the bottom of the Kwajalein Atoll lagoon, is available at Amazon.com. For more information, please visit: Brandiunderwater.com.

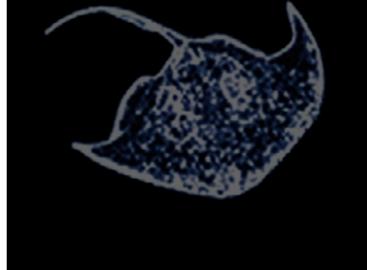


Barracuda (above); Honeycomb cowfish with diver (top right)

LEFT COLUMN TOP TO BOTTOM: Green sea turtle, scrawled filefish, squat anemone shrimp



fact file



Cozumel Island, Mexico



SOURCES: US CIA WORLD FACTBOOK, XE.COM, VISITMEXICO.COM, COZUMELSCUBA.COM

History Cozumel means “the island of swallows” in Mayan and the island is thought to have been first settled in 1000 A.D. Mayan ruins still exist, although many were destroyed. The island was sacred to Ix Chel, the Mayan Moon Goddess. The first Spanish came to Cozumel in 1518, and the Mayans were friendly with the expeditions, but the Spanish brought smallpox, and the island population of over 10,000 shrank to less than 400 by 1570. Cozumel became a popular island for pirates in the 1600s, and most of the remaining population moved to the Quintana Roo coast. In 1849, the town of San Miguel de Cozumel was recognized by the government of Mexico.

Geography The flat, limestone island is located 82km (51m) south of Cancun, in the Caribbean Sea, east of the Yucatan Peninsula. It is Mexico's largest Caribbean island, at 48km (30m) long and 16km (9.9m) wide. Much of the island is covered by mangrove forest, and most of the population lives in the town of San Miguel. The highest point is 15m (49ft) above sea level, and there are several cenotes or freshwater sinkholes. The Mesoamerican Barrier Reef System encompasses Cozumel's reefs, and a large portion of the southern area of the

island is part of the Arrecifes de Cozumel National Park.

Climate Diving occurs year-round, with only a short dry season from February to April and a wet season from May through January. Hurricanes are more likely to occur from July through November. Air temperatures range from 73-81°F (~23-27°C), with the cooler months being the dry winter months. Water temperatures range from 76-82°F (~24-28°C), being warmer in the summer and cooler in the winter months.

Environmental issues: Cozumel faces a number of environmental issues, including cruise ships' and hotels' mismanagement of waste and pollution. The reefs have shown noticeable decline, likely from many factors, including pollution; tourists harming the reefs by standing, touching or kicking them, and wearing non-biodegradable sunscreen; bleaching; stony coral tissue loss and other factors.

In recent years, stony coral tissue loss has shown up on Cozumel reefs, which is likely a spreadable bacterial infection and is not completely understood yet. First seen in Florida and the Caymans, there is speculation about whether cruise ships may have spread it to Cozumel, or that it may have



RIGHT: Global map with location of Cozumel Island
BELOW: Location of Cozumel on map of Mexico



Haggling with taxi drivers is expected.

Health & security Tap water is not drinkable, but bottled water is readily available. Unwashed and uncooked foods can also cause problems, so make sure fruits and vegetables are washed with potable water or cooked thoroughly and served hot. Malaria is not present in Cozumel but can occur in other parts of Mexico. The mosquitoes that carry dengue and Zika are present in Cozumel and throughout Mexico, and outbreaks occasionally occur. Protect yourself from mosquito bites. Routine vaccinations are suggested, including Covid-19, measles and typhoid.

Language Spanish is the official language, but you will find English commonly spoken and understood due to the large number of tourists in

even been spread though visitors' dive gear. It is recommended that divers wash their gear thoroughly, even during intervals between diving different dive sites, to help prevent spread. Sunscreen is also considered as a possible risk factor.

Cozumel was one of the first places to ban chemical sunscreen. Ingredients like oxybenzone and octinoxate have been shown to harm corals by basically blocking sunlight in the same way they block it on our skin. Corals need sunlight for their symbiotic algae to grow, and when the algae does not get the sunlight it needs, it dies or leaves the coral, leaving white, bleached coral behind.

Cozumel also made a decision in 2019 to start closing parts of the reef for certain amounts of time to help take off the pressure from human activities. This is currently ongoing, and in 2021, there have been rolling closures where a small part of the reef is closed

for a month, and the next month, another area is closed.

Economy Tourism constitutes the majority of the island's economy, including diving, fishing and snorkeling. There are many hotels and over 300 restaurants. Cruise ships frequent the island.

Currency Mexican Peso (MXN) and US dollars are commonly accepted. Euro and British Pounds less so but are sometimes accepted at tourist establishments. ATMs are common but be aware of transaction and exchange fees. Many ATMs will also dispense US dollars. Credit cards are accepted at most tourist businesses; some charge a fee. Exchange rates: 1USD=19.98MXN; 1EUR=23.65MXN; 1GBP=27.77MXN; 1AUD=14.75MXN; 1SGD=14.79MXN

Population 100,000 on Cozumel; 127.6 million in Mexico.

Cozumel.

Phone/Internet Mexico's SIM cards with inexpensive data and cell phone plans are easy to obtain; reception is good throughout the island with 4G. Many international cell phone providers have international plans that work in Mexico. Most resorts and many restaurants offer free Wi-Fi.

Voltage 127 volts, AC 60 Hz. Type A and B plugs with two flat parallel pins and/or grounding pin.

Transportation There is an international airport in Cozumel (COZ) which receives flights from the United States, Canada and other Mexican cities. Another option is to fly into Cancun (CUN) and take a shuttle and ferry or an air shuttle to Cozumel. Rental cars are readily available, and taxis are common in tourist areas (but can be harder to find in town).

Crime is not usually an issue on the island, but like anywhere else, take sensible precautions, including securing valuables in safes; do not flaunt expensive jewelry or electronics; do not leave valuables in open view in cars or at beaches; and be aware of your surroundings. Petty theft can occur, but violent crimes are rare.

Covid precautions Hotels, restaurants and other businesses have implemented Covid protocols, including capacity limits, temperature checks, hand sanitation and mask requirements. Most eating and activities are done outdoors, making Cozumel quite safe.

Recompression chamber The Cozumel International Hospital has a chamber.

Travel/Visa Most countries do not require a visa and Mexico allows tourists to stay up to 180 days.



Indonesia's

Raja Ampat

— A Papuan Odyssey

Text and photos by
Pierre Constant



The Raja Ampat Islands, located in Indonesia's West Papua province, nestled between the Pacific Ocean, the Halmahera Sea and Seram Island, are at the crossroads of tremendous biodiversity and coral diversity—home to 75 percent of the world's reef species. Pierre Constant returned to the region and shares his tales of diving and cultural experiences there.

The night was very dark, as I disembarked with fellow travellers, from the tender boat onto the silent shores of Waigeo Island. Hot and humid was the air, and I had hardly slept due to jet lag. It was five o'clock in the morning in the

village of Saporkren. Local guide Benny took us straight onto a jungle trail for a 45-minute climb to the top of a forested ridge. As I looked around, my headlamp shone on some millipedes, a hermit crab and a dwarf frog hopping around on the forest floor. Soon, we were invited to sit on a bench of branches at the top of the hill and wait.

Daybreak came slowly, as we tuned in to the sounds of the jungle. A big, tall tree appeared in a clearing in front of us, with a crown of hairy branches. Bird songs filled the air. Suddenly, a dark shadow materialised high above, flying frantically back and forth across the sky. Eventually, it landed on a branch and resumed an amazing display of reddish-brown feathers. Two long, white, helically twisted tail feathers shook in the air erratically. "The red bird-of-paradise," whispered Benny behind me.

Although it resembles the greater bird-of-paradise of Papua New Guinea, this magnificent bird (*Paradisaea rubra*) is endemic to Waigeo and can be found only on this island. The male performs a ritualistic courtship display every morning before sunrise, in

order to attract a female. She was obviously not in the mood that day, as we sat bewildered with our faces towards the sky.



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Gorgonian coral on the wall at Neptune's Fan Sea, Raja Ampat, West Papua, Indonesia (above); Historical illustration of red bird-of-paradise, *Paradisaea rubra* (center inset); Feeding whale shark, with remoras attached to its belly, at Namatote (top left). PREVIOUS PAGE: Cluster of orange cup corals found on an early morning dive at Saruenus Island in the Iris Strait of Raja Ampat





Isolated beach in Namatote Bay (above); The Mommon waterfall splashes straight out of the jungle into the Arafura Sea (left).



View over Raja Ampat from Piaynemo viewpoint (above); Wilson's bird-of-paradise in a courtship display at Waigeo Island (left)

Back on the road, a pickup truck took us farther

uphill, to the middle of nowhere. A trail led to a hideaway in the jungle. Hidden from view, we witnessed the show in a clearing of another breathtaking creature: the Wilson's bird-of-paradise (*Cicinnurus respublica*). Displaying a terrestrial court, moving from a chosen branch to the ground, it was just fascinating. With a shiny, turquoise-blue head and nape, flashy crimson back feathers glowing like embers, and an emerald-green chest with a yellow collar, the bird was enchanting to watch. Suddenly aware of our presence, it took refuge in the shade of a higher branch, until

we vanished out of sight. Wilson's bird-of-paradise is endemic to the Waigeo and Batanta islands.

There are 42 species and 15 genera of birds-of-paradise. Confined to dense forest habitat, at various elevations between sea level and the highlands, the majority of the species are sexually dimorphic, with a diet dominated by fruits and arthropods. Voyagers in Ferdinand de Magellan's circumnavigation of the world in 1519 to 1522 first encountered their skins. Local people claimed they originated in paradise, naming them "*Bolon diuta*" or "Birds of God." Early naturalists named them "*apoda*"



(i.e. without feet), therefore, "birds of paradise." Alfred Russel Wallace, British naturalist and explorer, spent six years in what was once called the "Malay Archipelago" shooting, collecting and describing specimens of birds-of-paradise of various species. Today, the birds enjoy legal protection. Hunting is only allowed for the ceremonial needs of the

tribes of New Guinea.

At the northwestern end of the Bird Head's Peninsula (also known as, Vogelkop) of New Guinea—the second largest island in the world—the Raja Ampat Islands (or Four Kings) are nothing new on the diving scene. My first trip there was 17 years ago in 2004, when only two dive boats were operating in these waters. Now, there are a hundred dive boats and a number of land-based resorts, which have sprouted like mushrooms.

The archipelago is widespread enough so you do not feel the pressure of tourism, such as it is in Komodo National Park, for example. Besides the four main islands of Waigeo, Batanta, Salawati and Misool, the Raja Ampat Islands are composed of 1,500 islands over a surface of 46,300 sq km, with the highest summit, Gunung Batanta, rising to 1,184m.

Raja Ampat Marine Park

Located between the Pacific Ocean, the Halmahera Sea and the Seram Sea (0°13'59"S and 130°31'01"E), the Raja Ampat Islands are at the crossroads of tremendous biodiversity and coral diversity, with 75 percent of the world's species, according to The Nature Conservancy. Since 2003, it is an administrative division or "*kabupaten*" of West Papua, with Sorong as its capital and main gateway for air travel. As of December 2019, the Raja Ampat Marine Park permit fee for international visitors is IDR 700,000 (~US\$49), on top of which the Raja Ampat visitor entry ticket comes as an additional charge. Expect to pay a total of IDR 1,000,000 (~US\$70).

Within this huge marine expanse, three main areas are distinguished: northern Raja Ampat around Waigeo Island, where most of the resorts are located; central Raja Ampat around Batanta Island; and southern Raja Ampat, around Misool Island. Close to the Equator and protected by mountainous island masses,





Sergeant majors under Airborek jetty (above); The *Damai I* anchored at Yenbuba village (top left); Diagonal sweetlips and ribbon sweetlips at Cape Kri (left); Orange tube sponge at Airborek Island (far left)



the archipelago has a humid tropical climate, where rain showers are common. The tourist season for divers is mostly from October to April with good visibility and sea temperatures around 29°C to 30°C on average. July to September is the monsoon season when winds affect the seas.

This was my fourth time to Raja Ampat. I chose to take the tour aboard the 40m-long, 8m-wide wooden Bugis Phinisi called the *MY Damai I*, for its legendary comfort and service—which was even more exceptional now, because it offered an appealing combina-

tion of diving experiences from northern Raja Ampat to southern Raja Ampat, all the way to Triton Bay on the southern coast of Papua. Furthermore, it included land excursions such as a birds-of-paradise tour on Waigeo and an exciting remote excursion to Asmat (which was, once upon a time, an infamous land of cannibals, who were nevertheless extraordinary

woodcarvers)—a conspicuous plus that was not on offer elsewhere.

Diving

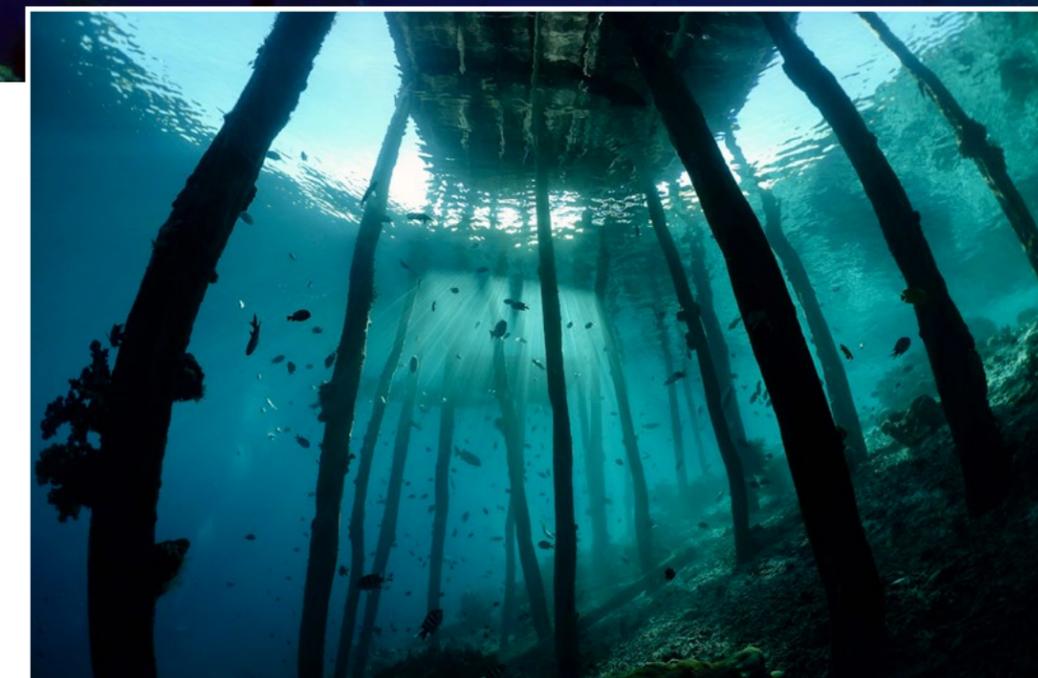
Blue Magic. The morning dive at Blue Magic, a seamount in the middle of Dampier Strait—between Waigeo and Batanta Island—was an opportunity to meet Napoleon wrasse, a school of sleek unicornfish, a grey reef shark followed by tunas

and jacks, and the usual farandole of bigeye jacks. Adri, the dive guide pointed to a fair-sized wobbegong shark, camouflaged on the top of a mound, dozing off.

Cape Kri. Cape Kri, off an elongated island farther west, was dark and misty underwater. There were lots of gorgonians and sea fans. A surprise lurked at a depth of 36m, where a large ball of ribbon sweetlips, diagonal sweetlips and paddletail snappers, was swirling around, as if in a meditative state. At the safety stop, a blacktip reef shark cruised by, and orbicular batfish hovered in the water column.



Zi and the giant clam at Airborek



Diver with school of jacks and barracudas (above) and diver with school of pinjalo snappers (top right) at Mayhem, Yangefo Island; Yellow scroll coral on top of reef at Melissa's Garden (right); Lightshow under Airborek jetty (left)

bommies spread out here and there, full of glassfish and green *Tubastraea* coral.

A school of bumphead parrotfish drifted like Zepellins over the sandy bottom, shy as ever; I would not stand a chance, trying to photograph them. The jetty was great for wide-angle shots, with a cloud of sergeant majors underneath the structure, accompanied by the odd red snapper with a stern look. Towards the end of the dive, the cruise director, Zi, with a hammerhead shark gadget trailing from the valve of her tank, led me to a marvellous collection of five or six giant clams, over a metre long, in the shallows. "Just don't put your hand in there!" she joked beforehand.

Mayhem. Mayhem, near Yangefo Island, is another seamount. Schools of yellowfin surgeonfish (*Acanthurus xanthopterus*) whitetongue jacks (*Uraspis helvola*), bigeye jacks and Java rabbitfish (*Siganus java*) dotted the sides of the seamount. Large pickhandle barracudas (*Sphyraena jello*) with yellow tails were an unusual sight. Down the slope, a big mass of red and mouse-grey Pinjalo snappers (*Pinjalo pinjalo*), moving in a lively dance, made my day. Mindlessly, an oceanic manta passed by like a ghost, whispering: "No, you

don't see me." Batavia batfish (*Platax batavianus*) and teira batfish entertained in the shallows.

Melissa's Garden. Following a dive at Melissa's Garden, around three limestone rock islets off Penemu Island, which was mostly a hard-

coral garden with table coral, staghorn and leaf corals, the tender boat took us on an excursion to the "geosite" of Piaynemo. A wooden stairway in the limestone jungle climbed to a viewpoint overlooking a splendid bay of rock islands in a conical shape.

A late afternoon stroll at the village of Yenbuba was enjoyable. Kids frolicked on the jetty, playing games with their teachers. Just too tired at the end of the day, I skipped the night dive, with a smile and a "no thanks," and slipped into the double bed in my large cabin, with a sigh of contentment.

Airborek Island jetties. As the sun rose on the placid waters of the Halmahera Sea, I was up on deck at 5 a.m., to take in deep breaths of the clean air. The *Damai I* was anchored in front of Airborek Island. The double jetty in the distance would be our dive site. The visibility underwater was fine on the healthy coral garden, with





School of longfin batfish (above), *Nembrotha cristata* nudibranch (left), yellow-lined flatworm (far left), Anna's chromodoris nudibranch (top center), and banded sea krait (right) at Two Tree (top right); Dive boat off to Puri Pinnacle (far right); Sea cucumber on Yilliet night dive (bottom right)



Being first to the top, I breathed in the natural beauty and pristine silence of the fabulous scenery, before a noisy cocktail of nationalities showed up. What a tourist spot the Raja Ampat Islands have become over the years! At the bottom of a flight of steps on the other side, a green warning sign read: "For the infirm: Please do not climb to the top." Too bad I went the wrong way!

Southern Raja Ampat

The next day, before sunrise, I stood on the forward bow to embrace the 360-degree panorama. A chain of rock islands, lost in time, slowly emerged on the horizon. Backed by a thin layer

of cottony clouds, southern Raja Ampat's subtle splendour blossomed in the undisturbed peace of dawn. In this ancient barrier reef of coral limestone—now broken, uplifted and covered by tufts of jungle—the air is soft, like the caress of a feather. I recalled my first time in Misool, a long time ago. Nothing had changed; it was still a blessing of nature, far away from civilisation. The *Damai I* would remain in the south for three full days.

Two Tree Island. Two Tree Island, off Sagof Island, resembles a nudibranch with two trees on it. A fishing eagle arose above its nest to have a peek at the boat. The dive site was a wall covered in sea fans and gorgonians. "Prepare for macro," advised dive guide Adri. My nudibranch encounters included Anna's chromodoris (*Chromodoris annae*); the nudibranch *Nembrotha cristata*, which is black with green dots; and a lovely flatworm, *Pseudoceros sp.3*,

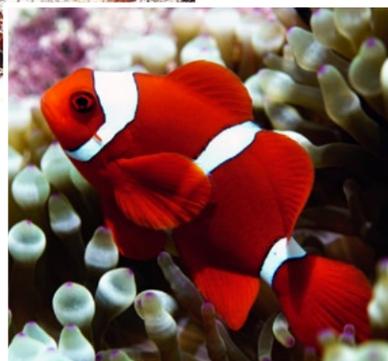
fringed in apple green and blue. Indifferent to my presence, a banded sea snake lurked in every hole along my way.

No Contest. No Contest, off Balbulol Island, was a dive around three pinnacles, with sea fans, gorgonians, overhangs, whip coral, striking red whip coral and *Dendronephthya sp.* soft corals galore. Map pufferfish and elusive scrawled filefish were present too, with a school of Pinjalo snappers.

Puri Pinnacle. Puri Pinnacle sea-mount, located northwest of Yilliet



Island, which mimics the spine of a sleeping dinosaur in shape, had three pinnacles on the protected side. In this quiet spot where big-eye jacks, pickhandle barracudas



ing over the island. Rain came down on us, as we got ready on the foredeck. It even got cold, but the thought of entering water of 29.7°C was comforting. Neptune's Sea Fan, Boo's

Windows and Nudi Rock dive sites, near Fiabacet Island were on the plan for the day. The last dive site was recommended for macro photography. Dive guides Adri and Daniel took pride in showing us a rare

pygmy seahorse (*Hippocampus pontohi*), which was white with a red mane, exciting divers searching for the microscopic.

Magic Mountain. However, some prefer the bigger picture (or wide-angle) and the thrill of giants at Magic Mountain, a famous seamount, which was still unknown in 2004, except to a young British skipper who had



christened it. This dive site is no less than a cleaning station for mantas. Back then, we had skin-dived over the top of the seamount, where seven oceanic manta rays were cir-

and Napoleon wrasse hovered timelessly between the pinnacles, gold-spotted trevally (*Carangoides bajad*) in their yellow phase hunted in small packs. A garden of *Sarcophyton* soft corals covered the reef flat.

The night dive was an occasion to meet the Raja Ampat bamboo shark (also known as "walking shark"). Do not look for it on the slope. This nocturnal species is only found in the shallows, at a maximum depth of 5m. A cute species, it is extremely shy though and afraid of lights!

Wahil Island

As we sailed towards Wahil Island, the weather turned ugly, with dark clouds loom-

CLOCKWISE FROM TOP LEFT: Black manta at Magic Mountain; Batavia batfish and clown triggerfish at Neptune's Fan Sea; Octopus in disguise at Andiamo; Manta ray (above) and red whip coral and bigeye snappers (left) at Magic Mountain; Spinecheek anemonefish at Nudi Rock; Triton Bay walking shark



CLOCKWISE FROM ABOVE: Location of Puri Pinnacle dive site; *Goniobranchus coi* sea slug feeding on ascidians at Teluk Wap; Gorgonian sea fan and manta ray at Magic Mountain; Soft coral and featherstars at Lighthouse, Pisang Island; Barramundi at Candy Store; Zebra shark at Lighthouse



cling. But everything seemed quiet today. However, as I slid down the ridge towards the other

seamount at 19m, I came across four mantas, including a black one. Giant jacks frequented the site, as well as pretty schools of yellow bigeye snappers (*Lutjanus lutjanus*) on the saddle between the seamounts.

Daram

The *Damai I* departed Warakaraket Island for the easternmost islands of the Misool group: Daram. These islands became a new Marine Protected Area in 2010, after the efforts of the Misool Eco Resort paid off, in which they came to an agreement with the traditional owners of the villages of Fafanlap and Usaha Jaya. The idea was to turn these

islands into a “no-take zone.” The latter was added to the already existing Batbitim Marine Conservation Area (425 sq km) created with the approval of the village of Yelliu in 2005. The dive sites of Andiarno and Candy Store are an enchantment of sea fans, gorgonians, soft corals and barrel sponges, with the added bonus of a swim-through arch.

Off Fakfak Peninsula, halfway between Misool and the Papuan mainland, lay the Pisang Islands, which were uplifted limestone isles covered in jungle. At the Lighthouse dive site, I explored the reef, a sandy flat bedecked with whip coral with the odd red one in the mix. To my astonishment, an unusual silhouette lay in the sand in the distance. Holding my breath for a smooth approach, it was none other than a zebra shark (*Stegostoma fasciatum*) in its reverie—cream in colour, with black dots. The peaceful creature allowed me to zoom in, from a distance of 1.5m

away; it got alarmed by the first flash of my strobes but settled down again. On the second flash of the lights, it fled peevishly to the top of the reef, with vigorous movements of its caudal tail.

The dive site T-Bone, a hammerhead-shaped reef nearby, offered a bonanza of elephant ear sponges in yellow and purple colours, at a depth of 20m plus. Some reckoned it was a good site for macro. Close to the mainland, Mommon seamount was a hangout for mantas. The reef was sadly criss-crossed by a spiderweb of old longlines, evidence of the massive destruction of its original fish life.

The dive sites Batu Cantik and Teluk Wap were sought-after sites for macro subjects. There, I marvelled at the nudibranch *Nembrotha sp. 1*, which was black with red dots and silver-grey gills, as well as *Goniobranchus coi*, a ravishing nudibranch, which was yellow with a black girdle, edged with light brown.





Whale sharks gather to feed under a "bagan" fishing platform at Teluk Namatote

Whale sharks

Teluk Namatote is the chosen spot for many "bagans," or fishing platforms. Small fry is caught at night with big lights and nets hanging under the *bagan*. If it attracts the tiny, it also attracts the giants, such as whale sharks. It is a lucrative business for fishermen, who complement their earnings with the visits of foreigners. Divers move about the *bagan* underwater, while locals feed the whale sharks with the "fish soup." With gaping mouths, the whale sharks come eagerly to the surface to gulp this free meal, repeatedly coming back for more. I counted around four whale sharks, the biggest one literally wrapped in a cocoon of remoras, glued to the top of its head, belly and sides.



Whale shark covered in remoras, attaching themselves to catch a ride

NEW NAUI PROGRAM!

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CLOCKWISE FROM FAR LEFT: Triton Bay walking shark; Orange cup coral at Little Komodo; School of yellow and blueback fusiliers at Saruenus Island; Hawksbill sea turtle at Little Komodo; Rosy spindle cowrie, crinoid cuttlefish, and eight-banded butterflyfish at Triton Bay Divers house reef

Triton Bay

A couple of hours away was Triton Bay, our playground for the next three days. On the edge of the Arafura Sea, this marine wonderland was surveyed in 2006 by a joint team of researchers from Conservation International and the State University of Papua. Renowned Australian ichthyologist Dr Gerry Allen recorded 300 species of fish in a single dive and 20 species of

marine life that were new to science. Among them were the Nursalim flasherwrasse (*Paracheilinus nursalim*) and the Triton epaulette shark (*Hemiscyllium henryi*), which is even more elusive than the Raja Ampat walking shark. At the southeastern end of Triton Bay, Iris Strait—located between the mainland, Aiduma Island and Dramai Island—was where the action was. There was a collection of limestone rock islets crested with vegetation here, with sandy channels running alongside them. It was a favourite ground for spa-

ghetti garden eels. Conspicuous forests of black coral with white polyps graced the base of the slopes, somewhat like Little Komodo. These colonies acted as cleaning stations for various species of sweetlips, including ribboned, silver and goldspotted sweetlips; as well as six banded and bluring angelfish (*Pomacanthus annularis*); and groupers and barramundi. At depth, schools of bigeye snappers, bluestriped snappers (*Lutjanus kasmira*) and paddletail snappers add to the fairyland. The magic of colour was also expressed in the numerous patches



Location of West Papua in Indonesia on regional map



West Papua map (above) and Raja Ampat map (below)



US CIA WORLD FACTBOOK

GOOGLE MAPS

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Sea star on night dive (above) and sleeping doublebar goatfish (top right) at White Rock; Marbled ray at Lighthouse (right); Anemone (bottom right)

Bluespotted grouper (above); Banded Tozeuma shrimp in black coral at Christmas Rock (right); Seafan at Neptune's Fan Sea (top left)

of orange cup coral on the walls of small drop-offs, bathed in the ever-present current of the Iris Strait. An early morning dive at Saruenus Island saw the full spectrum of colours displayed, from pink to orange and yellow, when the polyps were fully

opened. Schools of yellow-back and moon fusiliers added to the excitement; it was a veritable fountain of youth. To say that there was prolific soft coral growth everywhere would be an understatement. Large boulders offered good hiding spots for the tasselled wobbegong,

(*Eucrossorhinus dasypogon*). In addition, Bo's Rainbow and White Rocks were stimulating macro sites.

Asmat

It was a very long crossing from Triton Bay to Asmat, on the southern coast of New Guinea. "Forty hours, depending on the sea conditions," reckoned Mus, our Indonesian cap-





Raja Ampat

Smiling Asmat man with cassowary headdress (left); Asmat woman meeting the war canoes at the village of Omanasep (below); Asmat boy wearing war paint and cassowary headdress at the village



Asmat warriors in a dugout canoe (above); Paulus, the Asmat "big man," in traditional attire with pig teeth, at the village of Omanasep (left)

tain. After a bit of rough seas, which lasted into the night, swinging furniture around the cabin floor, the *Damai I* dropped anchor at the mouth of the Omi River. It was 2:30 a.m. Cappuccino-coloured water in the head, gathering black clouds, and light rain welcomed our arrival. There was low-lying jungle and muddy swamps as far as the eye could see. "No contact made with the guide yet," lamented Zi.

Incidentally, Asmat was the launching point for a French-Dutch expedition (1958-1959) from the southern coast to the northern coast of New Guinea, resulting in

a book and a documentary, *The Sky Above—The Mud Below*, which won an Academy Award in 1961.

Finally, after a little-over-three-hour desperate wait on board, we were given the signal to disembark. The sun came out shyly. We made our way up the Oman River with the tender boats, twisting between nipa palms and muddy banks under the cover of the swampy jungle. Forty-five minutes later, a motorised canoe with two serious-looking Asmat men, wearing cassowary feather headdresses, came to meet us. "You wait here," said one, with the palm of his hand extended forward.

Once the signal was given, we proceeded cautiously. A flotilla of dugout canoes suddenly emerged from hiding places in the green jungle on both sides of the river, carrying painted warriors in red and white colours, wearing cassowary black feathers or cuscus (possum) fur on their heads. Paddling upright, fast and furious, around our boat, making loud grunts and hitting canoes with the flat of their paddles, they performed an intimidating dance. Children, as well as defiant-looking teenagers, also

took part. "This is the traditional welcoming ceremony," whispered Nicky, our guide from Jayapura.

Standing tall on the bank of the river, wearing a crown of white cockatoo feathers on his head and a collar of wild pig teeth around his neck, Paulus the Bigman stared at us in a dignified manner. We were brought to the longhouse of Omanasep Village for another ceremony with the men of the tribe. An offer-





Asmat wooden hand drum (above); Cassowary bone knife (left); Asmat wooden shields (far left)

TOP LEFT TO RIGHT: Ceremony in the Asmat longhouse in Omanasep; Asmat with his artefacts for sale; Longhouse in Youw; Woodcarver at work in Youw (above left); Asmat carving (above right)

ing of tobacco and Gudang Garam cigarettes accompanied a “thank you” speech by one of our members. “This whole show has a cost,” confessed Nicky. “How much, may I ask?” I queried. “IDR45,000,000!” said Nicky (which is about US\$3,200). “You see, there are

over 800 people in the village. Everyone wants to make some money. Men request IDR100,000; women IDR50,000; and children IDR10,000.” With the required preliminaries over, the longhouse turned into a souvenir market. Sitting on the bark flooring, villagers unwrapped their wooden carvings, spears, poles, grass skirts, headdresses and even cassowary bone knives. Baffled, I gazed at some polished stone adzes (axes) from the deep mountainous interior. “Bargain with the highlanders,” I was told. The beautiful original pieces

would normally sell for IDR1,000,000 a piece (~US\$70). “You might be able to get it for US\$35—it’s alright!”

As the rain fell, we took refuge in the school. Lunch boxes from the *Damai I* were distributed to us. The longhouse of another village was full of Asmat shields. The art sale resumed, for the enjoyment of the foreign visitors.

Historical background

After the arrival of the Dutch in 1623, missionaries made serious efforts at conversion. James Cook landed in September 1770. His party was repelled by a threatening group of Asmat warriors. The first colonial post of the Dutch was established in Agats in 1938. Since then,

Roman Catholicism has replaced many of the indigenous ways. Deep down, however, you can still see the pride of fearsome warriors in the eyes of many of the youths.

The rock-bottom reality struck me hard. We are tolerated, even accepted, for the sake of business and the support of the community. “What did you expect?” I thought to myself. Nonetheless, the whole show had an expression of genuine authenticity. This, after all, was an uncompromising message. ■

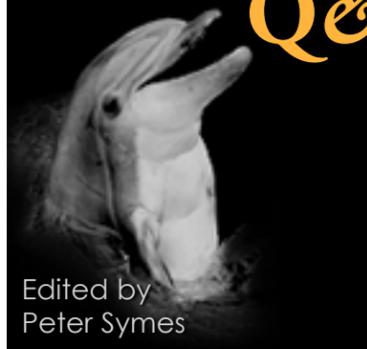
With a background in biology and geology, French author, cave diver, naturalist guide and tour operator Pierre Constant is a widely published

photojournalist and underwater photographer. For more information, please visit: calaolifestyle.com.

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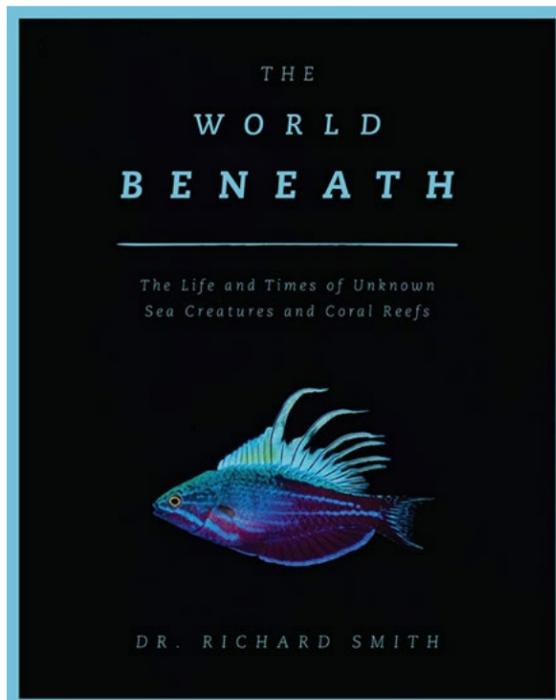
Feeding reef manta ray in the Maldives

Edited by Peter Symes

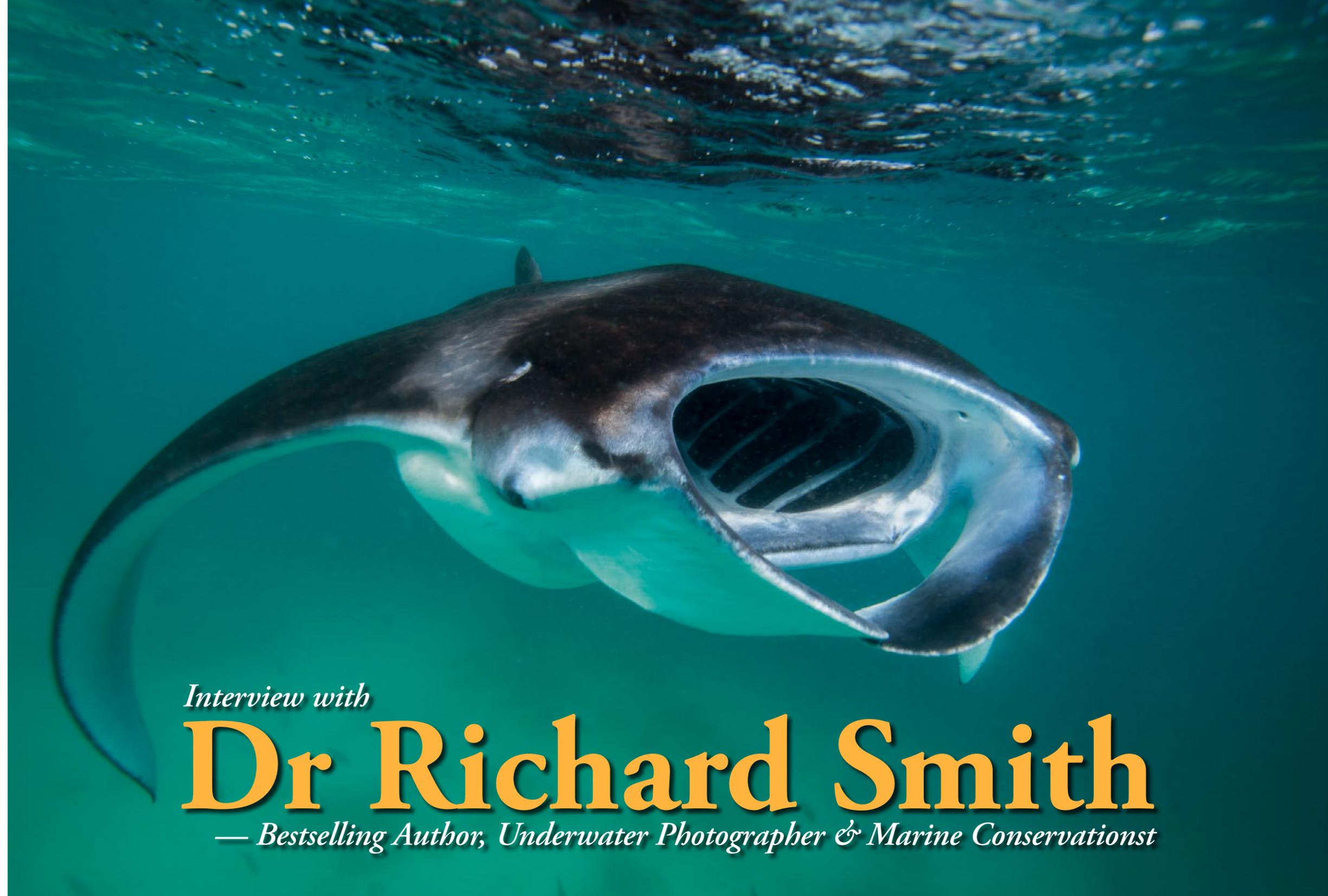
Interview by Peter Symes
Photos by Dr Richard Smith

— In this series of intriguing interviews, DecoStop Q&A seeks to learn more about the people making waves in the dive world.

In the first of the series, we meet British award-winning underwater photographer, author and marine conservationist Dr Richard Smith, who is the author and photographer of the bestselling new book, *The World Beneath: The Life and Times of Unknown Sea Creatures and Coral Reefs*.



Smith's bestselling book from Apollo Publishers



Interview with

Dr Richard Smith

— Bestselling Author, Underwater Photographer & Marine Conservationist

What is your first memory of becoming aware that there was such a thing as diving?

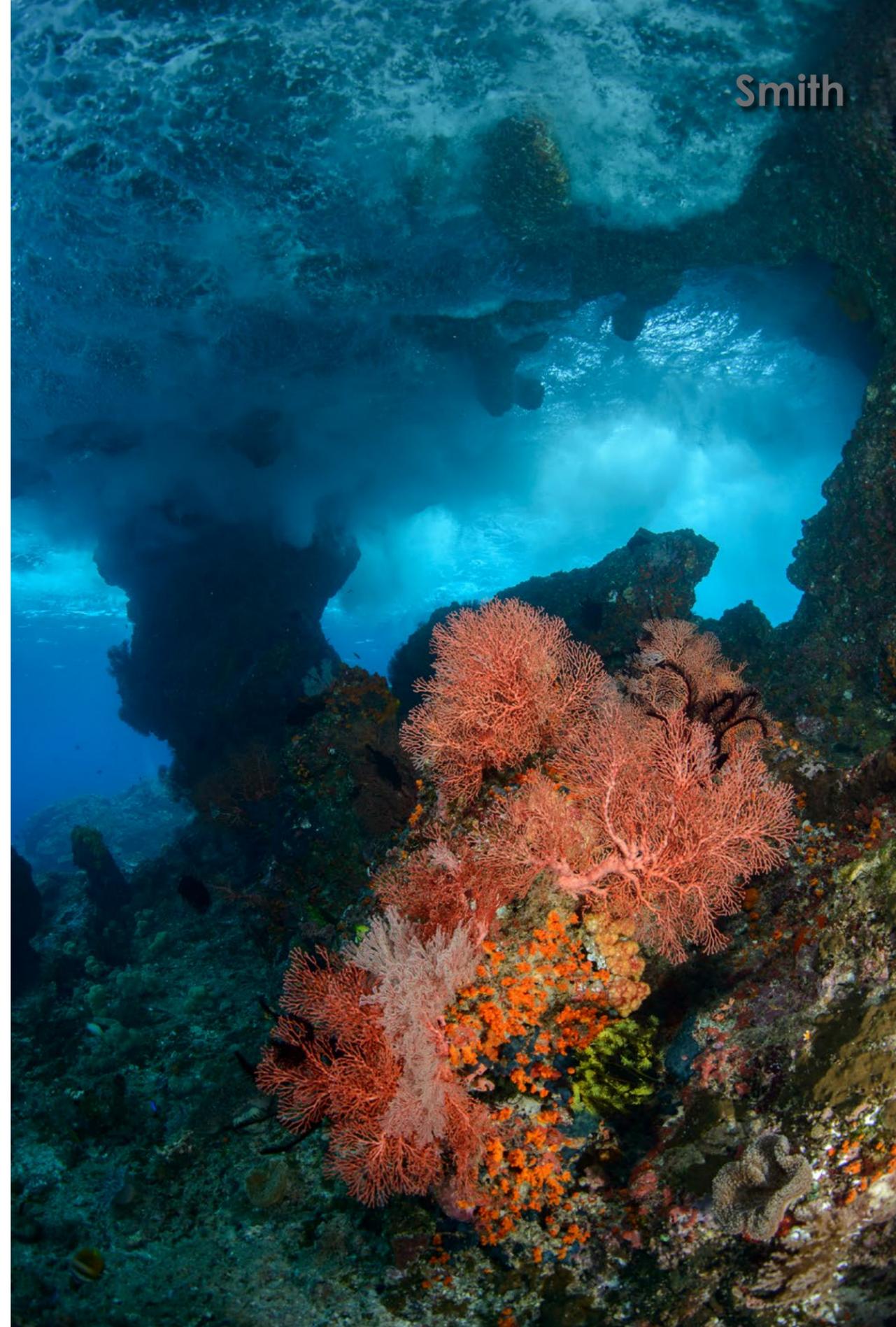
A friend of mine learnt to dive with his father when I was about 15. Until you know someone that has dived, I think it

can seem like quite a scary prospect. I have always been obsessed with nature and the opportunity to reach a whole new world of animals piqued my interest.

When did you decide that it was something you would like to try?

A year after hearing about diving, my dad and I decided we would give it a go too! We were planning to visit some friends in Australia, so we thought it would be a good opportunity to dive on the Great Barrier Reef. We decided to do the training in the United Kingdom before

we went, to maximise our time enjoying the reef. Both my father and I had been severely injured after being hit by a car whilst walking on the pavement outside our house a few years prior. I had been very sporty, but the accident meant that most types of physical activity were



Huge swells crashing through an overhang in West Papua, Indonesia

Walea soft coral pygmy seahorse found only in a small Indonesian bay, Togian Islands, Indonesia

no longer possible for me. It turns out that diving was perfect in allowing me to stay active, whilst indulging my love of animals.

When and where did you first become certified?

I grew up in a land-locked part of the United Kingdom, quite far from the coast, so we were fairly limited in options. We ended up doing the open water part of the training in a freshwater quarry. I was sixteen and had no idea how much learning to dive would change my life.

What was your first dive experience like? How did you feel afterwards?

Let's just say, it was lucky we had already planned the Australia trip! We did four dives in the quarry in November. There was frost

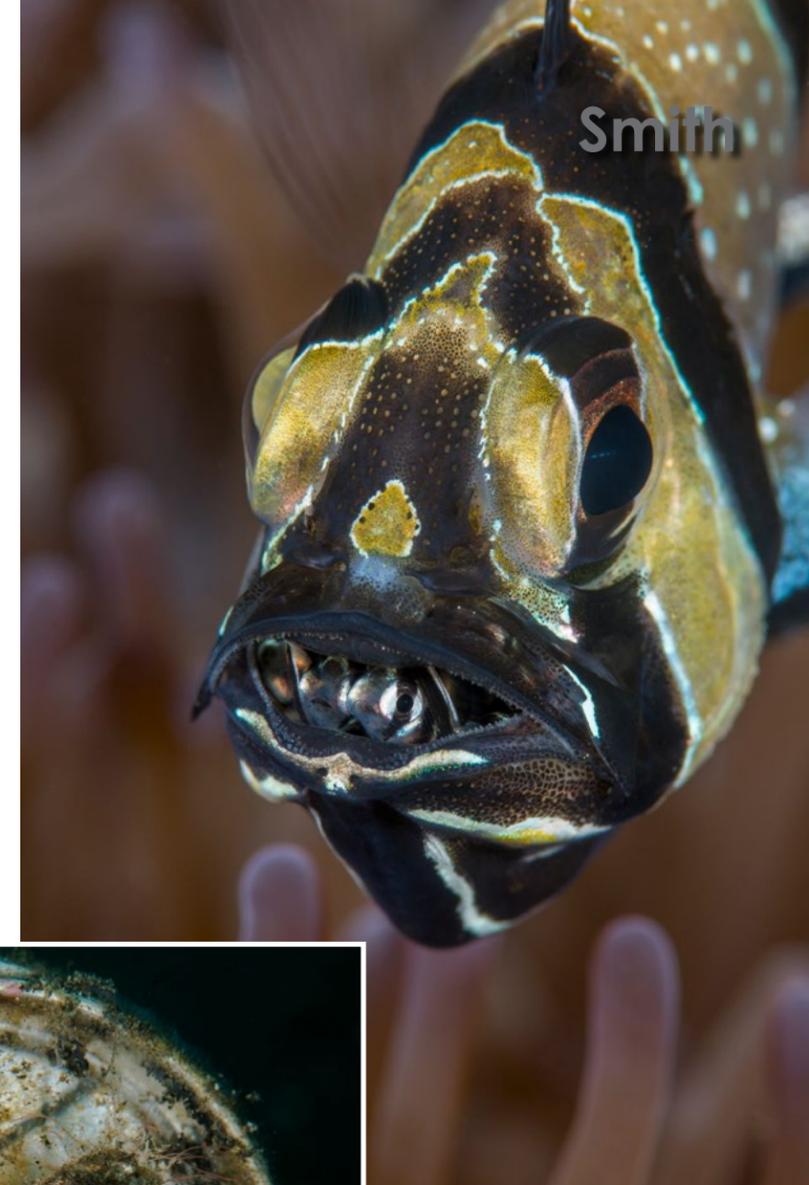
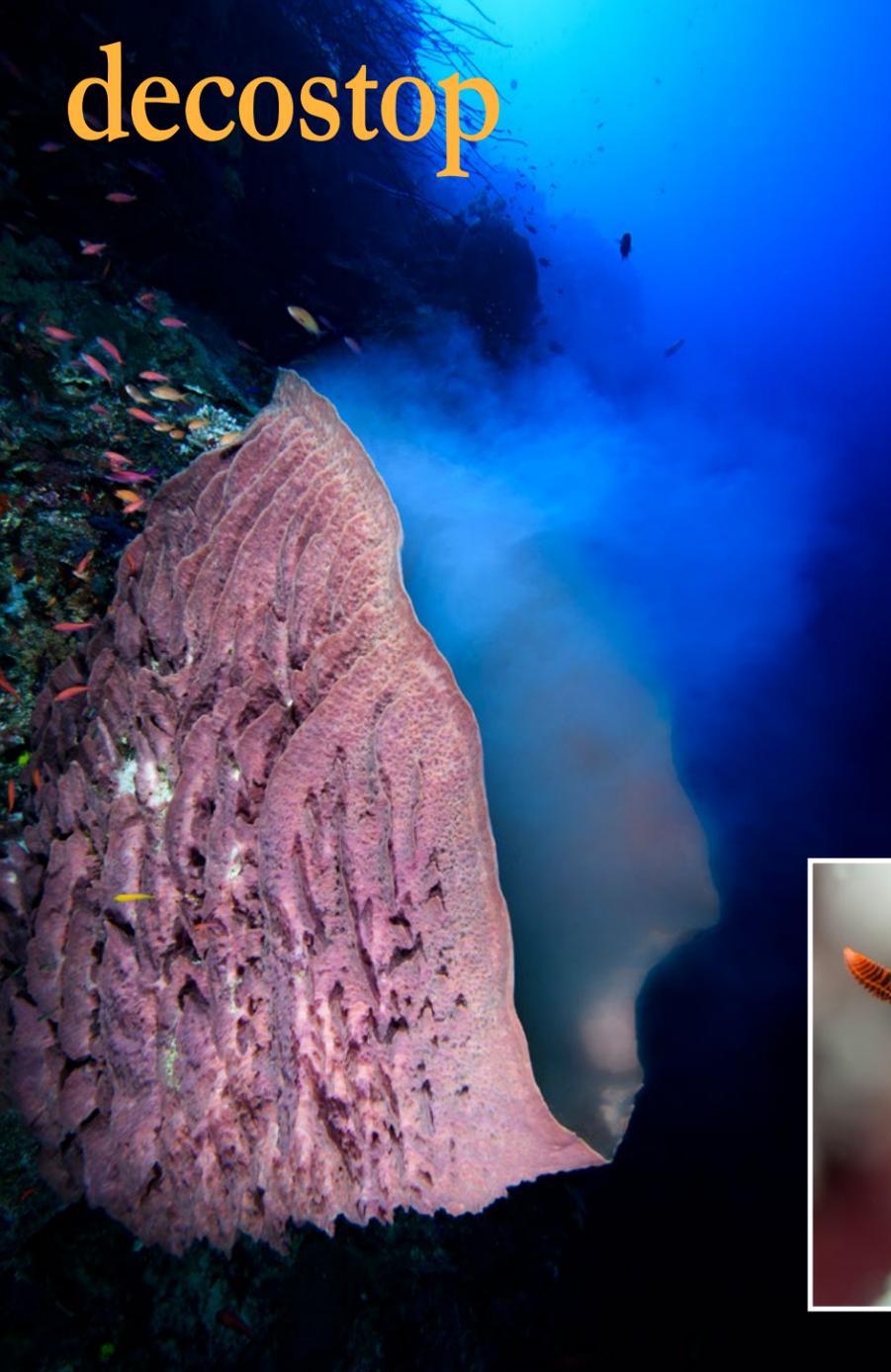
on the ground and a freezing fog. We wore drysuits and the water was 4°C. I was disappointed that after four dives I had only seen a couple of tiny fishes and one crayfish.

When did you start doing photography?

I had been working on a marine conservation project in Indonesia and was getting frustrated that the tiny nudibranchs (sea slugs) that I was finding were impossible to identify. Many were in fact new to science and undescribed, but I was scouring the books and struggling to identify the species based on the rudimentary sketches I had made on my slate. I started taking some images to enable me to get some proper identifications. I made about 500 dives before I started to take up photography properly, and I am really pleased that I had the opportunity to hone my diving and



The pink anemonefish is one of thirty anemonefish species that live with these stinging corals, Solomon Islands



CLOCKWISE FROM TOP LEFT: Giant barrel sponge, many decades old, spawning, Tubbataha Reef, Philippines; Soft corals on a bustling reef in West Papua, Indonesia; Male Banggai cardinalfish with a mouth full of babies, Sulawesi, Indonesia; A pair of golden pygmy gobies hiding in a soda can, Sulawesi, Indonesia; *Nembrotha kubaryana* nudibranch, Sulawesi, Indonesia



buoyancy skills, as well as my critter-hunting ability, before taking up photography.

When were you able to combine diving and photography?

I have always used photography to help with my natural history studies, whether capturing never-before-photographed fishes or trying to figure out the life cycle of an animal too small to study with the naked eye. My experience, however, suddenly became vital when I began my doctoral research on the biology of pygmy seahorses. I used very close-up

shots under the trunk of the pygmies to distinguish between the male and female. Males have a small slit-like opening, and females, a tiny raised circular pore. Without these shots, it would have been impossible to tell them apart. I also captured the first images of the pygmy's full reproductive cycle, which were vital for my work.

What made you decide to become a biologist?

As soon as I heard the word, I wanted to become a zoologist. I think I was about five. Ever since I can remember, I have

been fascinated with the natural world, so it was a natural progression. Growing up, I had a menagerie of pets, but was also a gardener from about seven years old! I think my destiny was set in stone from a young age.

When photographing underwater, what steps do you take to avoid interfering with marine life?

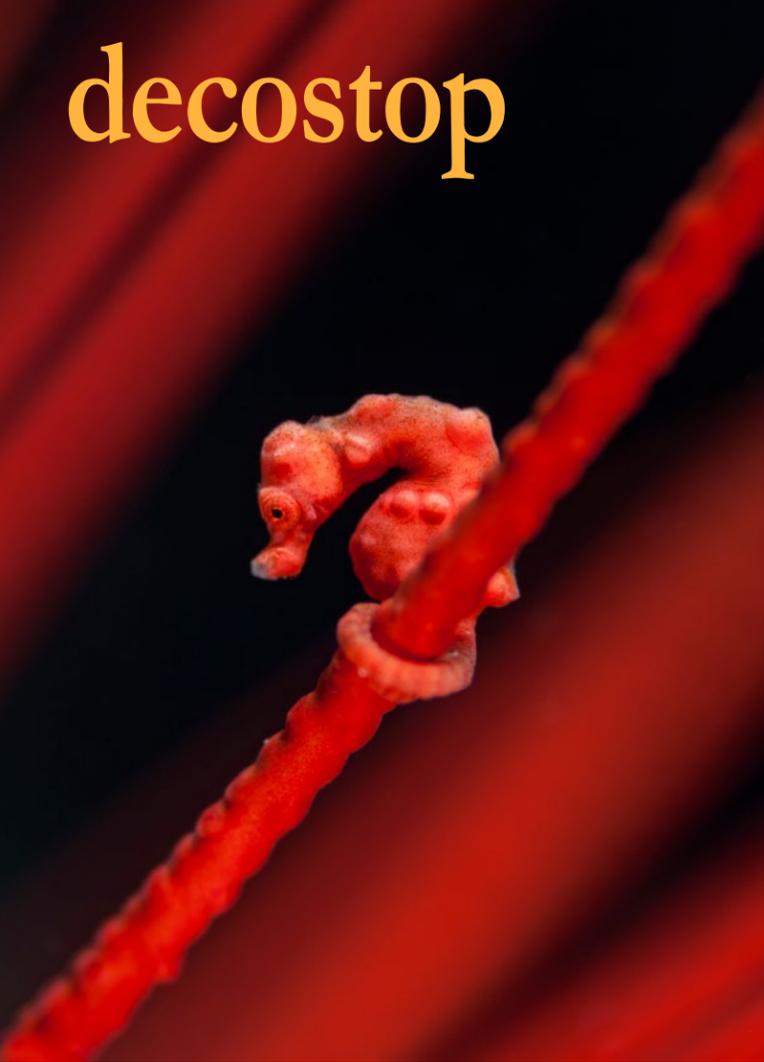
I am very passionate about this subject, and diver interactions with pygmy seahorses were actually part of my doctoral research. I strongly believe that the best photographs are taken when an animal feels secure and not threatened. As soon as an animal is disturbed, the fight-or-flight response kicks in. I do not own a pointer

may take a minute or two to settle after I arrive, but soon they will resume normal activities. I do not move around too much and only take shots when there is a frame I want. There is no point in taking dozens of shots when you only need one or two.

What is the most interesting or intriguing (animal) behaviour you have come across on your dives?

I have been lucky enough to observe so many mind-blowing behaviours during my work. Something that stands out was part of my doctoral research on the





Denise's pygmy seahorse (above left), which measures the diameter of a quarter, Sulawesi, Indonesia; Denise's pygmy seahorse on a gorgonian coral, Sulawesi, Indonesia (above right)

reproductive and social biology of Denise's pygmy seahorses. I spent hundreds of hours recording their interactions. One group of four pygmies—nicknamed Tom, Dick, Harry and Josephine—were an interesting bunch. Among the many amazing behaviours I observed with this group, the most surprising was watching them fight. Ordinarily, seahorses are fairly passive, but these three males vied for Josephine's attentions, which regularly led to fist-cuffs! In the pygmy seahorse world, where there aren't fists to settle disputes, the males would try and strangle each other with their tails!

If you have to offer just one tip or piece of advice for an aspiring underwater photographer, what would it be?

I think something that is often overlooked is how important it is to become a good diver before becoming too distracted by photography. Good buoyancy, experience in different conditions and learning about marine life (if you want to take images of creatures, rather than vistas) are all really important skills.

What is your favourite piece of kit?

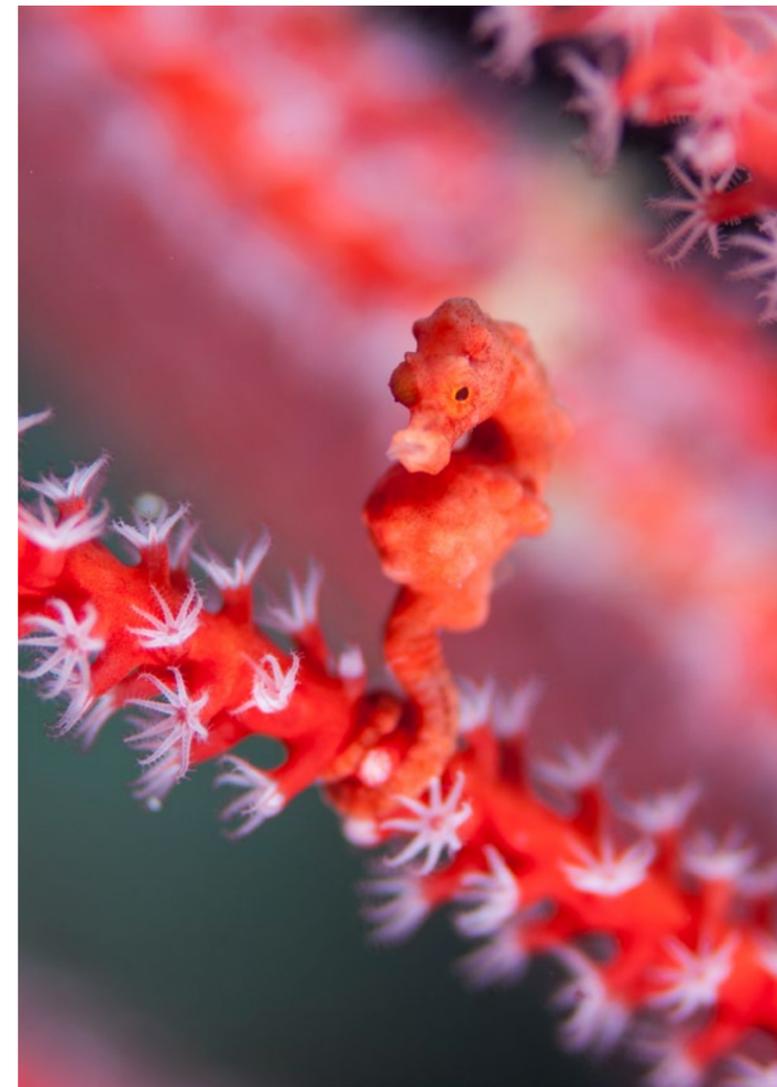
One piece of kit that I almost cannot do without is a hooded vest. I get pretty chilly as I dive so slowly, even in the tropics, and a 3 to 5mm hooded vest under my suit helps to keep me that bit warmer.

What is the oldest piece of kit you still use?

Most of my gear does not get swapped out if it is still doing the job, and I appreciate brands that are built to last. I still use my arm slate from goodness knows how many years ago—maybe 15 years now. I cannot do a dive without it; I always write down everything I see and details of where I find them. It is also great for writing down any ideas I may have. I get those on a dive, not in the shower!

What type of habitat do you find most interesting and why?

I love to dive all kinds of habitats, there is always something different to see. I love diving in different regions, where there might be interesting indigenous species to find. For instance, muck diving



A pair of tiny and well-camouflaged Bargibant's pygmy seahorses, Sulawesi, Indonesia (above left); Denise's pygmy seahorse on a whip coral, Sulawesi, Indonesia (above right); Displaying male blue flasher wrasse, measures just two and a half inches long, West Papua, Indonesia (top right)





Smith

Tiny juvenile hogfish comes face-to-face with a hidden frogfish, Negros Island, Philippines (above); Aggregation of sand tiger sharks sheltering in a cave, New South Wales, Australia (left)



in Japan was very fruitful and full of species you could not find elsewhere in the ocean.

Which subject matter have you found most challenging to capture?

My friend Juliette Myers shot an amazing image of a giant clam shrimp, which really caught my attention. I had been looking for giant clam shrimps for the longest time, having seen a picture of a preserved specimen. The specimen was transparent with blue spots, so I assumed it would be found on the outside surface of the clam. Having seen Juliette's shot, I realised that I had been looking in the wrong place all along. In fact, they live deep inside the body cavities of giant clams, which is quite a challenge in terms of underwater photography and lighting. As most

divers would know, if you get close to any bivalve mollusc, they quickly slam shut to protect their soft parts. Needless to say, I have spent many hours hovering outside giant clams waiting for the few seconds when a giant clam shrimp decides to wander within view.

If you had to pick just three of your own images to hang on your wall, which ones would you pick and why?

I think they would all have to be pygmy seahorses, to make a nice triptych! Denise's pygmy was the main focus of my PhD, so that would be there. Then, there would also be the two pygmy seahorses that I have named over the past couple of years: *Hippocampus japapigu* from Japan and *H. nalu* from South Africa.

If you have to think back on an experience (or a course) that left you all the wiser, which one springs to mind?

I think I learnt a lot from diving with my friend and incredible dive guide Yann Alfian. He showed me my first pygmy seahorse in Komodo in 2002, and our careers seem to have been intertwined ever since. He is the most incredible spotter but stands out by having the most amazing natural feel for animals and their behaviours. I learnt a lot from him about how to sensitively approach a shot and how important it is to know where exactly an animal lives if you want to find it.

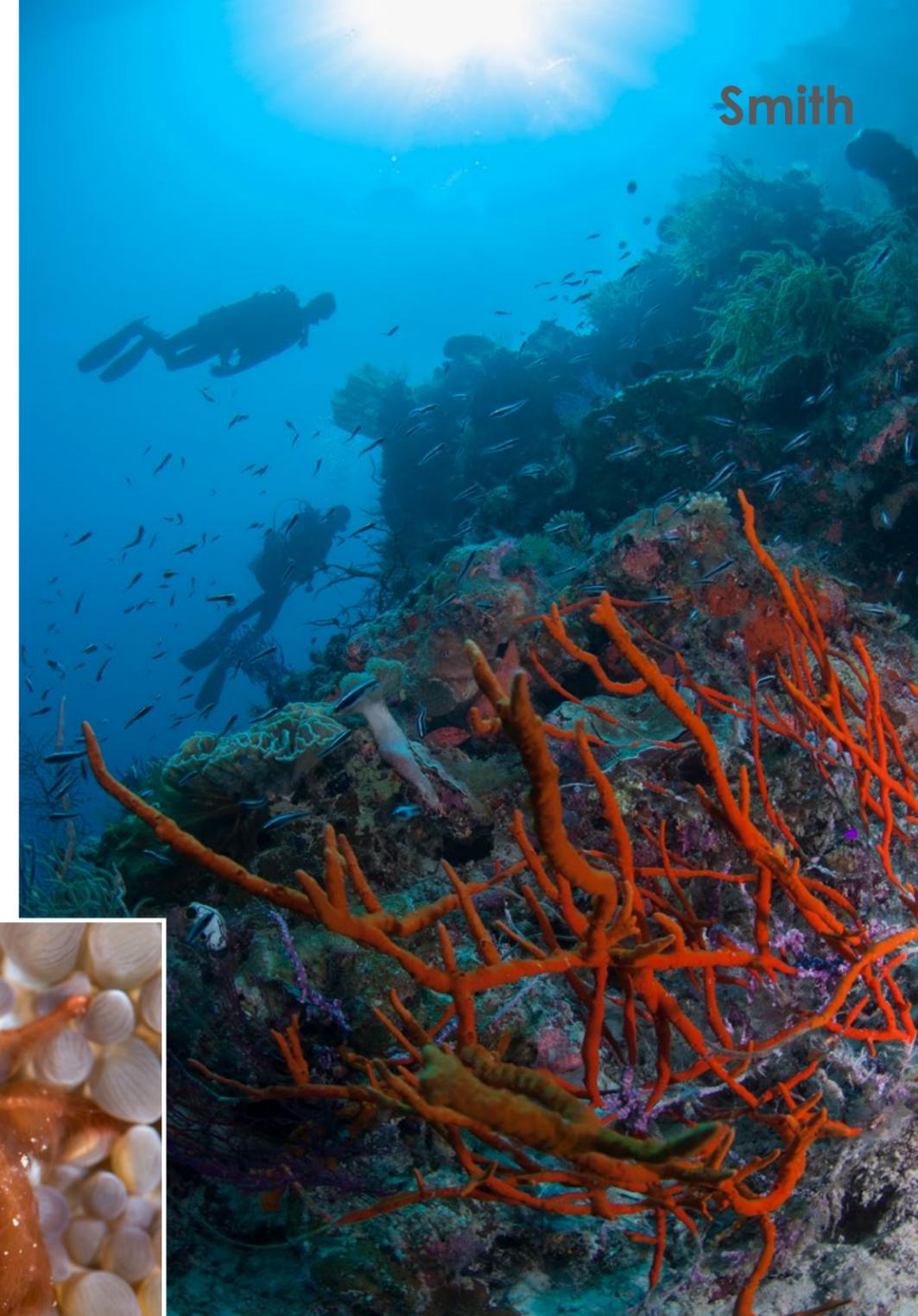
As a scientist, photojournalist and communicator, do you have a main message or philosophy you are striving to convey?



Male Galapagos pike blenny displaying, Galapagos Islands, Ecuador

The endangered Napoleon wrasse, one of the largest reef-associated fish, feeding on a damselfish, West Papua, Indonesia





I hope to be a bit of a champion for the smaller, underappreciated creatures of the sea. The whales, turtles and sharks get all the glory, but there is an incredible diversity of smaller animals under the sea that also need protection and are often overlooked. The goal in my book *The World Beneath* is to share some of these creatures and their fascinatingly complex interactions and private lives. Some of the tiniest creatures have a vital part to play in the Earth's marine ecosystems; however, regardless of this, each one makes the world a richer place.

Which type of dive do you enjoy the most?

I love spending a whole dive (or day, or week) really focusing on one animal. I love watching its comings and goings, interactions with other animals and learning what makes a particular animal tick. I find it quite meditative.

What is your next big project?

Colleagues and I are working on another discovery from the trip that yielded the South African pygmy seahorse. So, that is exciting! I have also started turning my

attentions to a follow-up for *The World Beneath*. ■

Dr Richard Smith is a British award-winning underwater photographer, author and marine conservationist who aspires to promote an appreciation for the ocean's inhabitants and raise awareness of marine conservation issues through his images. A marine biologist by training, Smith's pioneering research on the biology and conservation of pygmy seahorses led to the first PhD on these enigmatic fishes. Smith is a member of the IUCN Seahorse, Pipefish and Seadragon Specialist Group. He

has named the two most recent pygmy seahorse discoveries: Hippocampus japapigu in Japan and H. nalu in South Africa. Smith organises and leads marine life expeditions where the aim is for

participants to get more from their diving and photography by learning about the marine environment. His bestselling book, The World Beneath: The Life and Times of Unknown Sea Creatures and Coral

*Reefs, is out now. Learn more at: **OceanRealmImages.com** or follow on Instagram **@Dr.RichardSmith**, on Facebook **@OceanRealmImages**, or on Twitter **@Rich_Underwater**.*

Divers exploring a coral reef in Sulawesi, Indonesia (above); An orangutan crab covered in filamented red algae, Great Barrier Reef, Australia (centre inset); Feeding whale shark, the planet's largest fish in West Papua, Indonesia (top left)

MUSAN

*New Underwater Sculpture Museum in Cyprus
with Artworks by Jason deCaires Taylor*

Text and photos by
Andrey Bizyukin





Cyprus has unveiled a new underwater attraction: A museum of 93 underwater sculptures by British artist Jason deCaires Taylor. Andrey Bizyukin went to Cyprus to check it out. He shares his surreal experience in this underwater wonderland.

Cyprus is known to most divers as the island of wrecks. Many have heard about the wreck of Zenobia, Constantinos, Lady Tetis and others. However, not all divers like wrecks. To dive and penetrate a wreck, divers need additional training and must purchase special equipment.

Therefore, the number of divers with an appropriate level of training and equipment is essentially limited.

Then along came the Covid-19 pandemic, which changed many a diver's plans and limited travel opportunities. Some dive operators were forced to close their businesses for a long period of time, some went bankrupt, and some started implementing old plans to conduct dives in local waters. The dive community in general was pretty depressed. For some, the pandemic turned out to be a mythical "Black Swan," which destroyed all plans, but others treated it with a philosophical approach—as a new opportunity, a wonderful unique chance to do something good for the

environment and respond to the hint given to us by nature itself.

When considering a vision for the future, the most intelligent and creative people of Cyprus assessed their prospects and calculated their options. Then, during the pandemic, the mayor's office of the city of Ayia Napa decided to take the opportunity to spend one million euros to create a new unique underwater museum—the Museum of Underwater Sculpture Ayia Napa (MUSAN). The museum is accessible to nearly all water sports enthusiasts, snorkelers and divers of all levels and ages.

Jason deCaires Taylor, the renown underwater sculptor, was invited to create the museum and underwater park. Not



Divers explore the new Museum of Underwater Sculpture Ayia Napa (MUSAN) in Cyprus.



only was he an artist who was not indifferent to the problems of marine ecology and climate change, but he already had extensive experience creating underwater sculpture parks in different seas around the world.

Getting there

For my fellow divers and me, the temptation to go to Cyprus and dive there to see the underwater museum with our own eyes was so great that we began to look for opportunities. Was it possible to get to Cyprus from Moscow during the pandemic? It turned out that it was indeed possible. If you had been vaccinated against Covid-19, then you no longer needed to do PCR tests. You just had to upload your vaccination certificate to the Cyprus flight pass website (cyprusflightpass.gov.cy), get a QR code, and you could fly.

In just four hours of flight time, we were in Ayia Napa. Once a small village, today it was a beautiful city full of hotels, attractions, tourists, divers and now, its very own underwater museum.

To get to the site, we left port in a bright yellow catamaran named *Yellow Submarine*. The captain, dressed like a real sea dog—albeit, in swimming trunks and a bandana—personally greeted each diver. The dive operator told us that the underwater museum had 93 sculptures made of environmentally friendly materials, good for the sea and its inhabitants. The sculptural composition was assembled and installed on the sandy bottom of the bay, at depths from five to eight meters, around 200m away from the city's embankment.

A ten-minute trip from the port to the bay got us to site of the underwater



The museum features 93 sculptures created by British artist Jason deCaires Taylor.





The MUSAN dive site is just a ten-minute boat ride from port.



The museum is accessible to nearly all underwater enthusiasts, including snorkelers and divers of all levels of experience.

museum, whose water boundaries were marked with stationary buoys. After a short briefing, we got into the water. Visibility was about 20m, and the water temperature was a balmy +29°C. We swam close to the buoys, where the outlines of this grand “miracle” underwater were already visible from the surface.

Diving

We started our dive from the side of the installation in order to have a look at the statues of human and hybrid forms, which stood among a variety of organic sculptural forms of trees and underwater plants. All together, they looked like a nice underwater nature park. The sculptural compositions could be divided into three or four parts, arranged along a straight line with a length of about 50m.

It was recommended that we start the tour by visiting the museum from

the city embankment side. Here, there was an official entrance to the museum. We were greeted by sculptures of children with video cameras in their hands and unusual cone-shaped structures made of rods with dummy video cameras mounted at the top. We dived through the exhibit and got into an artificial garden of underwater algae, with leaves made of shiny metal attached to cables. They were held in an upright position by large blue buoys. Diving here felt like we had wandered into the famous kelp forests of California. This part of the park was the most similar to traditional diving experiences in the underwater world, with which every diver can relate.

Continuing onwards, we swam through a park of artificial trees that looked like huge cactuses. Following these sculptures were trees with artificial branches and metal leaves.

The presence of these terrestrial trees in an underwater context caused some dissonance upon viewing. Normally, trees do not grow on a seabed, as we all know, but the artist's imagination had found just such a creative solution. So, we could only remain casual viewers, who are not always given the right to vote or judge or even speculate upon what drives the creative imaginings of artistic individuals.

Sculptures of men, women and children were placed throughout the museum. Most of the sculptures of children were depicted with dummy movie cameras in their hands, aimed at the sculptures of adults. Apparently, with this depiction, the sculptor wanted to show that children notice and often copy the behaviors of adults.

We moved through the museum, along the sea bottom, from the





MUSAN



The museum serves as an artificial reef, which provides comfortable conditions for marine flora and fauna already starting to colonize it (top right).

entrance to the end, and then back again, swimming this time above all sculptures. We were in a museum whose collection could be viewed not only from the front, the back, and the side, but also from above, which is very unusual. In addition, our eyes enjoyed the play of light and shadow on the metal leaves, tree trunks and folds of the figures' clothing.

The museum seemed to be quite large and diverse. Everything was created with a deep sense of beauty. Everything was aesthetically pleasing. There was a strong desire to stay here as long as possible, to consider everything in the smallest details, which definitely caught one's eye and attention. I wanted to stop at each of the sculptures and examine it from all sides, mentally communicating with it and pondering what thoughts were in the

head of its creator. Some sculptures were duplicates but were exhibited in different contexts, creating completely different impressions. Here, in this underwater world, one just wanted to stop and step away from the busy tempo on land and think about the meaning of life.

Afterthoughts

The site for the museum was chosen very well. It was convenient and easily accessible, so that nearly all kinds of "waterfowl" could visit the museum, including divers, snorkelers and marine life. It was a real underwater oasis; swimming and diving inside it was easy, pleasant and interesting.

Marine life likes artificial reefs. They are places where comfortable conditions for marine flora and fauna are found. So, underwater sculpture parks do eventually

become new homes for marine life, and MUSAN is exactly this—the first underwater museum in the Mediterranean, which is also, in itself, a "work of art."

With just one scuba tank and a dive duration of an hour and a half, I had experienced the delight of contemplating the beauty of art and captured another hundred wonderful underwater pictures. I returned to the surface, joyful and inspired by the museum—back to the sun, the warmth, and the smiles of friends.

The pandemic will eventually end. Divers will return to their favorite activity and travels. In Cyprus, a very special, alluring underwater pearl of the Mediterranean awaits them—a new dive site called MUSAN. ■

Visit: musan.com.cy/en/home



My Favorite Underwater Portraits

Contributors' Picks from Around the World



Text and photos by John A. Ares, Larry Cohen, Anita George-Ares, Frankie Grant, Jennifer Idol, Kate Jonker, Celia Kujala, Matthew Meier, Brandi Mueller, Gary Rose, Michael Rothschild, Don Silcock, Olga Torrey, Claudia Weber-Gebert

We asked our contributors what their favorite underwater portraits were, and they sent us photos and tales of intriguing marine life. From sea lions to hammerhead sharks, manatees to sea turtles, dolphins to pilot whales, lemon sharks to pufferfish, wrasse and seahorses, and even kids, *X-Ray Mag* contributors share their favorite images showing a range of faces and personalities found under the waves.



Gentle Soul (left). Exposure: ISO 100, f/11, 1/200s; *Three Friends* (above). Exposure ISO 100, f/16, 1/200s; *Peek-a-boo* (previous page). Exposure: ISO 100, f/11, 1/200s; *Best Buddies* (on the cover of this issue). Exposure: ISO 100, f/14, 1/200s. Camera gear used for all images: Nikon D500 DSLR camera, Tokina 10-17mm fisheye lens, Nauticam NA-D500 housing, dual Sea&Sea YS-D2J strobes

Australian Sea Lion, Jurien Bay Marine Park, Western Australia, Australia

Text and photos by Celia Kujala

Jurien Bay Marine Park in Western Australia is home to several colonies of Australian sea lions. Their playful and curious nature, and the clear turquoise waters in which they live, make them a delight to photograph. They are always ready for their time in front of the camera, but I believe that the most special images involve more. It is only with research and time observing them that I am able to understand my subjects and most accurately and intimately tell their stories.

These portraits are my favorite because they are moments when I was able to connect with the indi-

viduals and capture something special about each sea lion's personality. I hope viewers feel a connection with the Australian sea lions in these portraits, motivating people to care about this species and the environments they call home. Sadly, Australian sea lions are one of the most endangered pinnipeds in the world, and their population is decreasing. Once heavily hunted, today they are protected, and their biggest threat is entanglement and dying as bycatch. Visit: sealpeace.com



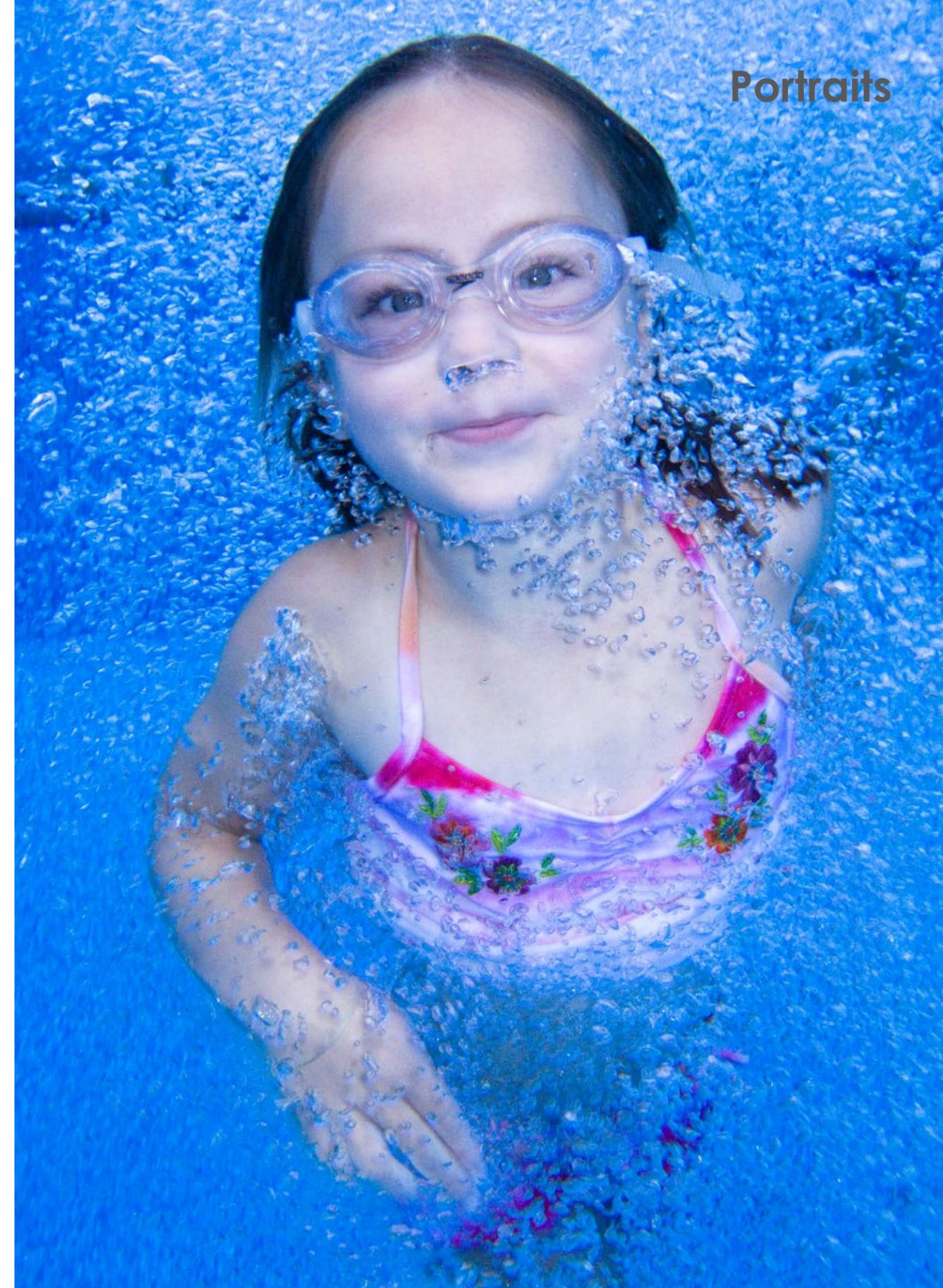
Manatee, Crystal River, Florida, USA. Exposure: ISO 100, f/4, 1/100s. Camera gear: Canon EOS 10D digital SLR camera, Tokina fisheye 10-17mm lens at 10mm, Ikelite housing, Ikelite DS-160 strobes

Manatee in Florida & Abigail in New Jersey, USA

Text and photos by John A. Ares

It was a manatee portrait taken in Crystal River, Florida, that made me fall for these sweet creatures. Our group of divers met at the dock to get on the boat at sunrise. You want to be on the first boat because it sometimes gets crowded later. Note that we were there just as the manatees were waking up. The two manatees in the background were snoozing. The one on the right had a satellite tracking device because it had recently been released from rehabilitation, following treatment for boat injuries.

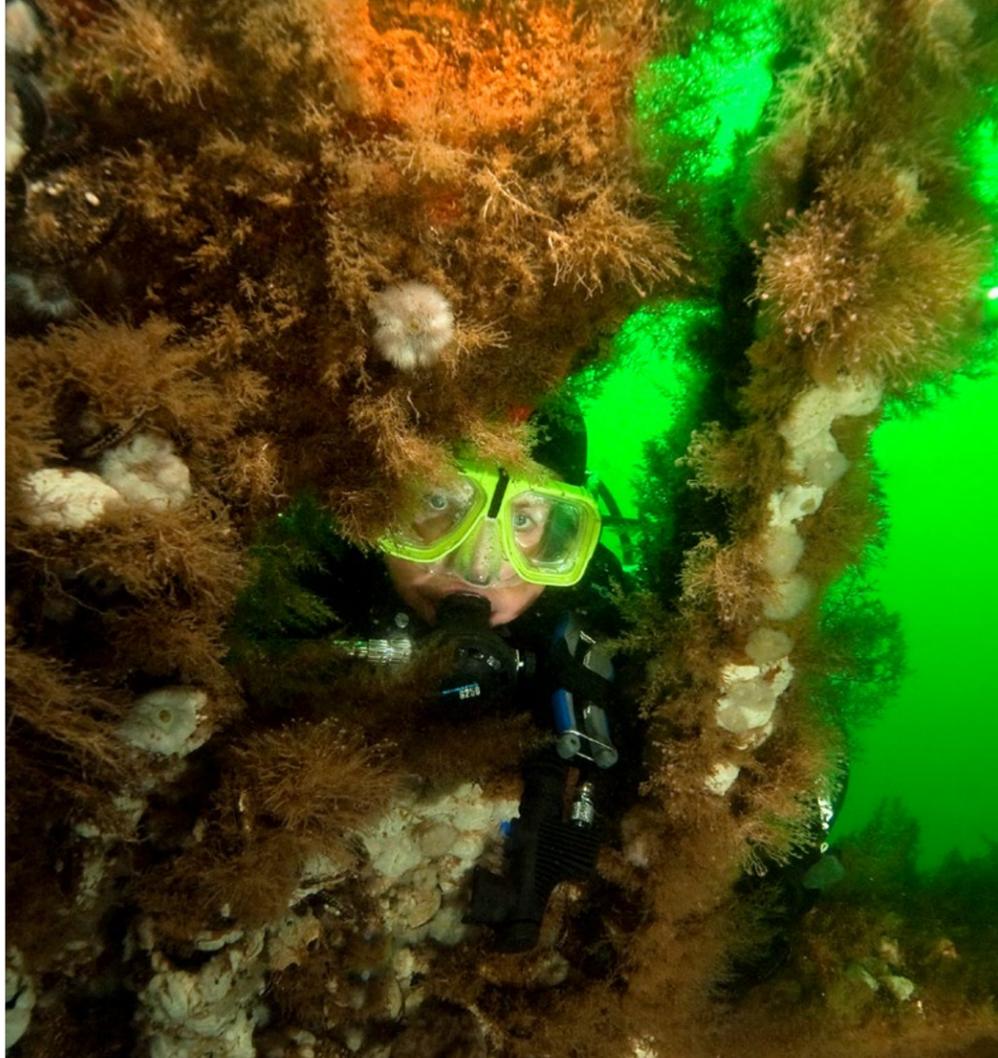
A friend of mine in New Jersey had been asking me for a long time to photograph her daughter, Abigail. I thought the idea of doing a photo shoot in the family's pool would be a perfect setting. So, I got into the pool with basic snorkeling equipment, and I asked Abigail to jump off the diving board and swim toward me. The resulting image was taken with a Canon Powershot G9 camera with camera flash, the lens set at 7.4mm, in a Canon G9 housing. Visit: JohnAres.com



Abigail in swimming pool, New Jersey, USA. Exposure: ISO 400, f/5, 1/125s. Camera gear: Canon PowerShot G9 camera with flash, lens at 7.4 mm, Canon G9 housing



Olga Torrey swimming at Dutch Springs, Pennsylvania, USA (above). Exposure: ISO 200, f/5.6, 1/180s. Gear: Olympus E-620 camera, Olympus 7-14mm lens at 7mm, Olympus housing, dual Sea&Sea strobes; Bloch's bigeye fish under ledge at Dahab in Egypt (top right). Exposure: ISO 100, f/11, 1/250s. Gear: Olympus E-520 camera, Olympus 50mm macro lens, Olympus housing, dual Sea&Sea strobes; Bluespotted ribbontail ray photographed off Pom Pom Island, Malaysia (far right). Exposure: ISO 200, f/8, 1/125s. Gear: Olympus OM-D E-M1 camera, Olympus 60mm macro lens, Aquatica housing, dual Sea&Sea strobes



Olga Torrey on the *Stolt Dagali* wreck, off the New Jersey coast. Exposure: ISO 400, f/5.6, 1/30s. Camera gear: Olympus E-620 camera, Olympus 7-14mm lens at 7mm, Olympus housing, dual Sea&Sea strobes

Olga, Bluespotted Ribbontail Ray & Bloch's Bigeye

Text and photos by Larry Cohen

A portrait image has to concentrate on the face and eyes, capturing the personality and mood of the subject. It does not matter if the subject is human or not.

The photograph of my dive buddy, Olga Torrey, swimming underwater without dive gear was a challenge. This image was shot at Dutch Springs, Pennsylvania in the United States, and the water was cold because it was late autumn. Olga was still willing to get out of her drysuit for the photo. She wanted me to suffer for my art, and I was wearing just a bathing suit. I had to ignore being cold and focused on getting the correct lighting to feature Olga's eyes. We also wanted her blonde hair to flow in the water. To do this, she had to surface and

dive down repeatedly until we got an image with the correct look.

The environmental portrait of Olga was captured on the *Stolt Dagali* shipwreck off the coast of New Jersey. The idea was to concentrate on Olga's face framed with the wreckage and the exquisite marine growth on the wreck. Since the foreground is dark, I used a slow shutter speed to get a bright green background. Her yellow-green mask augmented the green backdrop.

Whenever I happen to have a macro lens on my camera, I undoubtedly encounter a large, impressive subject. When diving off Pom Pom Island in Malaysia, I saw this exquisite bluespotted ribbontail ray.



Portraits



However, this gentle creature did not seem to mind me getting close for a headshot, focusing on its eye.

While shore diving off Dahab in Egypt, I spotted this Bloch's bigeye under a ledge. The stunning red color of the fish's body and the dark eye added contrast to the image. Since one of my strobes stopped working, I had to adapt my lighting to one strobe. So, I positioned the flash above the subject to create a strong shadow. Please visit: liquidimagesuw.com





ANITA GEORGE-ARES

Blue-spotted puffer, Dauin North, Negros Island, Philippines. Exposure: ISO 100, f/11, 1/200s. Gear: Canon EOS Digital Rebel XT camera, Canon EF 50mm f/2.5 compact macro lens, Ikelite housing, two Ikelite DS161 strobes

Puffer, Unicornfish & Sea Turtle

Text and photos by Anita George-Ares

I like to observe and photograph cleaning behavior. It is interesting to watch the interactions between different species. The bignose unicornfish portrait from Gabet Point in North Sulawesi, Indonesia, is one of my favorites, because it includes two species of cleaner wrasse. The bluestreak cleaner wrasse is on top of the unicornfish's head, and the bicolor cleaner wrasse is probing the gills. The strong blue and yellow color patterns of the fish make a nice contrast with the muted texture of the background coral.

It was dusk and I was finishing my dive at the Dauin North dive site off Negros Island in the

Philippines, when I came upon a large blue-spotted puffer spinning in the water column. Perhaps it was trying to shake off the remora clinging to it. The puffer made no attempt to leave, and I was able to capture a portrait. I like the concentric rings around the eye and the network of dark lines on the blue face.

At Ali Thila dive site in Ari Atoll of the Maldives, I was finishing my last dive of the day, and it was getting dark. I was in the shallows when I saw a juvenile hawksbill sea turtle. I took the turtle's portrait as it slowly ascended towards the surface. Please visit my Facebook Page at: [facebook.com/profile.php?id=100016947967639](https://www.facebook.com/profile.php?id=100016947967639)



Bignose unicornfish with a bluestreak cleaner wrasse and a bicolor cleaner wrasse, Gabet Point, North Sulawesi, Indonesia (above). Exposure: ISO 200 f/8, 1/200s. Gear: Canon EOS Rebel SL1 camera, Canon EF-S 60mm f/2.8 macro USM lens, Ikelite housing, two Ikelite DS161 strobes



ANITA GEORGE-ARES

Juvenile hawksbill sea turtle, Ali Thila dive site, Ari Atoll, Maldives (left). Exposure: ISO 200, f/11, 1/160s. Gear: Canon EOS Rebel SL1 camera, Canon EF-S 10-18mm f/4.5-5.6 IS STM lens, Ikelite housing, two Ikelite DS161 strobes



Great white shark (*Carcharodon carcharias*), Guadalupe Island, Baja California Norte, Mexico. Exposure: ISO 500, f/11, 1/250s. Gear: Canon EOS 7D Mark II camera, Tokina 10-17mm fisheye lens, Sea&Sea housing, ambient light

Great White Shark, Guadalupe Island, Mexico

Text and photo by Frankie Grant

Every year in the Eastern Pacific, great white sharks of all sizes converge on a small island off the coast of Mexico. Isla Guadalupe stands tall, like a monolith in the sea, creating its own clouds, which burn off just as quickly.

Taking almost a full day to arrive at Guadalupe Island turns away some adventurers, but for those who make the journey, it is always well worth it. The island boasts clear blue water, lots of bait, tuna, yellowtail and of course, great white sharks. Seemingly appearing out of the blue like magicians, the sharks will leave

in one direction and return from one's blind spot only moments later.

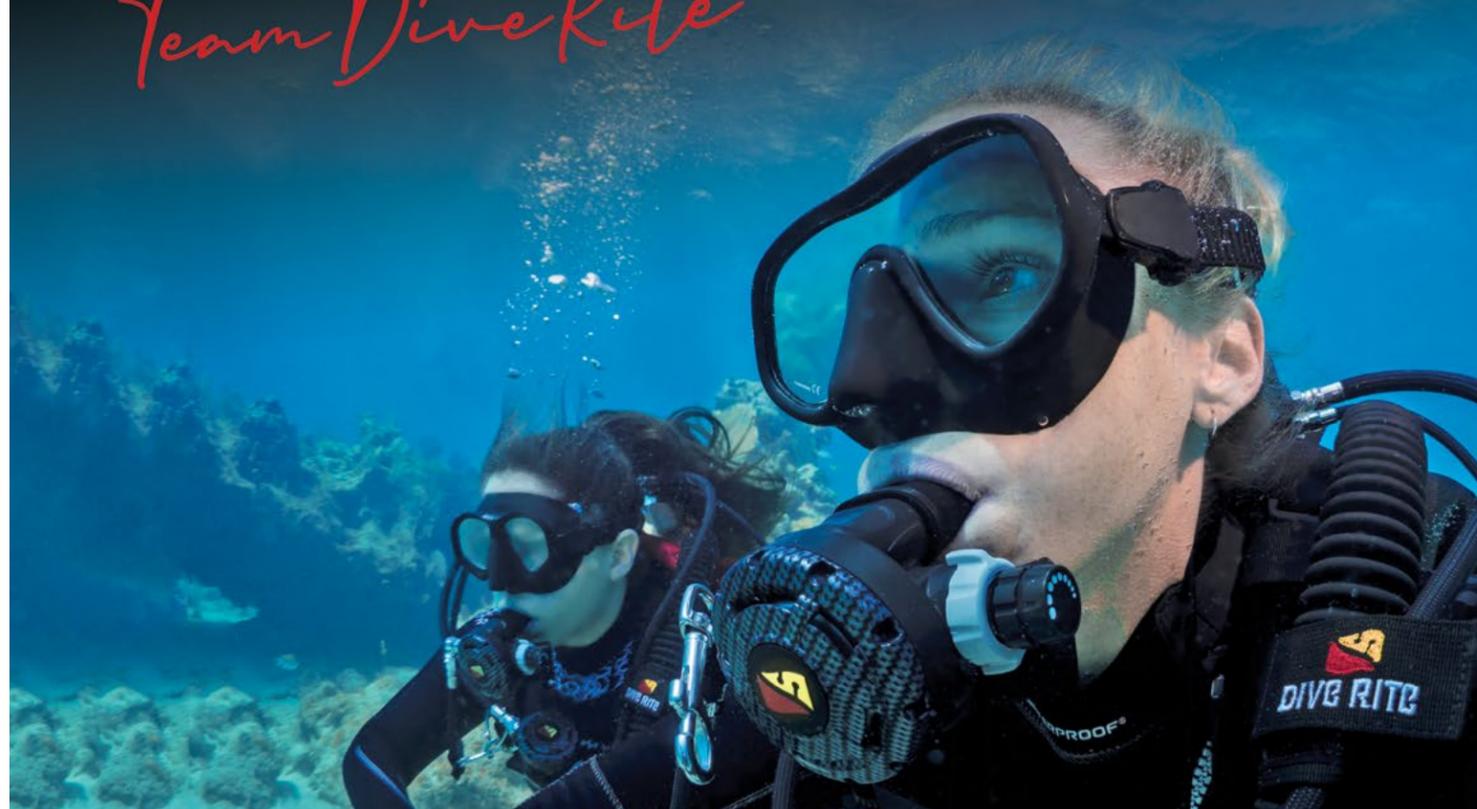
This particular trip was especially challenging, as a school of mackerel remained tightly against the submerged cage we were in, impeding our vision. Sharks would come into view as the mackerel slowly departed from the sharks' course. I was lucky enough to capture a combination of mackerel and shark, giving the image a different feel than the standard image one often sees of a great white shark against a clean blue background. Visit: frankiegrant.com

Local Dive Shops are the backbone of our sport. They are the gateway to training, the place where you meet dive buddies, get your tanks filled, book dive vacations, and of course purchase new dive gear. Being a small family run business ourselves, we understand that dive shops need your support now more than ever. We encourage you to support them any way you can to help keep our beloved sport growing.

SUPPORT YOUR LOCAL DIVE SHOPS



*Safe Diving,
Team Dive Rite*





The Weird and Weirder

Text and photos by Jennifer Idol

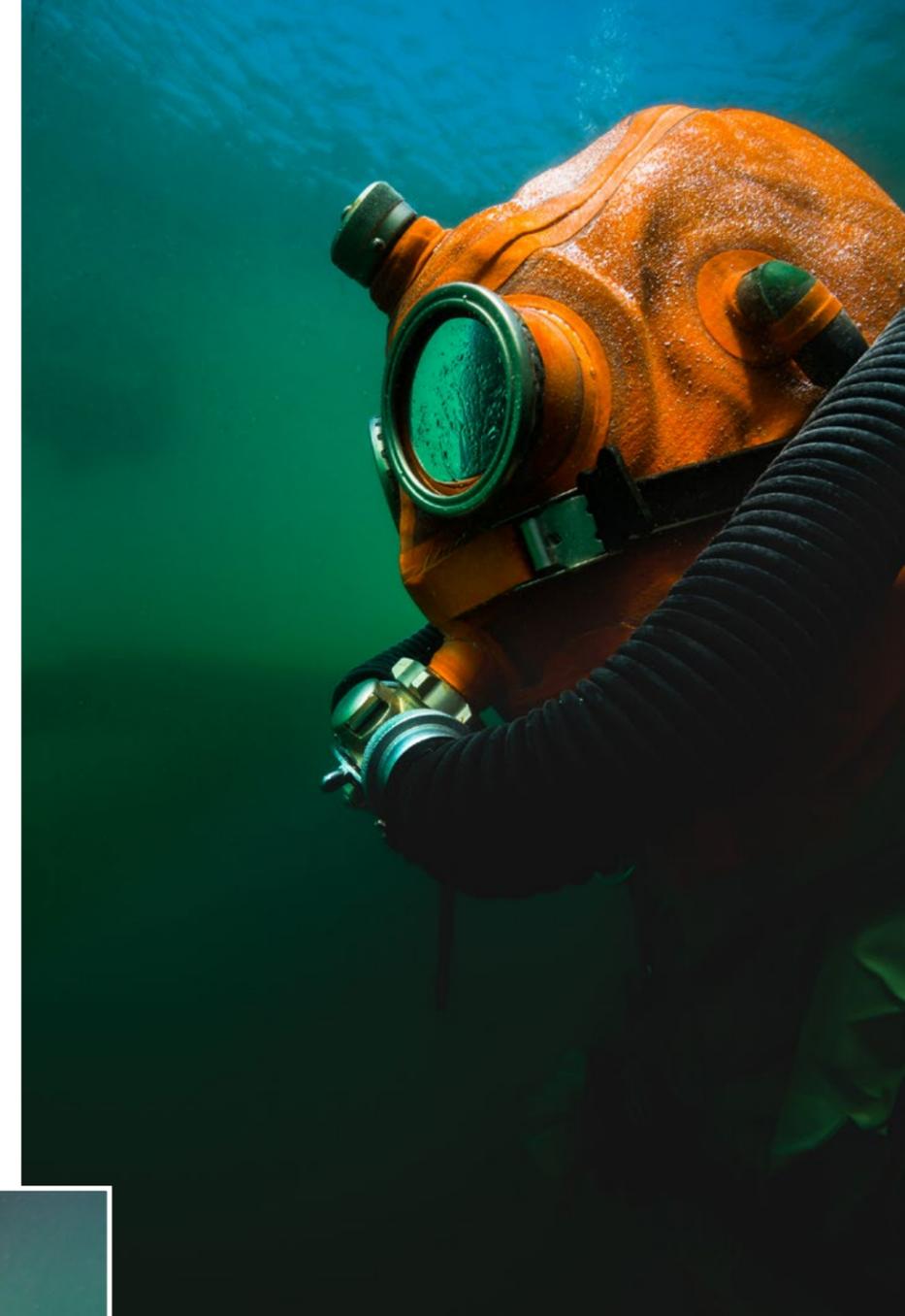
While every photo is truly a collaboration, portraits are especially so because the model contributes to the imagery through their creativity as they position themselves. This connectedness makes portraits profoundly personal creations.

I document a number of people underwater, but it is the more unusual context I find particularly compelling. In this case, Drew Lapointe, one of my favorite models and friends, posed in a Russian submarine escape suit owned by Fred Barthes of the Northeast Diving Equipment Group. We encountered this suit during the Hard Hat Rally at Dutch Springs in Bethlehem, Pennsylvania.

These suits were used from the 1960s as an attempt at providing submariners with the ability to self-rescue from a submarine at 300m depth and purportedly even to 600m. The orange suit is bizarre in appearance and resembles a gas mask from WWII more than a safety device.

I love highlighting the history and detail in these uncommon, historic diving units. They photograph dramatically, even in an innocuous selfie. This equipment required a tall model to fit the suit and someone comfortable with claustrophobic gear. Since the gear is historic, finding appropriate breathing equipment is challenging.

The big round eyes are the most dramatic feature, so I focused on the face and how it changes the character of the scene. The suit then becomes more sculpture than human model. Each year I am able to, I attend the rally and love connecting with the group that sets up this complicated equipment. Visit: uwDesigner.com



In the shallows of Dutch Springs, Drew Lapointe poses on one of the training platforms (far left). Exposure: ISO 400, 15mm, f/22, 1/100s

Like a statue, the historic gear appears differently from all angles (above). Exposure: ISO 400, 14mm, f/416, 1/200s

Drew and I celebrate our photo shoot together with a selfie (left). Exposure: ISO 400, 14mm, f/16, 1/160s

Gear used for all images: Nikon D610 camera, Nikkor 14-24mm lens, Nauticam housing



Red Sea Dolphin

Text and photos by Kate Jonker

The first photos I ever took underwater were of my husband's Open Water students. I loved capturing their expressions as they took their first breaths underwater. When you look at a diver, the first thing you see is their eyes peering back at you from their masks—and their eyes can tell you a lot about how they are feeling! Some were amazed, some were overjoyed, and some were simply terrified! From then on, I started to think of eyes as windows to the soul.

That has always stayed with me, regardless of whether I am photograph-

ing a shark, a fish or even a nudibranch. We are drawn to the eyes, we are drawn to human characteristics of our subjects, and the more human the characteristics, the more we seem to connect with them. Because of this, I feel a great connection with many of the marine animals I photograph, and I always try to bring out their own individual personalities in my pictures.

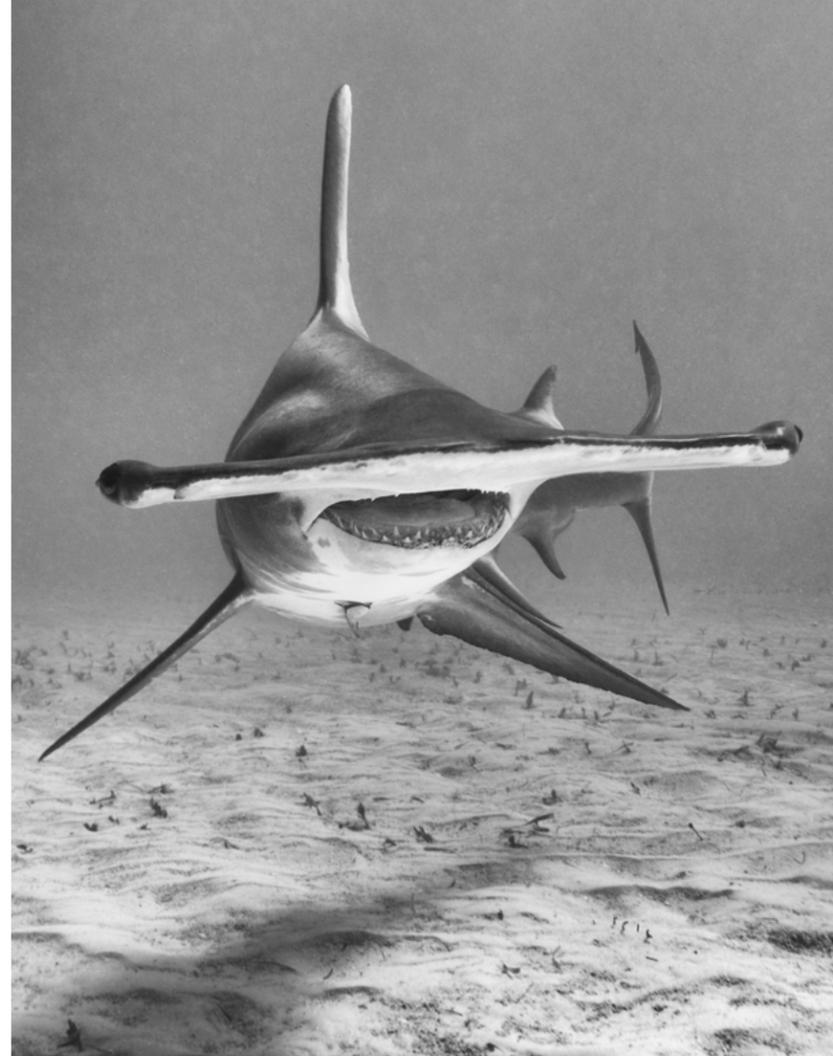
Looking back at the portraits I have taken, my favourite and most memorable is of a juvenile dolphin I encountered whilst diving Gubal Island in the Red Sea. Our group had been joined by a very excited and playful pod of dolphins, and for some reason, I seemed to be a source of entertainment for a smaller

group of four.

We swam the reef together, the dolphins darting around me as I photographed their antics. Eventually, three of them grew bored and swam away, leaving the smallest behind. The two of us continued to explore the reef together like old friends, while I surreptitiously took portrait photos of my companion as she watched what I was up to. I felt as if I was going for a walk with my favourite puppy! It was one of the most incredible experiences I have ever had underwater.

I will always remember taking her photo and looking into her eyes—they were smiling. An incredible connection, and one that will stay with me forever. Visit: katejonker.com

My favourite underwater portrait—that Mona Lisa smile stole my heart! (top left) Exposure: ISO 200, f/6.3, 1/250s; The small group of dolphins that played with me for 20 minutes on a dive at Gubal Island in the Red Sea, Egypt (top right). Exposure: ISO 200, f/3.2, 1/250s; My companion that stayed with me throughout the dive (above). Exposure: ISO 320, f/4.5, 1/250s. Gear used for all images: Canon 7D MK II camera, Tokina 10-17mm fisheye lens, Sea&Sea housing, two Sea&Sea YS-D1 strobes



A scalloped hammerhead swimming amongst a school of Pacific creolefish, Cocos Island, Costa Rica (left). Exposure: ISO 800, f/6.3, 1/125s. Gear: Nikon D3 camera, Nikon 24-70 lens, Subal housing, Sea&Sea YS-250 strobes; Great hammerhead portrait, Tiger Beach, Grand Bahama Island (center). Exposure: ISO 400, f/9, 1/200s. Gear: Nikon D810 camera, Nikon 16-35mm lens, Subal housing, Sea&Sea YS-250 strobes; Great hammerhead and shadow, Tiger Beach, Grand Bahama Island (right). Exposure: ISO 200, f/8, 1/160s. Gear: Nikon D810 camera, Sigma 15mm fisheye lens, Subal housing, Sea&Sea YS-250 strobes

Hammerhead Shark

Text and photos by Matthew Meier

I love photographing sharks and the hammerhead is one of my favorites. They are graceful and agile and have a wonderfully unique shape, which lends itself to distinctive portraits. I have been fortunate to be in the water with both scalloped and great hammerheads at numerous destinations, though I think my best portraits have come from Cocos Island and the Bahamas.

At Cocos, you can see scalloped hammerheads hovering at cleaning stations, swimming along the rocky reef and

Portraits



often alongside or overhead in large schools. Close interactions are an exercise in patience, good behavior by you and your dive partners, as well as a little luck. In the Bahamas, the great hammerheads are a little more curious, and there tend to be more reliable photo opportunities. I also enjoy the longer dives in shallow water, where the white sand helps to light the shark's underside and create graphic shadows.

All of these images were shot in color and converted to black and white to simplify the composition and highlight the elegant profile of these beautiful animals. I would like to thank the Undersea Hunter Group (underseahunter.com) and Master Liveaboards (masterliveaboards.com/bahamas/) for hosting these adventures. Visit: MatthewMeierPhoto.com



Sea Turtle Spa

Text and photos by Brandi Mueller

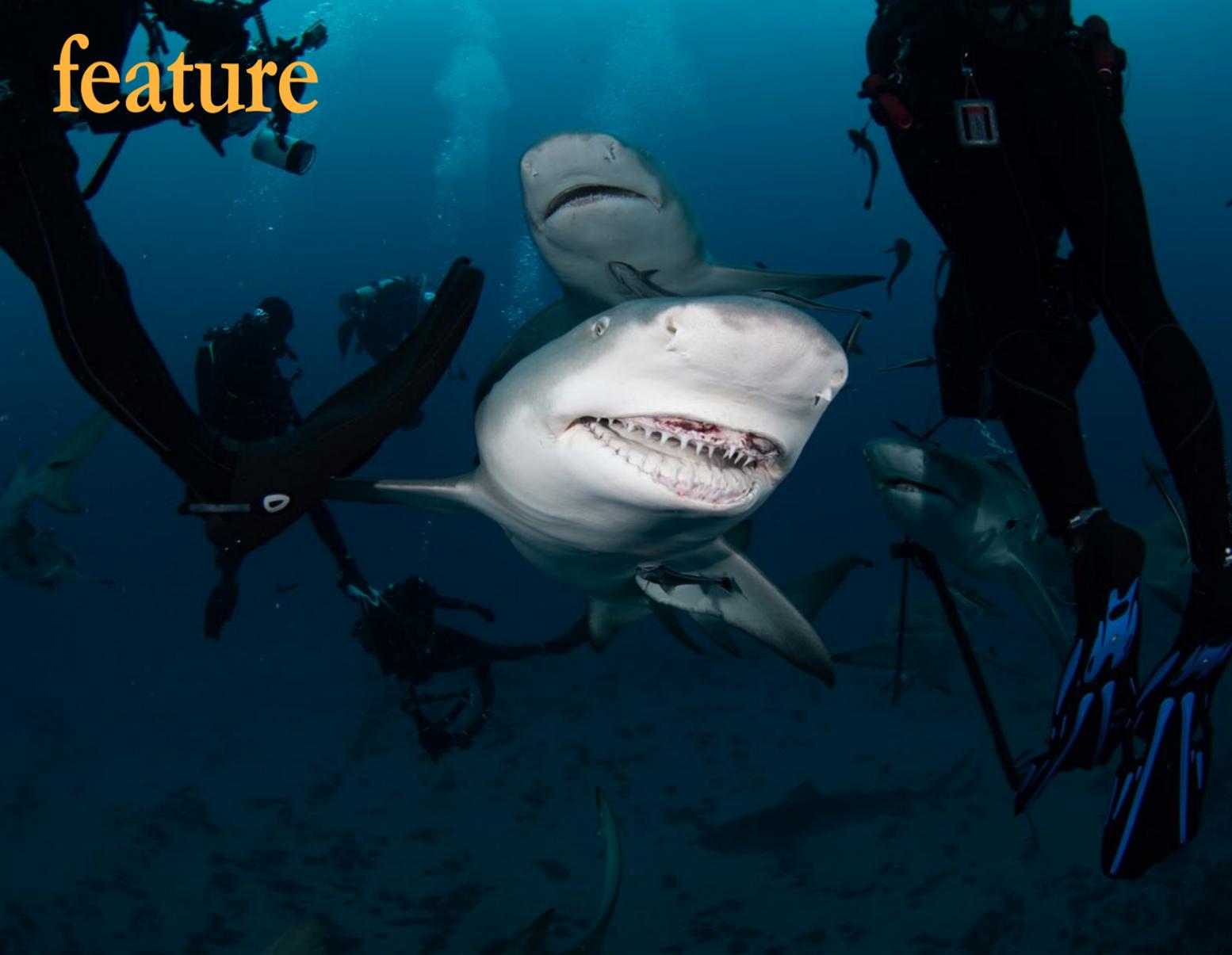
On a dive in Yap, located in the Federated States of Micronesia, I came across a hawksbill sea turtle under a coral ledge. Stopping to take a few photos, I realized it had several scarlet shrimp cleaning it, and the turtle sat perfectly still as it received its spa treatment.

I had never seen a turtle being cleaned by this type of shrimp, which I more commonly knew as the type of shrimp that would climb on divers' fingernails and perform a manicure or jump into the open mouth of a diver to perform a little dentistry. In the past, I had seen fish

eating the algae off the shells of turtles, but I had not seen this up-close-and-personal treatment in which the shrimp worked around the eyes and face of the turtle.

As I stayed to snap as many photos as I could, the turtle and shrimp seemed to pose for me. But I was also watching my no-deco time countdown (I was at 28m), and after getting a few portraits of the turtle and shrimp, I finally had to leave the turtle to complete the rest of its spa day without my documenting it. Visit: brandiunderwater.com

THIS PAGE: Hawksbill sea turtle being cleaned by scarlet shrimp, Yap, Federated States of Micronesia. Exposure: ISO 400, f/10, 1/125s (top left); Exposure: ISO 400, f/6.3, 1/100s (top right); Exposure: ISO 400, f/18, 1/160s (lower right); Exposure: ISO 400, f/18, 1/160s (bottom left). Gear used for all images: Nikon D7100 camera, Nikon 105mm lens, Ikelite housing, dual Ikelite DS161 strobes



Miss Snooty

Text and photos by Gary Rose, MD

Every year during November through March, they come from all over the Eastern Seaboard, and descend upon Jupiter, Florida, in the United States for the balmy weather and the deep blue sea. I bet you are thinking that I am talking about obnoxious northern snowbirds. Nope. I am referring to the annual lemon shark aggregation.

There are always plenty of locals. Mixed in with the locals, there is one lemon shark that stands out above all the rest. People come from all over the world to see her and photograph her—our local and resident MISS SNOOTY!

She is a character. Her charm matches her beauty. Because of a congenital birth deformity, she has a perpetual smile. She knows that she is special and

has become quite the “Diva”. Trust me, she will put on a show for you and for all the divers in your group.

If you have a camera, just float in the water, control your buoyancy, and I promise she will come to you and pose. Left-side, right-side, wide-angle, facial, and then she will circle back for a brilliantly posed body shot. She is also an expert at “photo bombing,” so be prepared.

The key is to be patient and let her come to you and put on her show. You will have plenty of photo ops. Again, I emphasize patience. Lemon sharks, and particularly Miss Snooty, are a combination of puppy dog—they will poke you, push you, and even nip at your strobes—and boa constrictor. Please visit:

garyrosephotos.com

Classic Miss Snooty (top left). Exposure: ISO 100, f/8, 1/125s; Miss Snooty up to her antics (top right). Exposure: ISO 100, f/8, 1/125s; Inches from the dome port (above). Exposure: ISO 200, f/8, 1/125s. Gear used for all photos: Nikon D500 camera, Tokina 10-17mm lens, Nauticam housing, Inon Z-330 strobes



Gear used for all images taken at Manasquan River railroad bridge, Point Pleasant, New Jersey, USA: Canon EOS 7D Mark II camera, Tamron 60mm macro lens, Nauticam housing, dual Inon Z-330 strobes. Feather blenny (far left). Exposure: ISO 100, f /20, 1/250s; Hermit crab (left). Exposure: ISO 500, f/10, 1/250s; Oyster toadfish (below). Exposure: ISO 125, f/20, 1/200s; Winter flounder (bottom right). Exposure: ISO 125, f/14, 1/30s

Manasquan River, New Jersey, USA

Text and photos by Michael Rothschild, MD

These portraits were all taken at a shallow shore dive site off the New Jersey coast, the Manasquan River railroad bridge. I love hunting for little critters in spots like this, and the bridge rarely disappoints. Underwater macro photography is very different from wide-angle, where lighting and strobe placement are so critical. With macro, once your settings are dialed in, it really becomes more about you and your subject. A good nature photographer needs the same skills as a hunter—you need to know your target well, and position yourself precisely to get the best results.

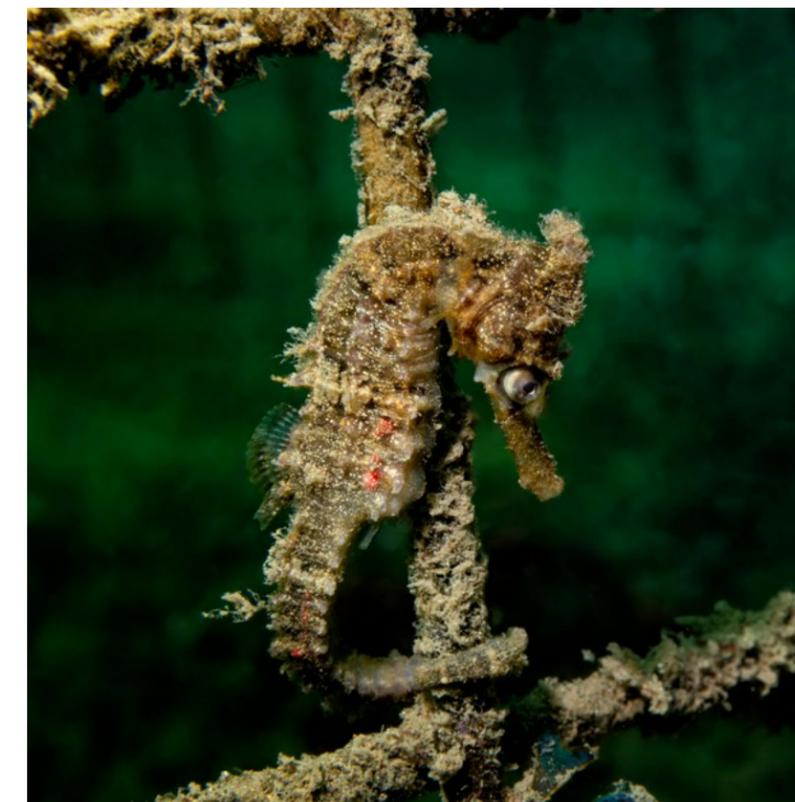
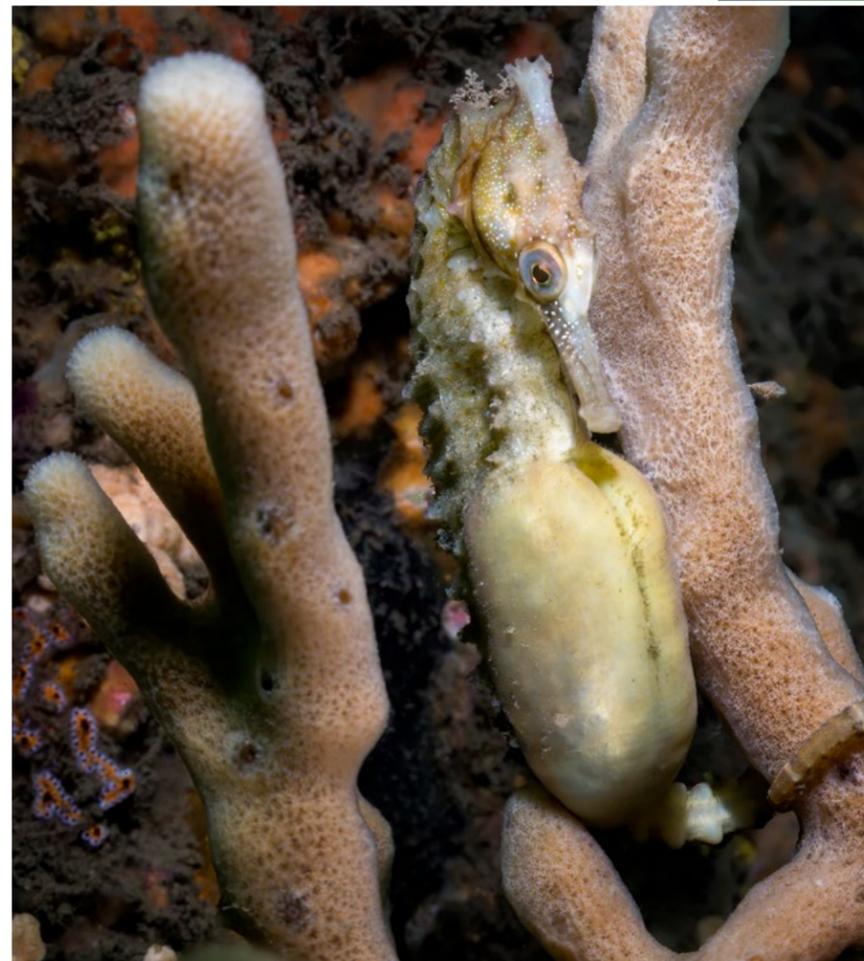
Every species reacts differently to the camera, so getting to know your local marine environment is crucial. Juvenile tautogs seem to be born wary of humans—it is almost impossible to get a face-on shot or even a reasonable three-quarter profile. On the other hand, blennies are the Instagram influencers of the undersea world—they will pose for you until you get bored and move on!

I am always amazed at how portraits make these creatures seem so expressive and emotive. Even crustaceans can capture your gaze when those eye stalks turn in your direction. Yes, some beautiful aquatic animals—like jellyfish, hydroids, and nudibranchs—do not have faces, and they still make good subjects. But once you find a great model who will throw you an engaging expression, you will really appreciate the work that our colleagues in fashion photography do every day. Visit: dive.rothschilddesign.com





Gear used for all images taken of White's seahorses at Clifton Gardens, Sydney, Australia: Nikon D500 camera, Nikon 10.5mm lens, Nauticam housing, twin Inon S2000 strobes. Portrait 1 (left). Exposure: ISO 400, f/14, 1/250s; Portrait 2 (bottom right). Exposure: ISO 400, f/18, 1/100s; Portrait 3 (below). Exposure: ISO 400, f/9, 1/60s; Portrait 4 (right). Exposure: ISO 400, f/9, 1/60s



White's Seahorse, Clifton Gardens, Sydney, Australia

Text and photos by Don Silcock

If this awful pandemic has achieved anything, it would possibly have to be an appreciation of what you have... And, as far as the underwater world of Sydney (where I have personally been hunkered down since March last year) is concerned, that would be Clifton Gardens in the uber-upmarket suburb of Mosman, where it is said

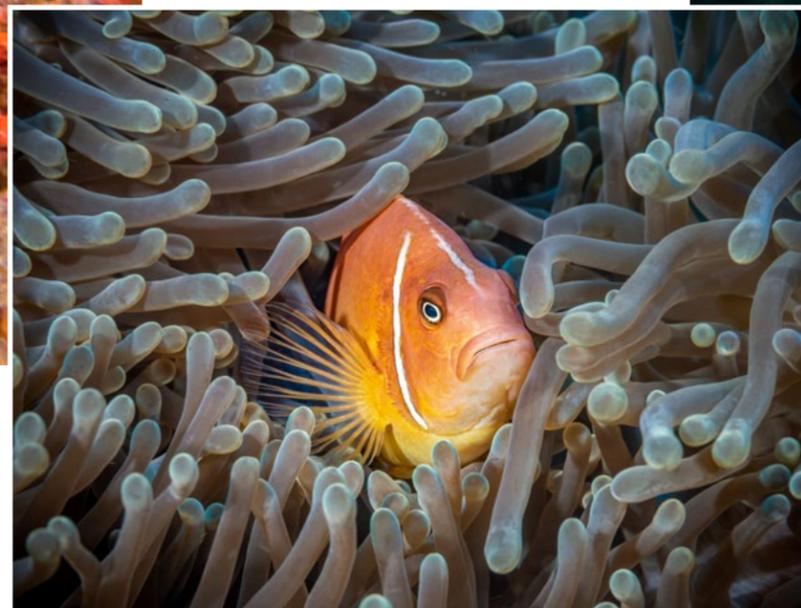
that if you listen carefully, you can hear the gentle sound of money rustling!

But that noise does not disturb the most well-known underwater inhabitants of Clifton Gardens—the resident population of White's seahorses (*Hippocampus whitei*), also known as the Sydney seahorse. These wonderful creatures are named after John White, the Surgeon General to the First Fleet, and are one of four species of seahorses

known to occur in New South Wales. In Sydney, population pressure has caused their natural habitats to decline, and as a result, they are now most commonly found on man-made swimming nets within the harbour. Naturally shy, the swimming nets afford the creatures the seclusion they need but also make for some wonderful backdrops for portrait photography! Visit: indopacificimages.com



Dive buddy Larry Cohen, framed by strawberry anemones on HMCS Yukon (left). Exposure: ISO 640, f/5.6, 1/80s. Gear: Olympus OM-D E-M5 camera, Olympus 12-50mm lens, Nauticam housing, dual Sea&Sea strobes; Pink skunk clownfish on sea anemone, Kimbe Bay, Papua New Guinea (below). Exposure: ISO 400, f/8, 1/125s. Gear: Olympus OM-D E-M5 camera, Olympus 60mm macro lens, Nauticam housing, dual Sea&Sea strobes; Sand tiger shark on Aeolus wreck shows her best profile (right). Gear: Olympus OM-D E-M5 camera, Olympus 12-50mm lens, Nauticam housing, dual Sea&Sea strobes; Female sea lion and her pup check out the reflection of themselves in the camera port (bottom right). Exposure: ISO 640, f/8, 1/160s. Gear: Olympus OM-D E-M5 camera, Panasonic Lumix G Vario 7-14mm f/4 ASPH lens, Nauticam housing, dual Sea&Sea strobes



Larry, Clownfish, Shark & Sea Lions

Text and photos by Olga Torrey

Just like a portrait photographer at a wedding, underwater, I consider my subject's expression extremely important. This is true even if it is a fish in the image, instead of a bride. I was astounded by the diversity of colorful wildlife in Kimbe Bay, Papua New Guinea. I knew that I was in the right place to practice shooting underwater. The pink skunk clownfish was the perfect model for this environmental portrait, showing its habitat where a sea anemone protects it. I focused on the eye and facial expression of the fish, which showed curiosity and no fear.

Diving around the Coronado Islands in Mexico, I was approached by a dozen California sea lions. The first rule of underwater photography is that when you think you are too close, get closer. These playful

creatures took this to the extreme. Even with a 7mm wide-angle lens, I had to get farther away. I wish I had used my fisheye lens. With all the chaos, I was able to isolate a mother and her pup for a family portrait. They were like a pack of friendly wolves! It was challenging to capture the image with them joyfully nipping at my fins and strobes. They were very interested in the attractive sea lions they saw reflected in my dome.

Diving off North Carolina in the United States on the shipwreck Aeolus is a shark-lover's dream. There are so many sand tiger sharks inside the wreck that the locals call it the "shark ballroom." As I observed the behavior of the sharks, I waited until an individual swam close to me, turning to the left. Waiting for the perfect moment, I was able to take a headshot of this exquisite

animal in profile. I focused on the shark's eye, teeth, nose and the marine growth around its mouth.

On another US wreck, the HMCS Yukon off San Diego, I took an environmental portrait of my dive buddy, Larry Cohen, while diving. I needed to concentrate on close-ups since the visibility was poor. I wanted to frame his face with the colorful strawberry anemones that blanketed the wreck. Seeing an opening, I asked Larry to swim behind the wreckage and move in close. Even with the lavish red in this image, the focus is on his piercing eyes. Visit: fitimage.nyc





Pilot Whale Calf, Tenerife, Canary Islands

Text and photos by Claudia Weber-Gebert

A few years ago, I got a special permit from Madrid to film the pilot whales around Tenerife in the Canary Islands, where there was a population of around 400 resident pilot whales. I asked Sergio Hanquet, a well-known photographer with more than 30 years of experience with whales and dolphins around the Canary Islands, to organize the filming for the project.

I was so excited about the trip, and we managed to have three days on the Atlantic Ocean to film the pelagic animals. The most emotional encounter we had on the trip occurred on our last day with a nursing group of pilot whales, which had three adult animals (one of them was pregnant and stayed in the background), and four youngsters that frolicked like playful kids.

We saw this group approaching our boat, got ourselves into the water, and waited for them. They saw us, came closer, and then the adults in the pod wanted to move on. At first, the younger ones followed the baby-sitting adults, but one of the youngsters kept turning back to look at us. As the group had now really travelled quite a distance away, we were going to go back to the boat when this little fellow turned around and came back to us. The adult whales had

no other choice but to follow the little runaway.

The four young pilot whales then started to swim around us and under us. We kept calm, watching the reaction of the adults at first, as they wanted the young ones to come with them. But the youngsters all refused, as they were curious about us. Several times, the adult animals tried to gain back the attention of their young, to no avail. After some time, the grown-ups seemed to accept us, as we were no danger to the youngsters, and so they allowed the youngsters “to play with us”—but the adults always kept an eye on us.

So, all there was left for me to do was to float on the surface and wait for the young pilot whales to come near and I could take photos of them with their lovely smiling faces—especially of the most curious little one, which we later nicknamed “the crazy one.” This one came back to us three or four times, when all the rest of the group wanted to move on, still playfully swimming around us and under us, allowing us to take wonderful pictures of those beautiful and intelligent animals. It was really sad then, when the group finally left, after spending at least 45 minutes with us. Such a great encounter—it stirred up a lot of emotions! Even Sergio admitted, that in his long career, he had never had an encounter like this one... so long and intense—so special. Please visit:

design-buero.org/Unterwasser-Fotografie



THIS PAGE: Several views of the curious young pilot whale coming in close to have a look at me, Tenerife, Canary Islands. Exposure: ISO 200, f/8.0, 1/180s. Gear for all images: Olympus OM-D E-M1 Mark II camera, with wide-angle lens, Nauticam housing, ambient light



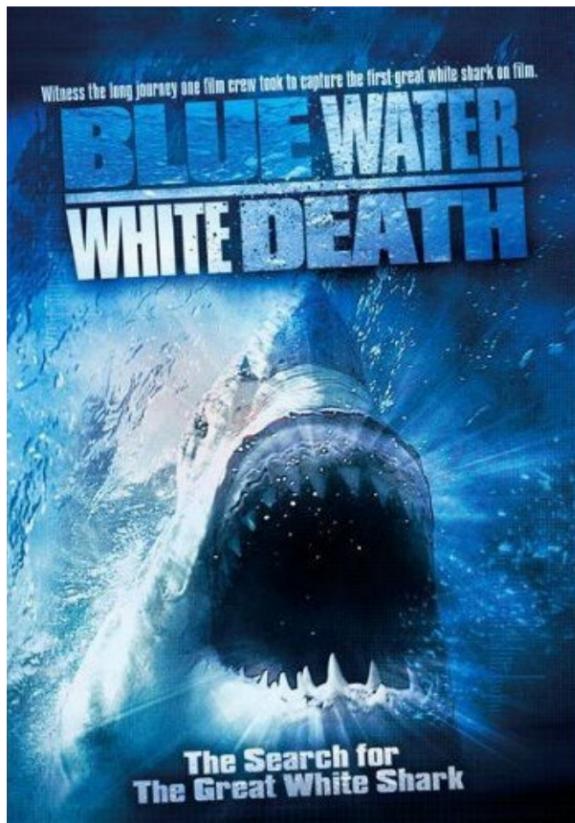


opinion

Great white shark. Our understanding of the nature of sharks has greatly evolved since the making of the film *Blue Water, White Death*

Text by Simon Pridmore

Recently, I was part of an online panel discussing the history of scuba diving. One of my fellow panellists mentioned the film *Blue Water, White Death* as having been a watershed as far as awareness of the need to protect large marine animals was concerned.



Blue Water, White Death DVD cover



The Dawn of Understanding

Blue Water, White Death – 50 Years On

ELIAS LEVY / FLICKR / CC BY 2.0

As a teenager, I watched this movie in the cinema and loved it. I do not think I came out of the cinema saying, "That's it! I want to be a scuba diver," but who knows? Perhaps it helped set me on a path I could not yet see.

Anyway, I decided to watch the film again on dailymotion.com and it was as good as I remember (despite the pop-up ads every few minutes). And my col-

league was right. Although *Blue Water, White Death* was sold to the 1970s public as a "man-against-man-eating-beast" adventure, with the benefit of hindsight, one can nevertheless perceive within the backstory the dawn of realisation that sharks may not be monsters to be feared, but rather wonderful creatures to be admired and protected.

Blue Water, White Death also gives us

the opportunity to watch some of the true pioneers of our sport at work. The video they shot is astonishing and would still be considered world-class today. The divers also displayed incredible courage in facing the unknown. Just because today, we dive all the time with sharks swimming around us and feel no fear, and just because nowadays you can see pictures on Facebook of your grand-

mother riding in a cage with great white sharks cruising nearby, it does not diminish the achievements of those who did it first, when nobody knew anything about the nature of these powerful animals.

Past vs present

As a scuba diver today, some aspects of the way they dived back then may grate on your sensibilities.





Great white shark. Once depicted as man-eating beasts, we now know that sharks in general are not what we thought they were.

In the late '60s and early '70s:

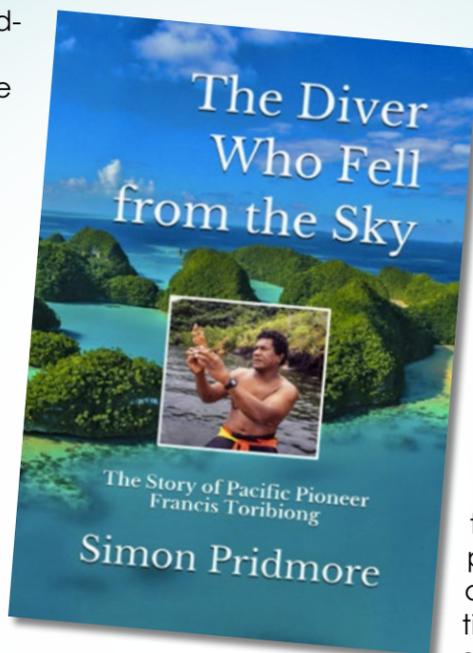
- Divers used to go into the water tooled up and ready for a fight, like *Star Trek's* Captain Kirk and company landing on an alien planet.
- The primary way in which they would

interact with big fish at that time was to wave recently killed smaller fish around to try to make the big fish do something interesting.

- When you dived, you swam; you did not float. With no means to adjust your buoyancy, your fins were what

A New Book from Simon Pridmore

When his country needed him most, Palauan Francis Toribiong came along and helped the Pacific island nation find its place in the world and become an independent, forward-looking 20th century state. And he achieved this, improbably, via the sport of scuba diving. This is the inspiring tale of an absolutely unique life, written by Simon Pridmore and illustrated with images of the beautiful islands of Palau, above and below the water.



him this title, people were speaking both literally and figuratively.

Toribiong was so completely different from all of his contemporaries in terms of his demeanor, his ambitions and his vision, that it was as if he had come from outer space. Palau had never seen anybody quite like him and there was no historical precedent for what he did. He had no operations manual to consult and no examples to follow. He wrote his own life.

Toribiong was born poor, had no academic leanings and no talent for diplomacy. Yet he was driven to succeed by a combination of duty, faith, a deep-seated determination to do the right thing and an absolute refusal ever to compromise his values. And, as well as all that, he was Palau's first ever parachutist—known by islanders as “the Palauan who fell from the sky.” In giving

Toribiong was the first Palauan ever to seek and seize the international narrative. No Palauan, in any context or field, had previously thought to go out into the world and say: “This is Palau—what we have is wonderful. Come and see!” This is his astonishing story.

Available in paperback or ebook on: **Amazon, Apple, GooglePlay and Kobo**



ELIAS LEVY/ FLICKR / CC BY 2.0

kept you from sinking. So, you never stopped flapping.

But I would urge you to look past these things. That was then; those were different times.

The movie

Blue Water, White Death follows the adventures of a hand-picked team of top divers travelling the world looking for great white sharks. They do not find any until a few minutes before the end of the movie, when they encounter them in cooler waters off Australia, close to beaches where there are colonies of seals.

The footage was filmed in 1969 and the movie was released in 1971. The producer and director was Peter Gimbel, a New York department store heir, whose association with the sunken liner *Andrea Doria* made him famous in the United States. He was the first to dive and photograph

the shipwreck and went on to produce two documentaries, one of which centred around the opening of the captain's safe, live on national television. The dive team in *Blue Water, White Death* includes American photographer Stan Waterman and Australian spearfishing champions and filmmakers Valerie and Ron Taylor.

The story line

The film begins with the team arriving in South Africa. They charter a boat and head out for the whaling grounds, where big sharks are said to follow the fleet. Their idea is to find a whaler that has just made a kill and has fed compressed air into the carcass to make it float. The divers will then ask permission to film around the dead whale, hoping for shark action.

Which is what happens. The footage of the harpooning of a sperm whale is horrific and shocks the team. After showing the whaler's bow cannon shoot the

whale three times before it dies, the camera flicks to Valerie Taylor with her hand to her mouth, screaming, “They shot him! They shot him!”

Then it cuts to Waterman, filmed up close, looking out to sea, saying: “Such extraordinary creatures, marvellously intelligent. At the rate they are being hunted now, they'll be extinct before we really come to understand them.”

It is unlikely that many of the film-going public in 1971 had ever seen how a whale was killed, nor would they have heard sentiments such as those expressed by Waterman, to the effect that whales were not only intelligent animals, but that they were also on the verge of being wiped out.

Dealing with sharks

In the film, sharks duly appear around the dead whale, and there is lots of talk among the divers as to how to fend them





off. They all agree that sharks respect a show of aggression, and if you are passive in their presence, they will perceive this as weakness and attack you. However, they have widely varying ideas as to the degree of aggression necessary.

Ron Taylor has a bang stick fitted with an explosive charge and he describes how to use it: "You pull the safety clip out and slam the end with the charge in it against the shark. It's really deadly."

Waterman, however, has a less extreme counter-measure in mind. He declares that his plan is to fend off any unruly sharks with "a punch straight on the nose with your bare fist."

The divers all go into their aluminium cages armed like big-game hunters with spear guns, bang sticks and enormous knives. Gimbel proudly declares that his knife has a 10-inch (25cm) blade.

The sharks attracted to the carcass in the film are oceanic whitetip sharks, dusky sharks and blue sharks. There are no great whites around.

The whaling fleet returns to Durban, with over a dozen whales hanging from the sides of each ship. A coastal train hauls the whales from the boats to a yard where they are cut up and torn apart. The camera does not turn away its gaze for an instant. It is gruesome stuff.

A few weeks later, the team tries again. This time, they put the cages and divers into the water around the whale at night. This results in amazing footage of feeding sharks, but again, there are no great whites around. The divers notice that the sharks are taking little interest in them, even after dark, and they conclude that the cages may not really be necessary.

Swimming free

So, the following day, they go into the water cage-free. Nevertheless, they are still mentally tuned for battle and equipped as if they are going to war.

"We have to act aggressively. It's the only thing they understand," says Gimbel.

The ensuing underwater footage shows the divers exhibiting far more threatening behavior than the sharks. At one point, a blue shark comes too close and is completely disabled by a bang stick blast to the head. It starts spinning wildly around, out of control, and eventually sinks down into the inky depths, out of range of the divers' lights.

In their post-dive interviews, the divers are still high on the adrenaline. Even for them, some of the most experienced divers in the world, swimming free with feeding sharks has been incredibly exciting.

Dusky shark

However, each finds it extremely difficult to describe what just happened. It was not at all what they expected.

Ron shakes his head in wonder that they have all emerged from the water without even a scratch, and Valerie marvels that she never sensed for a moment that the sharks would bite her. The much-anticipated attacks never came, none of their fears were realised, and they were at a loss to explain it.

Present day reflections

It is fascinating to listen to the cast wrestling with this disconnect between expectation and reality. Those of us who routinely swim with sharks today know that, except in a tiny number of recorded instances, unprovoked sharks in clear water present no danger at all to divers. Unwittingly, Gimbel and the others had been full of apprehension for a risk that did not exist.

I am sure, as I watched the film in the

Understanding

darkness of the theatre in 1971, I sat, heart in mouth, fearing that at any moment a shark would attack a diver. The divers' nervousness in the water, as they constantly turned, twisted and jabbed away the sharks, would just have reinforced that sensation of imminent danger.

However, rewatching the movie in 2021, I see the sharks presenting no threat at all. The divers' display of aggression and array of weaponry feel disproportionate and entirely unnecessary. It is all a little embarrassing.

But, of course, the divers then did not know these things, and it is fascinating to witness them after the dive at the dawn of understanding, grappling with the realisation that sharks are in fact not the vicious, unthinking brutes they thought they were.

Back to the story

Frustrated by their failure to find great whites, the team heads off first to the



Oceanic whitetip shark, with pilot fish

MICHAEL ASTON / FLICKR / CC BY-NC 2.0



opinion



ELIAS LEVY / FLICKR / CC BY 2.0

Seychelles, then the Comoros and then Sri Lanka. There are no great whites there either.

Then, with a "Like I said before..." Ron announces he has a good idea where they can find great white sharks, and the scene switches to Australia. The Taylors' friend Rodney Fox acts as a guide and entertains them all with a vivid description of a great white shark attack, which he survived. It sends shivers down the spine.

The team duly finds the big fish they have been searching for all this time and they get some incredible video from inside the cages. Nobody suggests swimming free with great whites

after hearing Rodney's story.

One of the team nearly dies when a great white shark grabs a huge chunk of bait hanging on the cage in which the diver is standing and tries to swim off with it, cage and all. Encountering resistance, as the cage is tied to a mooring buoy, but refusing to release its prize, the shark contorts its body wildly and shakes its massive head back and forth, causing the guy inside the cage to be rattled around like a loose coin in a spin dryer.

Eventually, the diver realises that the shark is never going to give up and, if he does not do something drastic, at some point the shark will succeed in

ripping the cage loose. Then he and it will be dragged off into the depths. Fortunately, he has his huge knife strapped to his leg and he deploys this to slice through the line holding the bait, thereby saving his life... and coincidentally showing that sometimes having a weapon in hand on a dive can be a good thing!

Tragic irony

It is a terrific finale. Author Peter Benchley once revealed in an interview that it was this scene that inspired him to write the book *Jaws*. So, ironically, just as *Blue Water, White Death* prompted the divers involved to revise

Great white shark. After the making of the film *Blue Water, White Death*, divers in the movie became life-long advocates for the protection and greater understanding of sharks.

their view of sharks as mindless predators, it also inspired a series of films that had an entirely opposite effect on the public perception of sharks. It would be a decade or more before memories of the *Jaws* movies faded sufficiently for many people to decide that it really was "safe to get back in the water."

Hunters turned gamekeepers

The key on-camera figures in *Blue Water, White Death* would go on to become life-long advocates for the protection and greater understanding of sharks.

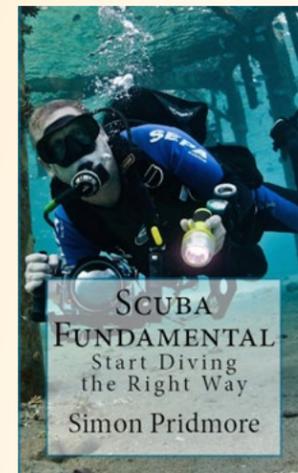
Waterman won five Emmy Awards for filmmaking and was the subject of a Discovery Channel biographical feature called *The Man Who Loves Sharks*.

Having been lethal, world-class spearfishers in their younger days, Ron and Valerie Taylor became ardent conservationists, "fighting for the poor old, much-maligned sharks" (as Valerie put it). The recent National Geographic documentary *Playing with Sharks*, now showing on Disney, tells their story. ■

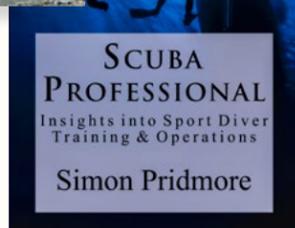
Simon Pridmore is the author of the international bestsellers Scuba Confidential: An Insider's Guide to Becoming a Better Diver, Scuba Professional: Insights into Sport Diver Training & Operations and Scuba Fundamental: Start Diving the Right Way. He is also the co-author of the Diving & Snorkeling Guide to Bali and the Diving & Snorkeling Guide to Raja Ampat & Northeast Indonesia. His most recent published books include The Diver Who Fell From The Sky, Dive into Taiwan, Scuba Exceptional: Become the Best Diver You Can Be, Scuba Physiological: Think You Know All About Scuba Medicine? Think Again! and the Dining with Divers series of cookbooks. For more information, see his website at: SimonPridmore.com

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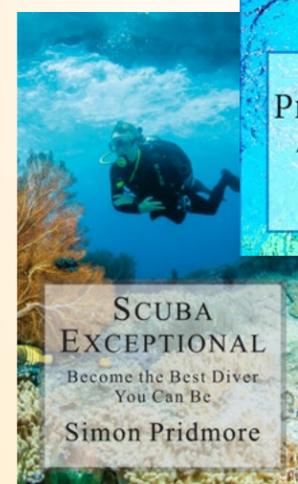
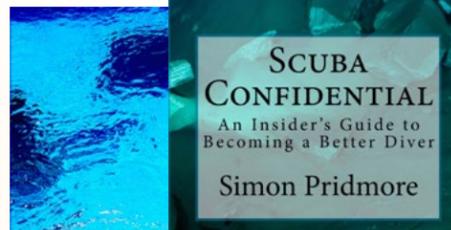
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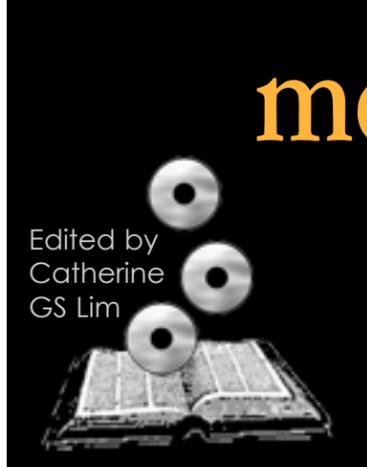


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Edited by Catherine GS Lim

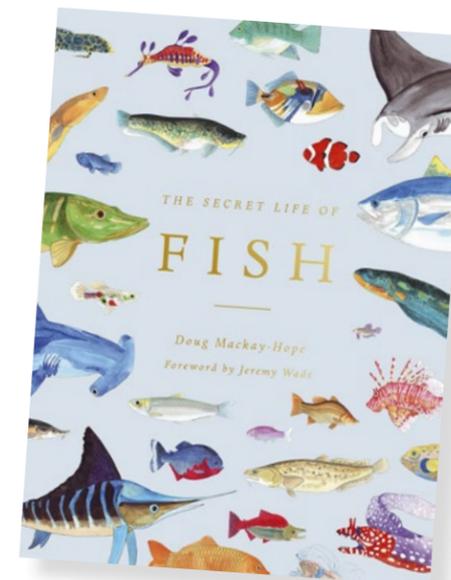


Underwater Photography

Two Worlds: Above and Below the Sea, by David Doubilet

In his first major book in two decades, photographer David Doubilet presents a series of beautiful over-under (or split-shot) photos that celebrates the beauty and magnificence of the worlds above and beneath the waves. In his words: "I want to create a window into the sea that invites people to see how their world connects to another life-sustaining world hidden from their view."

Publisher: Phaidon Press
Date: 15 September 2021
Hardcover: 128 pages
ISBN-10: 1838663185
ISBN-13: 978-1838663186

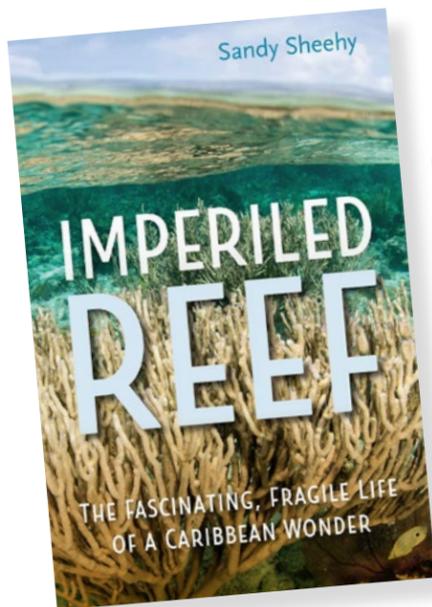


Fish Life

The Secret Life of Fish: The Astonishing Truth about our Aquatic Cousins, by Doug Mackay-Hope

Divided into chapters like Dangerous and Deadly, Unusual Giants and Mini Marvels, this book presents readers with interesting facts about 50 intriguing fish species. Alongside charming watercolour illustrations, biologist Doug Mackay-Hope shares little-known snippets of information that bring these fishes to life and reveals the secrets of how their bodies work. (Specifically, we are referring to aspects of their biology like their super senses, deadly toxins, their ability to give electric shocks, etc.)

Publisher: Ivy Press
Date: 28 September 2021
Hardcover: 224 pages
ISBN-10: 0711260990
ISBN-13: 978-0711260993



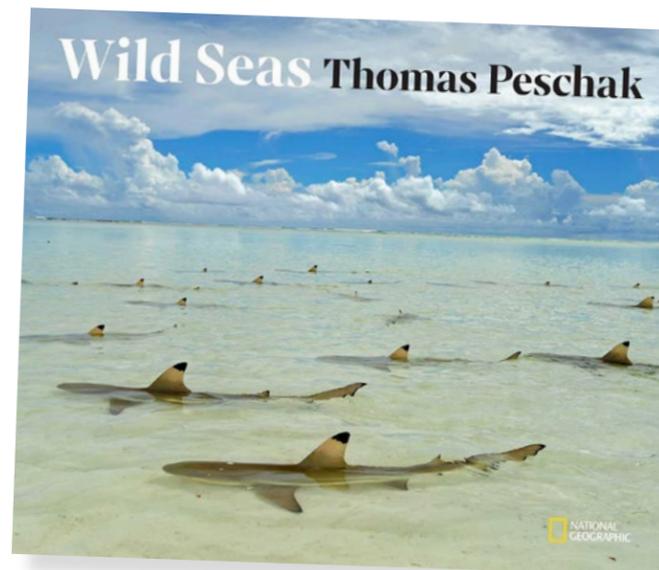
Coral Reefs

Imperiled Reef: The Fascinating, Fragile Life of a Caribbean Wonder, by Sandy Sheehy

Situated along the coasts of Mexico, Belize, Guatemala and Honduras, the Mesoamerican Barrier Reef is the world's second

largest coral structure. Besides delving into the reef's formation and its flora and fauna, this book also gives an account of the threats it faces (from global warming, overfishing, overdevelopment, etc) and the efforts of nongovernmental agencies, scientists and local communities to address them. In addition, the writer also covers practical actions that individuals can take to protect this reef.

Publisher: University of Florida Press
Date: 5 October 2021
Hardcover: 304 pages
ISBN-10: 1683402499
ISBN-13: 978-1683402497



Underwater Photography

Wild Seas, by Thomas Peschak

Wild Seas charts National Geographic photographer Thomas Peschak's transformation from marine biologist to conservation advocate. His 200 photographs in this book bring to light the beauty and wonder of the marine world and its inhabitants, from gregarious gray whales, acrobatic manta rays and parading penguins, to sharks in a feeding frenzy and sea turtles the size of bears—and more. They also show the dark side of pollution, overfishing and climate change, thus presenting an impassioned case for protecting our oceans.

Publisher: National Geographic
Date: 5 October 2021
Hardcover: 240 pages
ISBN-10: 1426221932
ISBN-13: 978-1426221934

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Text and photos by Scott Johnson

Comprising two tropical island groups located 932km southeast of Miami, the Turks and Caicos Islands are a British Overseas Territory in the Lucayan (or Bahama) Archipelago of the Atlantic Ocean. Underwater photographer Scott Johnson describes the easy diving found here as he meets the challenge of capturing images of mouth-brooding behavior in fishes.



Yellowhead jawfish with eggs in its mouth (above and right); Spinyhead blenny (top)



Turks & Caicos

— *Easy Diving & Mouth-brooding Photography*

"Is this an exercise in futility, stupidity, or both?" I asked myself as I ascended from the second shallow dive of the day to take a short break, grab a fresh tank, and then give it another go. The *Turks & Caicos Aggressor II*, which my

wife Lauren and I think of as our "home away from home" (since we are aboard the yacht at least once per year), was currently moored above the Driveway dive site in West Caicos. It was an appropriate name for the site as I felt

like Lady Luck had run over me and then backed up a few times for good measure thus far today, frustrating my photographic efforts.

Undaunted, I returned to the same patch of sand and rubble that served as

a rather uncomfortable and unsuccessful observation point for much of my previous dive. I chose this spot after finding and disregarding a dozen or so yellowhead jawfish, which either were not caring for eggs or had eggs that





Yellowhead jawfish incubates its eggs in its mouth and aerates them by spitting them out and quickly sucking them back in.

were too immature. Fortunately, the male yellowhead jawfish only a meter in front of me had a mouth full of silver eggs, which would likely hatch within the next 24 hours. Now, it was back to the hard part—waiting.

When male and female yellowheads mate, the female releases an egg packet, which the male fertilizes, scoops up in his mouth and then orally incubates for seven to nine days until the fry hatch. In order to capture “the shot,” which is of the male jawfish aerating the eggs by spitting them out and then almost instantaneously sucking them back inside, I lay as motionless as possible and breathed at a steady, rhythmic pace to allow the protective parent to realize I was no threat. Finally, after thirty minutes of missing the in-the-blink-on-an-eye aerations, I squeezed the shutter at just the right moment and framed the silver eggs before the jawfish returned them to his mouth. With an appreciative nod to the diligent father, I slowly backed away and finished another beautiful dive in the azure waters of Turks and Caicos.

Countless coral skeletons

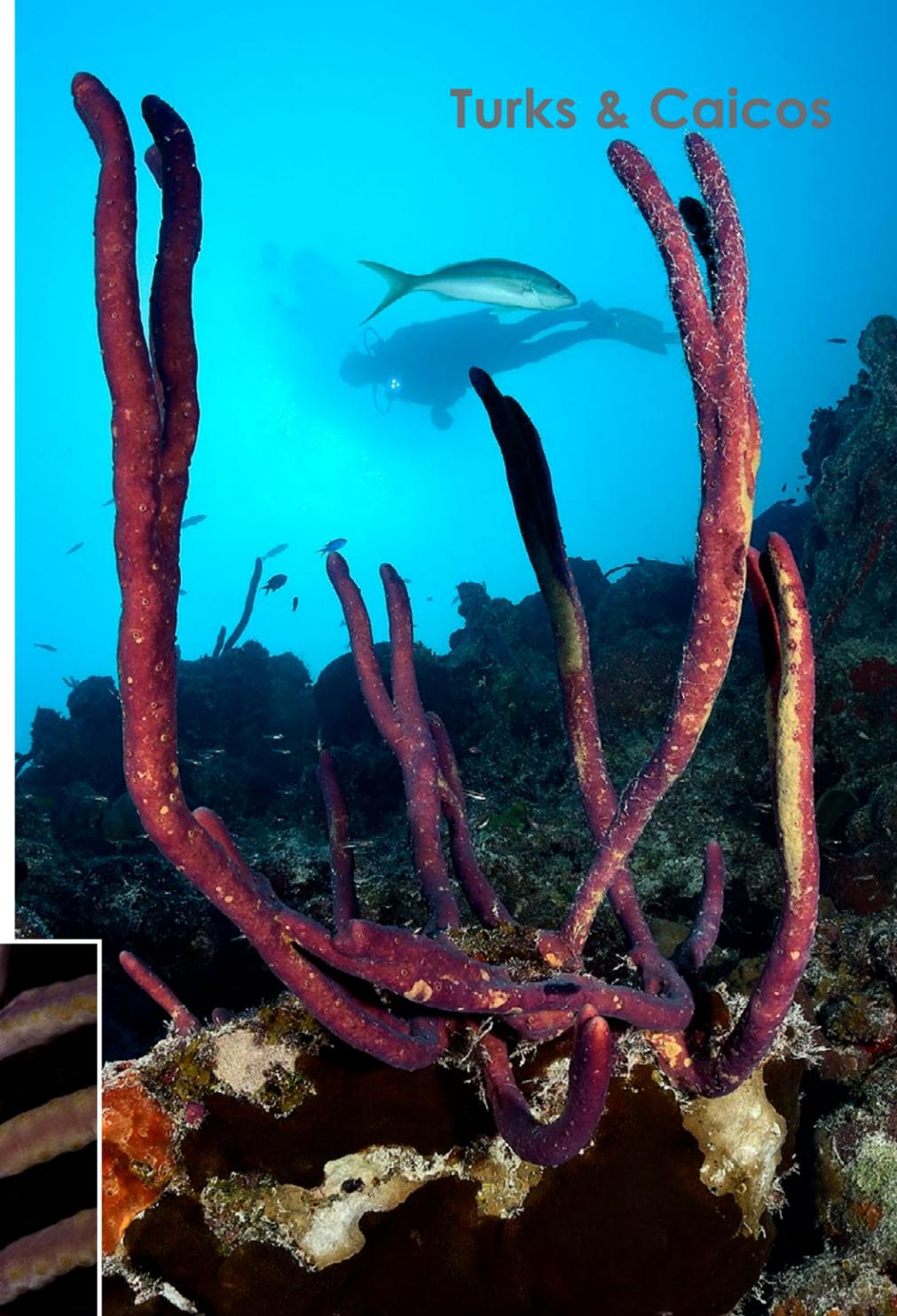
The Turks and Caicos Islands (TCI) are a British Overseas Territory located 932km southeast of Miami in the US state of Florida, 63km southeast of Mayaguana in the Bahamas, and 161km due north of Hispaniola (Haiti/Dominican Republic). Over 40 enchanting islands and cays, which account for 389 sq km of beckoning beaches, are separated into two distinct groups by the 35km-wide and 2,195m-deep Turks Island

Diver and rope sponge on reef (right); Flamingo tongue pair (below)

(or Columbus) Passage. The Caicos Islands, by far the larger of the two chains, run east to west and include West Caicos, Providenciales (Provo), North Caicos, Middle or Grand Caicos, East Caicos and South Caicos, as well as small cays like French Cay, Parrot Cay and Pine Cay. The Turks Islands stretch north to south and contain only two sizeable landmasses in Grand Turk and Salt Cay.

The Bahamas and TCI are divided by the Caicos Passage and combine to form the Lucayan Archipelago. This dotted string of islands represents the pinnacles of coral banks that were formed in a similar manner to the Florida Keys. These ancient reefs were repeatedly covered, uncovered, and sculpted by fluctuating sea levels, which

Turks & Caicos



were triggered by changes in the earth's temperature, and consequently, the size of the polar ice caps. The islands and cays we see today are the covered crests of untold numbers of coral skeletons, which collectively form the terrestrialized reefs.

Bold, beautiful and fun “Not going to happen,” said Rob Smith, the *Turks & Caicos Aggressor II*'s stout engineer and trusty dive guide, when he saw me trying to carry one of our bags from the dive deck to our cabin. This had become somewhat of a game between us through the years as the whole crew took pride in making sure guests never do





Roughhead blenny (far left); Pederson's shrimp (center); Spotted drum (above inset); Caribbean reef squid (above)

anything remotely resembling work. I considered it a major victory if I could zip my own wetsuit before a crew member beat me to it.

The “no work, live easy” theme aboard the yacht was generally continued underwater, as the diving in TCI was ridiculously uncomplicated, exciting and dependable. Basically, guests merely needed to jump off the back of the 36.6m luxury yacht once the vessel was moored. Mild to no currents, warm water, and 30m of visibility were the normal diving conditions.

The islands here are predominantly encircled by shallow-water, “spur-and-

groove” reefs. Follow a groove away from an island and it will generally lead you to a dramatic drop-off and the tranquil, cobalt blue of open water. Panoramic views of the walls can be breathtaking due to the water clarity and the evident health of the reefs. Variety is measured more by what you see during your explorations than the variances in the life or typography from one site to the next. Big marine animal sightings are common throughout the archipelago. Believe it or not, guests get so used to seeing rays, sharks and turtles during a charter that they often go in search of a nice channel-clinging crab or

spiny lobster to entertain them. We divers can be a fickle lot.

Underwater games

Provo's Thunderdome or The Dome was a “wreckish” dive unlike any other in the world and one of the best night dives in the Caribbean to boot. The Dome represented the remains of a French television game show entitled *Escape from Pago Pago Island*, which was filmed in 1992 and 1993. The steel structure that was once the centerpiece of the set now lay twisted and partially disassembled by storm-induced waves. You had to dig in the sand to make it

past 10m, so there was plenty of bottom time for examining the area. Roughhead blennies, Pederson's shrimp and skeleton shrimp were readily found on remnants of the abandoned set. Spotted drums, schoolmasters and large green morays frequented the interior of the most intact section.

Brazen black jacks could be a pain at night because they often tried to use divers' lights as hunting aids. For example, one rushed out of the darkness to grab a tiny Caribbean reef squid before I even had the chance to photograph it, making me feel like an accomplice. Overall, night dives at The

Dome reminded me of treasure hunts for living booty in the form of banded clinging crabs, flamingo tongues and other exquisite residents.

West Caicos and French Cay were uninhabited islands. About all one would find on land were birds, insects, lizards and scrub plants. Life beneath the surface was a totally different story. The neon-colored fish, bushy gorgonians and robust sponges were welcome contrasts to the terrestrial starkness.

Underwater fly-bys were a common occurrence at West Caicos. I made it a habit of scanning the blue water in case a manta ray, spotted eagle



LEFT COLUMN TOP TO BOTTOM:
Goldentail moray eel; Nurse shark;
Diver with Caribbean reef shark

Diver with large spiny
Caribbean lobster under
ledge on reef (right)



ray or sea turtle was cruising along the wall. The Anchor was West Caicos' signature dive. A huge, 17th-century anchor was embedded in the wall of a narrow channel at 21m. Despite its size and shape, the sponge-encrusted anchor was easy to miss if you were not paying close attention to the reef. A dive guide came in handy on this one.

Where the wild things roam

French Cay is where the wild things swim and where liveaboards rule. Strong trade winds and waves often make the 29km crossing south from Provo an uncomfortable challenge for day boats. The sites Double D, G Spot, Half Mile, Rock & Roll and West Sand Split are all similar in that they were obviously named by drunken, modern-day pirates and because each usually offers plenty of sharks, schooling horse-eye jacks and industrious

jawfish. Nurse sharks use French Cay as a romantic getaway each July and August when they congregate in the shallows to mate.

Caribbean reef sharks often appear just below the surface near the dive deck at these sites as if responding to the hum of the generators. Guests often pause before making a giant stride entry as they wonder what might happen if he or she lands on a muscular, scaly back. You know each is thinking, "OMG! OMG! OMG!" During the dives, the sentinel sharks are ever-present. They circle the yacht. They circle the divers. And they circle one another.

During a dive at Rock & Roll, I positioned my back to the sun, framed one of the approaching sharks in my Aquatica viewfinder and then fired a quick burst of shots. The weak electrical impulses generated by my strobes prompted the curious



FACT FILE:

GETTING THERE: Air Canada, American Airlines, British Airways, Delta, JetBlue, Southwest and United offer daily direct flights to the Providenciales International Airport from various major hubs in North America and Europe.

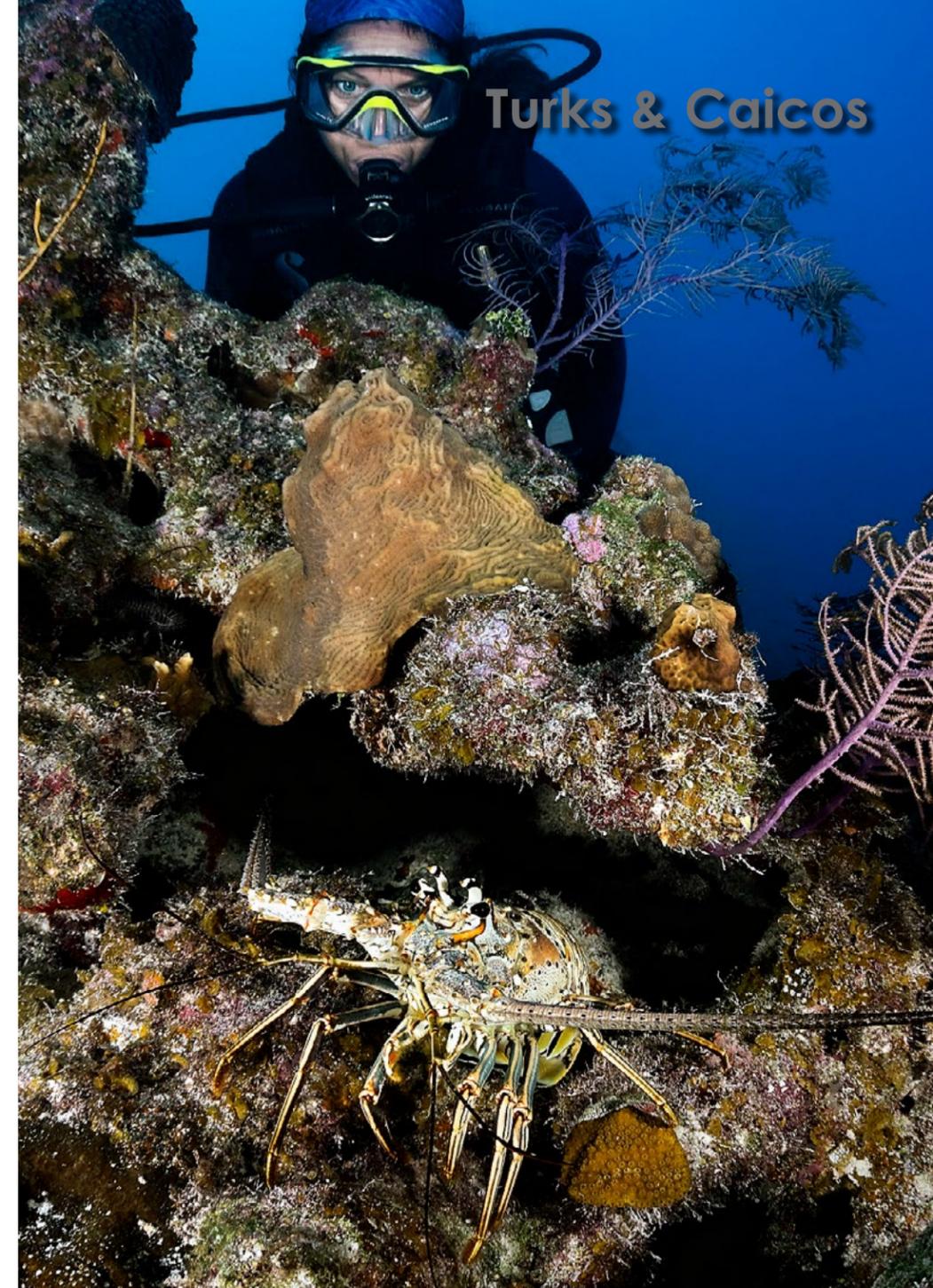
DEPARTURE TAX/VISA: The departure tax is currently US\$60, though it is typically included in the airfare. A visa is not required for visitors from most countries. Visitors are granted entry for 90 days. A valid passport and return or ongoing international transportation ticket are required to enter the Turks and Caicos Islands.

LANGUAGE: English

CURRENCY: US dollars and credit cards are widely accepted.

ELECTRICITY: 120 volts AC, 60 Hz, with standard US-style plugs

DIVE OPERATOR: The *Turks & Caicos Aggressor II* (aggressor.com)



shark to bump into me. But I did not mind because the underwater world of the TCI was exactly where I wanted to be.

The destination of "easy"

The TCI's "Beautiful by Nature" slogan was spot on. The picturesque, flat islands offered miles of lonely white sandy beaches, bathed in balmy breezes and lapped by turquoise waters. Our days and nights were

spent leisurely diving, eating and relaxing—quite decadently, I must confess. Ultimately, TCI was the destination of "easy." Life aboard the *Turks & Caicos Aggressor II* was easy. The diving was easy. And, of course, swimming with the sharks was easy. The only things that were not easy were photographing the mouth-brooding jawfish and having to go back home at the end of the charter trip. ■

Edited by Peter Symes



Adult Chinese white dolphin swimming off the coast of Lantau Island, Hong Kong

Only 27 white dolphins left in Hong Kong

Only 37 Chinese white dolphins remain in Hong Kong, according to the latest statistics from Hong Kong's Agriculture, Fisheries and Conservation Department.

The species is protected in Hong Kong by the Wild Animals Protection Ordinance (Cap. 170). Nonetheless, the number of dolphins in Hong Kong

has declined as much as 80 percent over the last 15 years, according to conservation groups such as the Hong Kong Dolphin Conservation Society.

The reproductive rate of dolphins is considerably low so the mission for conservationists is to "keep the population healthy," Vincent Ho, the vice-chair of the Hong Kong Dolphin Conservation Society, told the *New York Times*.

Ocean noise pollution is threatening Chinese white dolphins, affecting the criti-

cally endangered creatures' ability to hunt, navigate and communicate. With a much reduced number of high-speed boats traveling to and from Macau and other mainland cities during the pandemic, the number of dolphins in the area grew in 2019.

Researchers say it is more likely that less boat traffic has brought dolphins back to their habitat and not that the populations are rebounding. ■



The pygmy blue whale is the smallest subspecies of the blue whale (shown here).

New population of pygmy blue whales found

A new population of pygmy blue whales has been discovered in the Indian Ocean, thanks to the recordings of underwater nuclear bomb detectors.

A new population of pygmy blue whales has been discovered in the Indian Ocean, thanks to underwater nuclear bomb detectors that recorded their whale songs.

The research team, led by the University of New South Wales (UNSW), had been studying data from the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) which monitors international nuclear bomb testing, when an unusually strong signal caught their attention.

It was a whale song, but one

that the scientists knew little about. Studying its structure, frequency and tempo, they realised that the whale songs came from a group of pygmy blue whales that had not been previously recorded in the area before.

The team then scanned through all of the CTBTO data—18 years' worth—looking for any wider patterns and confirmed that the songs were not a random occurrence.

Lead author Emmanuelle Leroy, a UNSW postdoctoral fellow, said that the songs of blue whales were very structured and simple, but each subspecies and population had a different song type. "Their songs are like a fingerprint that allows us to track them as they moved over thousands of kilometers," she said.

The Chagos whale song has three sections: the first was the most complex, and this was followed by two

basic parts.

"This new whale song has been a dominant part of the soundscape in the Central Equatorial Indian Ocean for the past nearly 18 years," said senior author Tracey Rogers, a UNSW marine ecologist, in a *Live Science* article.

"We found them not only in the central Indian Ocean, but as far north as the Sri Lankan coastline and as far east in the Indian Ocean as the Kimberley coast in northern Western Australia," she added.

At this time, the Chagos population has yet to be confirmed with a visual sighting.

The findings of their study has been published in the *Scientific Reports* journal. ■ SOURCES: UNSW SYDNEY, NATURE, LIVESCIENCE



A great white shark is observed by divers in a cage under the *Rodney Fox* expedition vessel. The dive operation is now run by Rodney Fox's son Andrew Fox, who has become an expert and avid photographer of great white sharks and their behaviors, having been raised in close relationship with them all his life, combined with an academic foundation in environmental science.

In Deep with **Andrew Fox** *— Born to Great White Sharks*

Interview by Don Silcock
Photos courtesy of Andrew Fox
and Don Silcock

The great white shark (*Carcharodon carcharias*) is undeniably the most well known of the ocean's many predators. It has, one could say, "form" and is widely considered as a ruthless and terrifying man-eater, which has taken the lives of many innocent swimmers, surfers and divers.



COURTESY OF ANDREW FOX

Andrew Fox at the Neptune Islands



COURTESY OF ANDREW FOX

And, if you have anything more than a passing interest in these notorious creatures, you will almost certainly have heard of Rodney Fox—the man who miraculously endured a horrendous attack by a great white when he was spearfishing off Aldinga Beach, south of Adelaide, in 1963. To this day, nobody

else in the world has survived such a ferocious attack. The probability though is that even if you know about Rodney Fox and the attack, you may not know about what he did after he recovered from it, and how he became a staunch advocate for the protection of great white sharks,

and the first to build a business that would actually take people to see them firsthand in the open water. It really is an amazing story and, on a personal level, one that helped inspire me to overcome my intense fear of sharks in general, and the great white in particular. Over the years, I read everything I could

about Rodney—so much so, that I felt like I actually knew him. Then, in November 2020, I finally got the chance to meet him—when he hosted a trip on board the new *Rodney Fox* expedition vessel to South Australia's Neptune Islands as part of his 80th birthday celebrations. Rodney was on the boat for four days, and I was





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Andrew Fox

CLOCKWISE FROM TOP LEFT: Andrew and Rodney Fox conduct a joint shark presentation; Andrew Fox examining a dead great white shark; Dr Eugenie Clark on her first great white shark expedition; Rodney Fox shows his scars from a great white shark bite; Photographers and authors David and Anne Doubilet, who came to dive and photograph sharks with Rodney Fox in 1980; A young Andrew Fox (with cat)

able to sit and chat with him for many hours about his life and adventures, which was just a wonderful experience!

On that trip, I also got to meet Rodney's eldest son, Andrew, who has been running the whole operation after his dad retired back in 2000. You could say that Andrew is a hard read... He is a big guy with a commanding presence but does not say too much; however, when he does, it pays to listen. He also does a nice line, in rapier-like sarcasm, but beneath all that lurks a deeply knowledgeable and incredibly experienced expert on the great white shark. And not only that, his photographs of great white sharks are probably the very best in the world!

Born to sharks?

Imagine, if you will, growing up in a house where large and potentially dangerous sharks are part of the household fabric and where one of your earliest and most vivid memories is being woken up in the early hours of the morning to peer over the side of your dad's abalone fishing boat to see the large head of a great white shark—spy-hopping, as it assessed the strange situation.

The boat, a 20ft-long half-cabin called *Skippy*, was there because Rodney had been contracted by Steve Spielberg's production company to attract great white sharks for the live portion of the film *Jaws*. So, the *Skippy* was moored in Memory Cove, located southeast of Port Lincoln, while Rodney tested the

reliability of the location and whale oil as an attractant. A seven-year-old Andrew had long gone to sleep in one of the bunks, and Rodney also eventually retired, only to be woken by a harsh rubbing sound along the outside of the fibreglass hull when the great white shark appeared!

Jaws made Rodney very much the go-to guy in South Australia for pioneering underwater cinematographers like Al Giddings and legendary *National Geographic* underwater photographer David Doubilet. Then came adventurers like Carl Roessler, Doug Seifert and Stan Waterman, leading well-heeled tour groups to experience one of the very

extremes of the underwater world which, at the time, was almost akin to climbing Mount Everest. Then there were the shark researchers like Eugenie Clark and John McCosker, whom Rodney

helped immensely in their quest to really understand the great white shark, rather than sensationalise the animal—not to mention, the iconic Australian underwater filmmakers Ron and Valerie Taylor who were a regular presence in South Australia.

Basically, Andrew's formative years were spent with his dad receiving an almost constant stream of interesting, adventurous and extremely charismatic visitors—plus, Rodney took him on as many of those expeditions as he could. It was not your normal, everyday upbringing.

Being Rodney Fox's son

Andrew is a really busy guy, but on a subsequent trip to the Neptune Islands, some six months later, he graciously agreed to sit and answer a series of questions I had put together, starting with, "What was it like growing up in South Australia as the son of Rodney Fox?"

Andrew's response was that he just felt really lucky, because as the eldest son, he was the first to go out with his dad on the great white shark expeditions. Those were very much the early days of being in the water with the sharks, and there was much to learn, plus it was during a time in Australia that was significantly less regulated than it is now.

It was all incredibly exciting stuff, but because Andrew was completely immersed in it all, it was, as they say, just a "normal day." He never really thought of his dad as being famous but did acknowledge that, at school, there was a degree of "tall poppy syndrome" expressed by the other kids, usually



THIS PAGE: Views of great white sharks from the Rodney Fox's ocean-floor cage

when there was something in the media about Rodney.

It was only as Andrew developed a sense of his own mortality in his thirties, that he fully realised what Rodney had gone through when he was attacked by a great white. He reckons that his dad just dealt with it all, both at the time and as he recovered, in the classic “she’ll-be-right-mate” Australian fashion and never really internalised the full magnitude of what had actually happened.

Career choices

Upon finishing high school, Andrew pursued a degree in environmental science at Adelaide’s Flinders University, which eventually gave him the pretty unique combination of an academic foundation, combined with unparalleled firsthand involvement with great white sharks. Although, he will admit it took

him two years longer than it should have because of all the time he spent out at sea.

For me personally, one of the highlights of a great white shark trip on the *Rodney Fox* expedition vessel is the evening when Andrew does his “talk.” It is usually on the second night after everybody has settled in and is a very low-key affair—no egos on display. In fact, you get the distinct impression that he would much prefer it if somebody else was doing the gig.

But once he gets going, his deep passion and knowledge of the great white shark becomes apparent, and it is clear that Andrew is talking about his life’s work. There are, no doubt,

other academics and researchers who know much more about key aspects of *Carcharodon carcharias*; but with over 40 years of empirical experience with these animals in South Australia and an academic foundation of his own, you

quickly realise while listening to Andrew that the person standing in front of you is one of the world’s absolute experts.

The great white shark

Having spent so much time with these animals, I was intrigued as to how Andrew would actually describe them. His response was that great white sharks were “more majestic than menace, and still, to this day, so greatly misunderstood and holding on to their secrets.”

He went on to explain that while great white sharks are completely unpredictable and potentially extremely dangerous, their behaviour is driven by an instinctive capability to survive. And,

as an apex predator, they do what they need to do when they need to do it—but with the ingrained caution and situational awareness that successful predation has taught them.

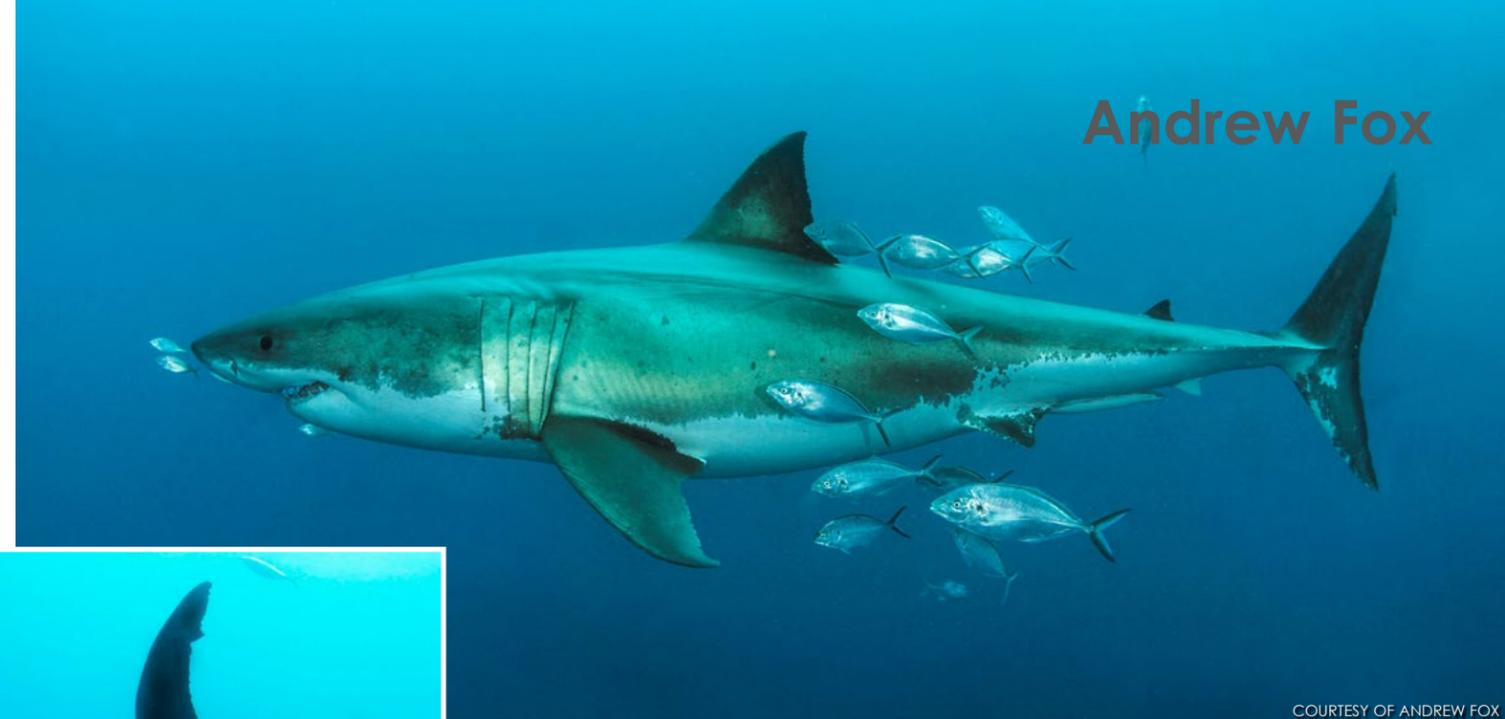
Much of that instinctive behaviour seems to be driven by how hungry they are—which is a function of when they last ate and what they ate. Based on a then ground-breaking US research paper (published in 1982), it was long believed that great white sharks can go for weeks before needing to feed. But a more recent paper by the University of Tasmania (UoT) indicates that they actually eat much more often. The difference between the two papers is



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Andrew Fox has been able to identify around 1,000 individual great white sharks, often by their unique physical traits such as the deformities of the shark named “Imax” (left); the enormous size of “Mrs Moo” (far left); and the deep scars on “Scarface” (above); Great white lunges for bait (top center)

that the first one used data from a tagged shark that was feeding on a dead fin whale, to calculate its metabolic rate and from that extrapolate how often it would need to eat.

In contrast, the premise of the UoT research was that the great white in the 1982 paper had already found an abundant source of food with the dead whale, and therefore, would have a low metabolic rate, as it leisurely worked at the “all-you-can-eat” buffet. So (with the help of Andrew Fox), the UoT researchers tagged sharks at the Neptune Islands, which were patrolling and actively hunting for seals. The findings showed that these sharks had a much higher metabolic rate and

would therefore have to eat much more often.

The “Reader’s Digest” version of it all is that great white sharks need to eat every day when they are feeding on open-water fish like silver seabream. On the other hand, when they switch to fat-rich mammals around the Neptune Islands, consuming a seal every two to three days is probably enough.

The bottom line is that the urge to eat and the availability of suitable food is probably the major driver of behaviour, and great white sharks do need to eat quite often. How often is a function of the nutritional value of what they eat. Seals are highly nutritious, silver seabream less so

but still adequate, while humans provide very little nutrition and are simply not on the shopping list!

Getting to know them

Andrew has personally identified around 1,000 sharks, mainly by using their unique markings and personalities. The pigmentation markings on great whites are very stable and stay with them as they grow—which is how sharks like “Pi” and “Heffalump” were first spotted and named. Then, there is the physical damage like the deep gouges on “Scarface,” or the deformity on “Imax,” and finally there is sheer physical size, as with “Mrs Moo.”

The Neptune Islands are a very important location on the

great white “superhighway”—the migratory corridor the sharks use along the southern coast of Australia. The waypoints along this corridor are where the sharks know they can feed; and the seal colonies of the Neptune Islands, which are considered among the largest in the country, provide a known and reliable source of high-nutrition food. This is particularly so during winter and spring each year, when recently weaned seal pups are first venturing out into the open waters around the islands.

Some of those identified sharks appear there every year—such as Imax, who turns up like clockwork, mostly in winter. On the other hand, an individual named

“UFO,” a 6m giant, made a reappearance at North Neptune Island after a 12-year gap.

Such reappearances are a cause for celebration, as Andrew observes how they have grown and how they are faring in general. But where they go remains an intriguing mystery, as they must be feeding somewhere else. Compounding that mystery is analysis of tissue samples taken from various sharks, which indicate a fairly wide variety of food sources. Meaning they have alternative feeding sites that are not seal colonies—but exactly where those sites are, nobody knows.

The ethics of it all

For the vast majority of underwater photographers and probably most scuba divers, cage diving with great white sharks is firmly on the proverbial “bucket list.” For me personally, it was something that equally scared but intrigued me, and my first trip to Port Lincoln back

in 2003 was almost an out-of-body experience. It was also an experience that changed the trajectory of my life, as I realised that more than anything else I had tried, photographing big animals underwater was something I really wanted to do.

But whenever I talk to non-divers and underwater photographers about great white sharks, they are usually incredulous that I am so keen about it all. And, occasionally, I will encounter somebody who vehemently believes that it is completely wrong to conduct these “interactions.”

A common thread in these responses is that by encouraging potentially dangerous sharks such as great whites to interact with humans, we are changing their behaviour. And, in doing so, it greatly increases the chances of humans being attacked. So, as someone with probably more firsthand experience of those managed interactions than anybody else, I was very interested



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The Rodney Fox expedition vessel (above); View of great white sharks from Rodney Fox's ocean-floor cage (right)

in Andrew's opinion on this matter.

His main response was that great whites are very much apex predators and are able to do whatever they want, so very little that humans do, deliberately or inadvertently, has any impact on them at all. At the Neptune Islands, for example, great white sharks are present all year round—albeit, in greater numbers in winter and spring when the young seal pups offer relatively easy targets. But being present in the general area does not mean that the great white sharks will respond to the hurly-burly in the water and come to the boat.

Some do and some do not, and Andrew referred to Imax as a classic example. While Imax does come and check out the boat, this shark only appears when the “ocean-floor cage” is lowered and is never seen at the “surface cage.” Why? Well, nobody knows but Imax. And it seems that is just the way it is—which is something Andrew

is very comfortable with, as the last thing he wants is for these magnificent creatures to behave like circus animals.

Over the years, the “attractants” used to get the sharks to the boat have evolved from the original “witches’ cauldron” (as it was nicknamed) of horsemeat and other such delicacies, to the minced fish that is used now. With the benefit of hindsight, Andrew makes the point that none of the attractants used was significantly better than any of the others, and at the end of the day, all of them are simply trying to get the sharks’ attention by stimulating their sensitivities.

When that works, it provides the trip participants with an opportunity to see firsthand an animal that relatively few others have seen. Almost without fail, this exposure leaves a deep, meaningful and positive impression on the diver, and Andrew believes that this is the case due to how they, as an operator, handle it—because sensationalising it all

does not benefit the participants nor the sharks, he said.

High-adrenaline moments

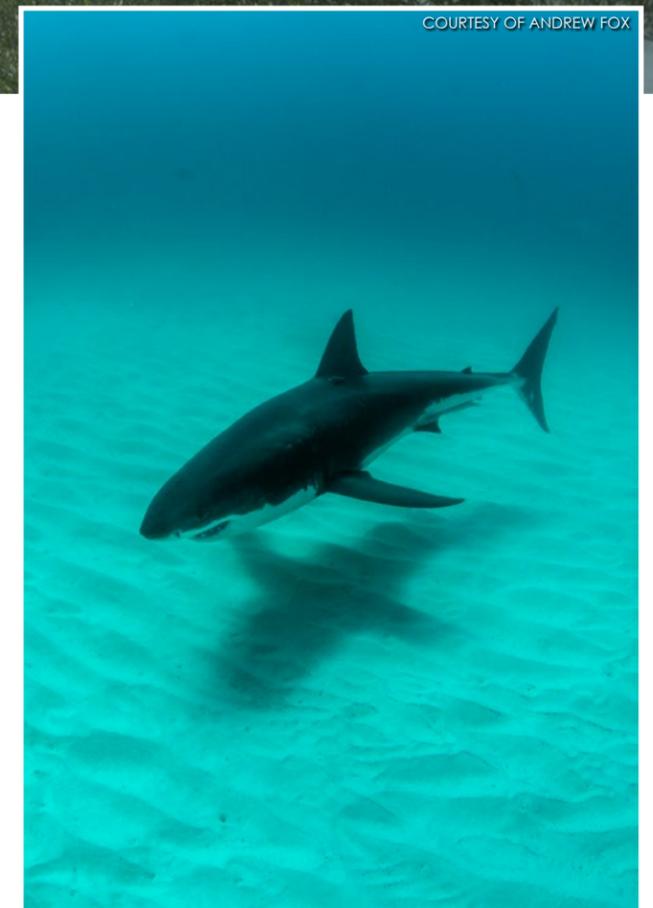
With almost 40 years of cage-diving experience, I knew that Andrew must have had some high-adrenaline moments, and I managed to get him to talk about a few of them—which he did in a really down-to-earth and very casual fashion, further raising the high bar of my regard for him.

Andrew said his most memorable moment was during a trip he took to the Neptune Islands to test electronic shark repellents when, somewhat ironically, there was an unusually large number of sharks around the back of the boat—some of which were very dominant, with the other sharks clearly wary of them.

Underwater, in the ocean-floor cage, at a depth of 30m, a total of 19 sharks were counted and photo-identified, with 15 known and four new—all within a

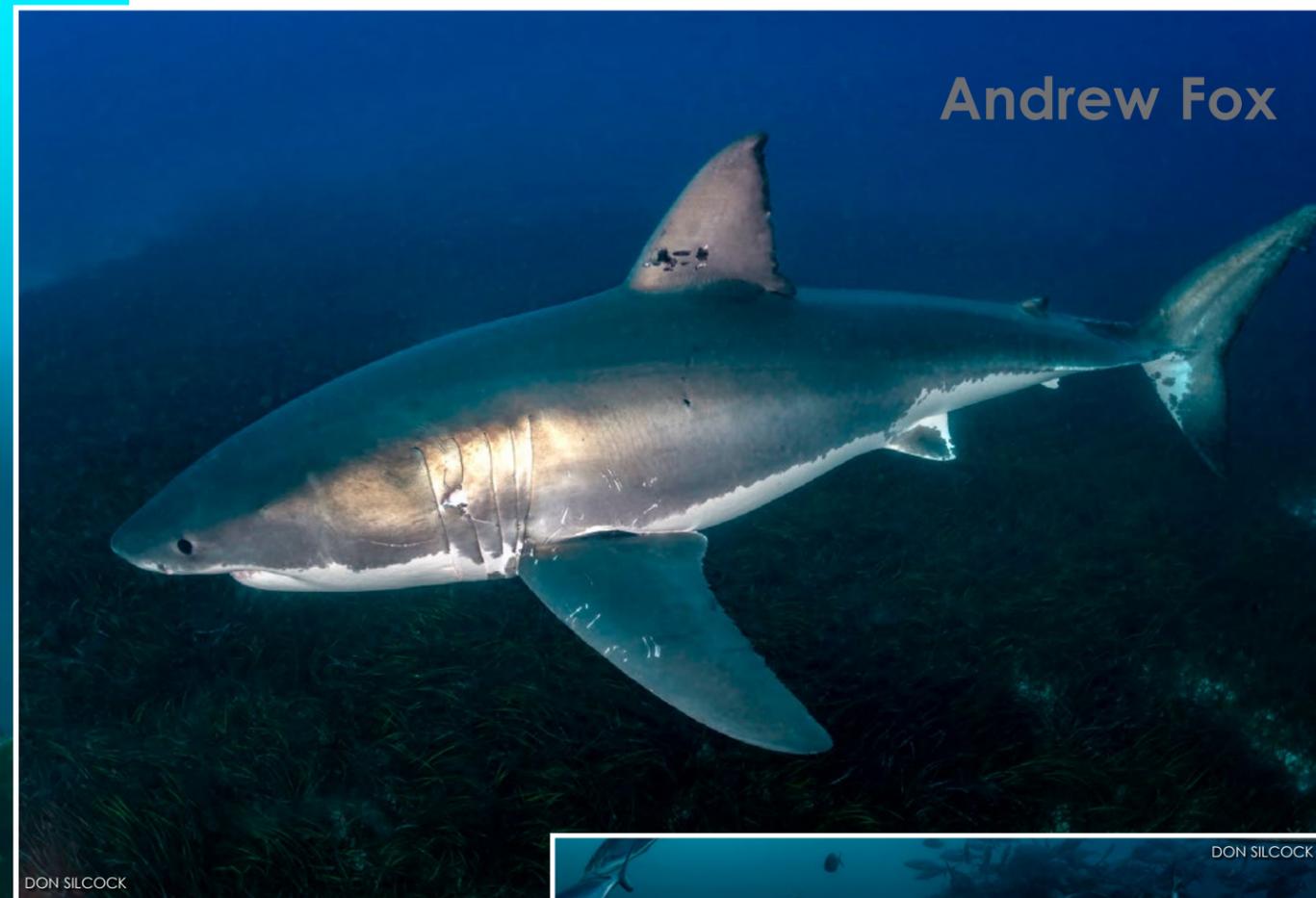
very hectic 15-minute time period, which was the best overall experience in all of Andrew's years of diving with great white sharks. Bear in mind that three sharks around the ocean-floor cage at the same time is a big day. So, 19 sharks seemed like a veritable plague of locusts!

I was very curious if Andrew had ever been really scared, to which he said that bad weather in the Southern Ocean was always the thing that worried him the most as it can be really intimidating. In terms of outright, in-your-face “scary dangerous” moments with great whites, there was his experience with the individual named “Jumbo,” a 5m female that was a regular visitor to the Neptune Islands and a formidable, bold and intimidating great white shark. When Jumbo appeared, Andrew went down to the ocean floor in the solo cage. Soon after he got onto the bottom, she came barreling in and knocked the cage over! Jumbo appeared to be determined



Great white shark on sea floor





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COURTESY OF ANDREW FOX



DON SILCOCK

THIS PAGE: Views of great white sharks from the Rodney Fox expedition vessel's ocean-floor cage

to attack Andrew and went about it in a determined, methodical and very intimidating manner. Only very experienced divers get to try the solo cage, which is equipped with a main wire to the winch on the boat, a signal rope and an inflatable cylinder to get back to the surface. And Andrew said he was not overly concerned, as he was safe in the cage and knew he could get back to the boat, but... Jumbo's body language and attitude made her intentions very clear. It was a sobering experience that reinforced his belief in the complete unpredictability of the great white shark.

Where to from here?

Both my recent trips were on the new Rodney Fox vessel—the former Darwin-based pearling “mother ship,” which was completely retrofitted in Fremantle (at considerable expense) to provide

the expedition platform Andrew and his business partner Mark Tozer needed to move the business forward.

Underwater, South Australia is an incredibly rich and biodiverse part of our great brown land down-under, but apart from great white sharks, leafy seadragons and giant cuttlefish aggregations, it remains largely a mystery. For example, how many people know about the Great Southern Reef, the massive series of temperate water reefs that extend around Australia's southern coastline, covering around 71,000 sq km from New South Wales around the southern coastline of Australia to Kalbarri in Western Australia?

I have personally been fortunate to have done a number of trips to different parts of South Australia and believe it offers the most interesting diving in the country. Yet so very little of it is known and explored, so I was particularly intrigued

by Andrew and Mark's plans for the new vessel. I led with, “Do you have the right boat now?” The answer to which was an unequivocal and very firm, “Yes.”

Andrew explained that the boat, formerly called the *Elizabeth Bay*, was designed and built in Fremantle (at the same shipyard where the recent retrofit was completed) for open-ocean service. This was a really key detail, because any boat that ventures out into the Southern Ocean must be built to deal with the weather and seas that can blow up there.

Both Andrew and Mark are now confident that the rebuilt and renamed *Rodney Fox* gives them the platform they need to embark on the expeditions they want to do. Top of the list is Pearson Island in the Investigator Group Wilderness Protection Area, some 63km southwest-by-west of Cape Finniss on the western coast of

the Eyre Peninsula. The area around Pearson is a marine sanctuary known for its pristine biodiversity.

Then there is the wonderful, but largely explored coastline of Kangaroo Island that Andrew and Mark are looking to circumnavigate as part of a dedicated expedition. A little farther out timewise, but also firmly on the agenda are Tasmania, the far western coast of South Australia, and a trip across the Great Australian Bight to Western Australia. Interesting times ahead! ■

Special thanks to Andrew Fox for his contributions to this article. For more information, visit: rodneyfox.com.au

In more normal times, Don Silcock is based in Bali, Indonesia, but is currently hunkered down in Sydney during the pandemic and enjoying Australian diving. Find extensive location guides, articles and images on some of the best diving locations in the Indo-Pacific region and “big animal” experiences globally, on his website at: indopacificimages.com





Text by Ila France Porcher

Another piece of pro-shark-fishing propaganda has been published in the form of a “scientific” paper (Shiffman et al. 2021). While promoting commercial shark fishing and the shark fin trade, it belittles shark conservationists by claiming that their approach to shark conservation is lacking in scientific knowledge.

Leaving aside the question of why shark scientists would work to undermine shark conservationists, its simplistic assertion focuses on just two unrelated subjects: the efforts to ban the shark fin trade, and the existence or not, of sustainable shark fisheries.

But science is not binary, and a brief perusal reveals that this is not a scientific paper but a political attack. The two bills proposing to cope with the problem of shark depletion that are currently before the US government address these exact points. The Shark Fin Sales Elimination Act of 2017 has been passed by the US Senate and would effectively remove the United States from the shark fin trade, while The Sustainable Shark Fisheries and Trade Act of 2018 is the shark fishing industry’s solution. It would allow US shark fishermen to continue to profit from the shark fin trade and there is strong political pressure to push it through (Gehan 2019).



Politics Posing as Shark Science

The first author of the present paper, David Shiffman, supports it. A long-term promoter of shark fishing, he has strongly criticized the Shark Fin Sales Elimination Act, and promotes the shark fin trade (Shiffman & Hueter 2017). The theme of this paper of belittling conservationists is common in his writing. Indeed, he is not

a shark scientist; he is a shark fisheries scientist.

Though the idea of fishing sharks sustainably does indeed sound like a good one, when one looks into the practical details of the Sustainable Shark Fisheries and Trade Act, it is clear that there is no way to implement it. The shark fisheries

that have been sustainably managed are only a few in North America and Australia that have traditionally fished sharks, skates, or rays for meat, but no commercial shark fishery serving the shark fin trade has ever been sustainable.

To anyone who has mastered the basics of subtraction, it is clear that sustain-

able shark fisheries could never serve the secretive, largely criminal shark fin trade (Dent & Clarke 2015).

The Sustainable Shark Fisheries and Trade Act

This bill involves putting US practices into play on a global scale. But the detailed



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recording and international cooperation that would be necessary would seem prohibitively difficult. Fisheries management schemes are expensive to set up and operate. Expenses range from those for scientific advice, research, and management, to enforcement—including monitoring, control, and surveillance—which can cost 14 percent of the value of the landings. Most of the cost is borne by the public sector, while the benefits are concentrated on the fishermen (World Bank 2017; Ferretti et al. 2020).

Countless details remain unaddressed, never mind resolved:

- How would the determination of what is a sustainable catch rate for every shark fishery in the world be made?

- How would the baseline be determined? (The mere assumption that it is possible goes well beyond what we know at present.)
- How would sustainable fisheries' management plans be implemented throughout every shark fishery in every country that fishes sharks?
- How would they be funded?
- How would they be enforced?
- How would every country in the world with a shark fishery be lobbied to pass sustainable shark fisheries management legislation?
- How would regional fisheries management organizations be made to agree to



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One of over 300 threatened shark species, the oceanic whitetip shark is primarily threatened by bycatch in commercial fishing and the shark fin trade, according to NOAA Fisheries.

base quotas and rules solely on scientific recommendations without a few countries deciding to veto science-based recommendations, as happens already in other contexts on economic grounds?

- How long would all this take, how much would it cost, and who would pay for it?

Massive data collection projects would need to be organized, which would have to be standardized, implemented, monitored, and funded on a global scale. Then, when laws are in place and enough data has been collected to determine what the sustainable catch rates might be for every shark fishery in the world, development and funding of fisheries' management plans would need to be put in place, including staffing and training, purchase of equipment, and so on.

All this would need to be maintained long-term, while somehow requiring every country to keep politics, financial self-interest, and corruption, to say nothing of criminality, out of the process. But there is no international body that can force sovereign countries to do anything on this scale. Furthermore, some countries, especially those with large fisheries, have consistently been resistant to controls on fishing based on scientific data.

The evidence for sustainable commercial shark fishing

The current fisheries hype over sustainable commercial shark fishing is based on the paper Bright spots of sustainable shark fishing (Simpfendorfer & Dulvy 2017), one of the co-author's former papers, and cited here as the needed evidence of sustainability in shark fishing. But it was proven to be optimistic at best or false at worst, just two years after it was published. Among other things, it claimed that the shortfin mako fishery in the North and South Atlantic (and that of the blue shark) could be sustainably managed.

But at the same time, scientists of the International Commission for the Conservation of Atlantic Tunas (ICCAT) found that the status of the mako shark was so dire that even if all fishing was stopped immediately, its numbers would continue to decline for the next 15 years. There was a probability of only about 50 percent that the stock would be rebuilt by 2045, and the probability that it would be rebuilt would not exceed 70 percent until 2070, 50 years from now (ICCAT 2019).

Yet industrial fishing for the mako shark continues in the Atlantic, and the situation is considered to be similar for the blue shark.

The North Atlantic, right in the heart of the "civilized" world, should be the very

epitome of excellent fishing management and sustainable shark fishing. But the truth is far from that. The sharks in the North Atlantic are managed by ICCAT, which represents 48 contracting nations and groups, including the European Union. Member nations provide data of highly variable quality for their fisheries and there are also several major fishing nations fishing the North Atlantic that provide no shark catch data to anyone, and are not party to ICCAT. It is estimated that only a quarter of the sharks killed there are reported, and that illegal finning is rampant (Campana 2016).

Yet, Shiffman et al. write:

"Results show that in general, the environmental advocates who most strongly supported bans on fisheries and trade were the least familiar with the current state of scientific knowledge on sustainable shark fisheries."

But it seems to be Shiffman et al. who are out of touch with the current state of scientific knowledge on sustainable shark fisheries.

Contrary to what the authors state, there is much scientific evidence that throws into question the idea that sustainable commercial shark fisheries are possible long term (for a summary see Porcher et al. 2019). An example is a study cited by this present paper as providing basic

shark tales



evidence of the existence of sustainable shark fisheries (Walker 1998). But instead of establishing the presence of plenty of sustainable shark fisheries, it questions whether sustainability can be realized and focuses on the difficulties of doing so. Furthermore, it was written before the shocking results of the shark fin trade became evident.

The only other paper that the authors cite as evidence that sustainable shark fisheries exist is Shiffman's own paper (Shiffman & Hueter 2017) in which he claimed that they exist all over the world but provided no evidence that they do.

So, in fact, the evidence these authors provide on the subject is flimsy.

Divers are "marine tourists"

Reading through the paper, we find the claim that the public is concerned about sharks because they "can be ecologically important" and that they "are a popular encounter for scuba divers and other marine tourists."

This extreme twisting and misrepresenta-

tion of the facts is typical of the paper. All scientific studies of sharks in the biosphere have found that, as top and middle predators, they are among the most strongly interacting animals in the food chain. Several studies have shown that the extreme disruption wrought by more than seven decades of shark removal through trawling and long-lining has caused major, cascading biodiversity shifts throughout the originally complex and diverse aquatic ecosystems, which evolved during the 500 million years before industrial fishing began.

However, fisheries have never been concerned about the ecological results of their activities (Travis et al. 2014). And the way this paper discounts and dismisses this important facet of shark removal reflects that.

Terming divers as "marine tourists" disparages a major force behind shark conservation efforts. A high fraction of divers dive locally all the time and know their area well. They are the ones who have personally witnessed the dis-

appearance of sharks from the oceans and coasts the way the buffalo vanished from the plains of North America during the 1800s. For this reason, divers have always been at the forefront of shark conservation efforts, and their contributions are highly valued by anyone truly concerned about the plight of sharks.

Conservationists are extremely knowledgeable scientifically

The results of the survey on which this paper is based show that two thirds of NGO employees read scientific papers regularly and more than half have published scientific papers. This was found even though the authors deliberately excluded scientists from the survey. NGOs were found to use scientific and not moral reasons for their arguments for shark protection. Remarkably, only four respondents out of 155 reported never reading the scientific literature.

So, the conclusion of the paper should have been that NGOs working on shark

conservation are very knowledgeable scientifically, rather than the contrary.

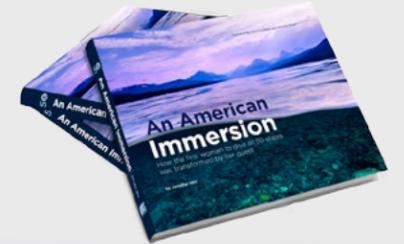
Beliefs more important than facts

In 2016, Dan Kahan and his team at Yale Law School made headlines when they found that people will fail to question their beliefs in the face of scientific discoveries that contradict them. Their study showed how people reason selectively and interpret data in such a way that it conforms with their political vantage point. Scientists are even more prone to this than others and the phenomenon is clear to see in the sustainable shark fisheries' lobby. Regardless of the facts, their conclusions always favour fishing more sharks.

The situation parallels the way two decades of scientific findings that fish feel pain and suffer are sneered at and denied by fishermen (Sneddon et al. 2018). As a result, most people seem to believe that no matter how you brutalize them, fish and sharks will not suffer,

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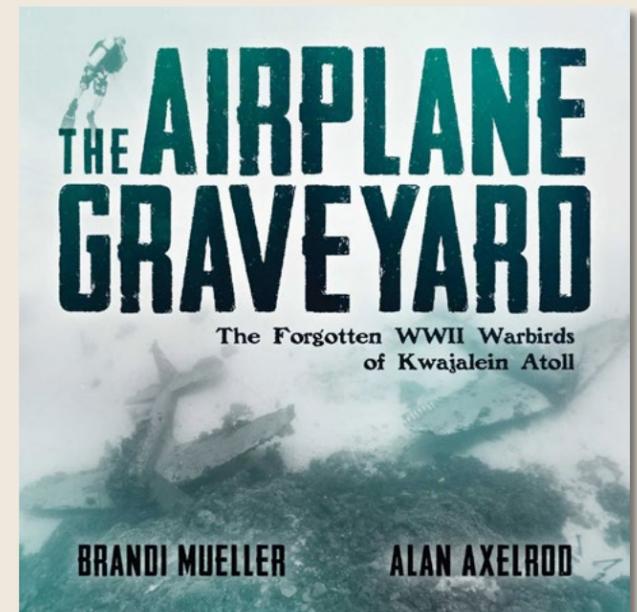
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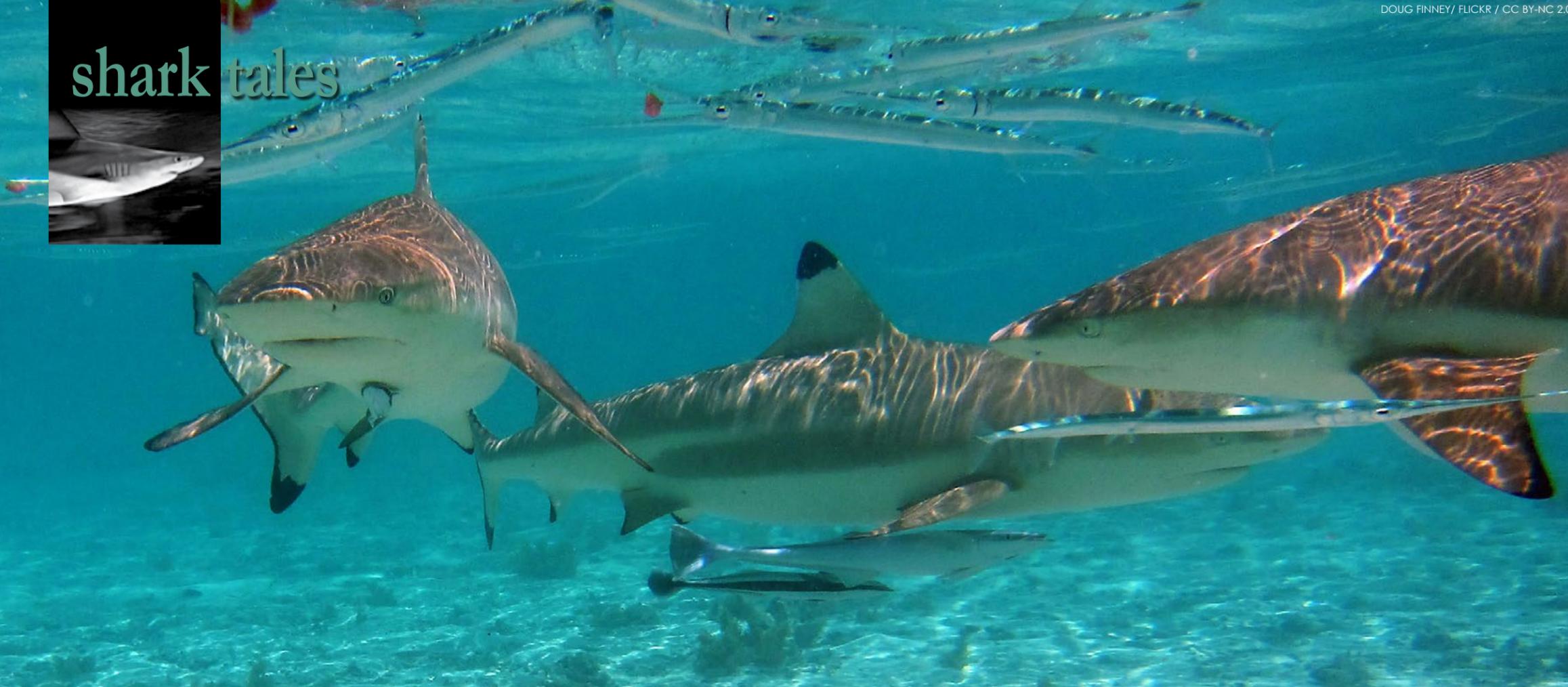
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so their abuse continues with almost no public outcry nor protest. Yet there has never been any evidence that fish do not feel pain—it is just an assumption based on their lack of a human brain.

In fact, the pain system in fish is remarkably similar to our own and if it did not work, they would not have it. Indeed, no one who has watched a fish eat a sea urchin will doubt their sensitivity.

Status of sharks based on science

Detailed analyses of fishing records show that the shark species accessible to global fisheries have been systematically depleted since industrial fishing began in the 1950s. By 2003 they had sunk to about 10 percent of their former levels. Industrial fisheries originally targeted teleost fish, so sharks were mostly discarded with no record being kept. But, with the rise in value of shark fins due to the shark fin trade, at the same time as teleost fish stocks were depleted, sharks (along with tuna) became the most valuable catches (Sala et al. 2018) and are now being targeted by fisheries around the world.

The shark fin trade is driven by enormous profits and there is no interest in sustainability in either the shark fin industry or consumer countries (Sadovy de Mitcheson et al. 2018), where neither the will nor the resources to manage the trade exist. With the global demand for shark fins rising while the large predators supplying that demand are at a tiny fraction of their former numbers, and increasingly threatened with extinction, commercial fishing for sharks is clearly unsustainable.

Worldwide studies of overfishing have repeatedly called for a reduction of the fishing effort to allow fish stocks and their habitat to recover. But turning to fishing the predators now that the teleost fish are 90 percent depleted is folly (World Bank 2017; IPBES 2019; Dasgupta 2021).

It is a no-brainer really, for no wild animal can withstand targeted industrial-scale hunting long term—not whales, not sea turtles, not fish, and certainly not sharks.

But philosophical pro-shark fishing propaganda, of a type neglecting biological fact, is working hard to see that they never get the protection that they so urgently need. ■



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Dried shark fins (above). According to IUCN and CITES, the growing lucrative shark fin trade is one of the most serious threats to shark populations worldwide, driving many species towards the brink of extinction; Blackfin sharks (top)



The South Florida Underwater Photography Society (SFUPS) is a non-profit social organization dedicated to the promotion of excellence in underwater photography through its membership.

shark tales



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shark tales

Several years ago, there was a concern that it might have a negative impact on tourism. But we've been working to educate people about sharks and what we've actually seen is no negative impact.

— Paul Niedzwiecki,
Cape Cod Chamber of Commerce



TIM SHEERMAN-CHASE / CC BY 2.0

Shark tourism becoming popular in Massachusetts

A growing shark population off Cape Cod shores in the US state of Massachusetts has spawned a rising number of charter boat operators offering shark tours in a region where whale- and seal-watching excursions have long been popular.

Cape Cod's slow embrace of its shark reputation comes three summers after the popular vacation destination saw its first great white shark attacks in generations.

Businesses dreaded the negative perception seared into the public imagination by *Jaws*, the 1975 blockbuster movie about a man-eating great white shark that made its director, Stephen Spielberg, a household name.

But now a small but growing group of charter boat operators are offering great white shark tours in a region where whale- and seal-watching excursions have long been a tourist rite of passage.

Paul Niedzwiecki is the chief executive officer of the Cape Cod Chamber of Commerce, a nonprofit organization

that promotes tourism and other business interests on Cape Cod. Cape Cod hosts about four million visitors a year, who bring in more than \$1 billion in tourism spending and support thousands of jobs.

"When we started to see (great) white sharks become more prevalent several years ago, there was a concern that it might have a negative impact on tourism. But we've been working to educate people about sharks and having them be shark smart," Niedzwiecki told Associated Press.

"There's no definitive tally for how much shark-related tourism contributes to the roughly 65-mile (105km) peninsula's economy, but its growth is helping stretch the tourist season into the fall, as peak shark sightings happen in August and September."

Spotting and tagging sharks

Finding sharks off the coast of Cape Cod is not hard, with some shark tour operators using the same methods that shark researchers use to find the predators: drones, or an overhead "spotter" plane, to locate sharks and direct their boats to them.

Shark researchers have also noted the increased number of sharks in the area.

Researchers with the Atlantic White Shark Conservancy, have tagged more than 20 great whites so far this year, and the scientists still come across many untagged apex predators after a decade of pursuing them around the region.

"We're still trying to figure out how many great white sharks there are along the Cape every year," Maddie Poirier, ecotourism naturalist for the Atlantic White Shark Conservancy, told the *Boston Herald*. "We come across a lot of untagged sharks. There are a lot of sharks that we have identified through the underwater study that are not tagged, and there are a lot of sharks that we have tagged that we haven't identified through video footage yet." ■ SOURCE: ASSOCIATED PRESS, BOSTON HERALD, ATLANTICWHITESHARK.ORG



Click on the image to see the video

Stingrays' bulging eyes makes them more streamlined

Rather than introducing drag, the protruding eyes and mouths of stingrays have the opposite effect, allowing stingrays to swim even faster and more efficiently, hydrodynamic simulations show.

Stingrays have a higher swimming efficiency than most other aquatic animals, and many studies regarding high-performance swimming have focused on the hydrodynamic benefits of stingrays swimming styles: "Rajiform" locomotion (undulation) and "mobuliform" locomotion (flapping), which are considered the key to stingrays' high-performance swimming.

It turns out that the rays protruding eyes and mouth also play a critical role in enhancing the cruising speed of these

elegant swimmers. Hyung Jin Sung at the Korea Advanced Institute of Science and Technology in South Korea and his colleagues investigated how the bulging eyes and mouths of stingrays created a set of vortices as the water moved over them. One vortex pushed water towards the back of the ray, leaving an area of lower pressure in front of it. This low-pressure zone allowed the simulated rays to swim faster.

A spanwise vortex pushed water to the sides, increasing the pressure below the ray and decreasing the pressure above it. This made each stroke of the fins generate more thrust, increasing the efficiency of swimming. In the hydrodynamic simulations, the cruising speed with "optimal" eye and mouth protrusions were 20.5% faster and the efficiency 10.6% greater than in the absence of eye and mouth protrusions. ■ SOURCE: PHYSICS OF FLUIDS (JOURNAL)



Bluespotted ribbontail ray

PETER SYMES





Cave diver in Cenote Concha, Yucatán Peninsula, Mexico

Text by Daniel Millikovsky
Photos by Reinaldo Alberti,
Ivone Bender, Daniel Millikovsky

When one thinks about cave diving, the feelings are mixed and it is very difficult to express what it feels like in a single word, but perhaps a possible description is “to live the discovery.” Discovery is an experience and an intrinsic need in human beings since before the discovery of fire. Exploration on earth, in the oceans or on the moon is driven by an impulse to see what lies beyond, in order to better understand who we are, where we come from, and where we are.

In this article, we are going to venture into one of the most demanding but incredible dive specialties offered in our beautiful activity, which is cave diving, and enter “The Underworld,” or “Xibalba,” according to Mayan mythology. Our roadmap will cover the “what, how, when and where” of cave diving, so that when the time comes, you will know how to choose and decide if you are prepared for an experience that cannot be easily described but must be experienced.



Cave Diving

The Final Frontier...

DANIEL MILLIKOVSKY

What is cave diving?

Cave diving is essentially the activity of entering confined, flooded spaces formed by calcium carbonate or dolomite, which have been undermined or dissolved throughout the history of the planet and is usually found under the sur-

face of the earth.

As described in the standards that govern diving as an activity, cave diving is a module included as a specialty of technical diving. In turn, technical diving encompasses three areas. One of these areas is diving in confined or overhead

environments such as wrecks and sunken boats, a second is under ice, and the third is in flooded mines, caverns and caves. This means that there is no direct vertical access to the surface as required by open water diving.

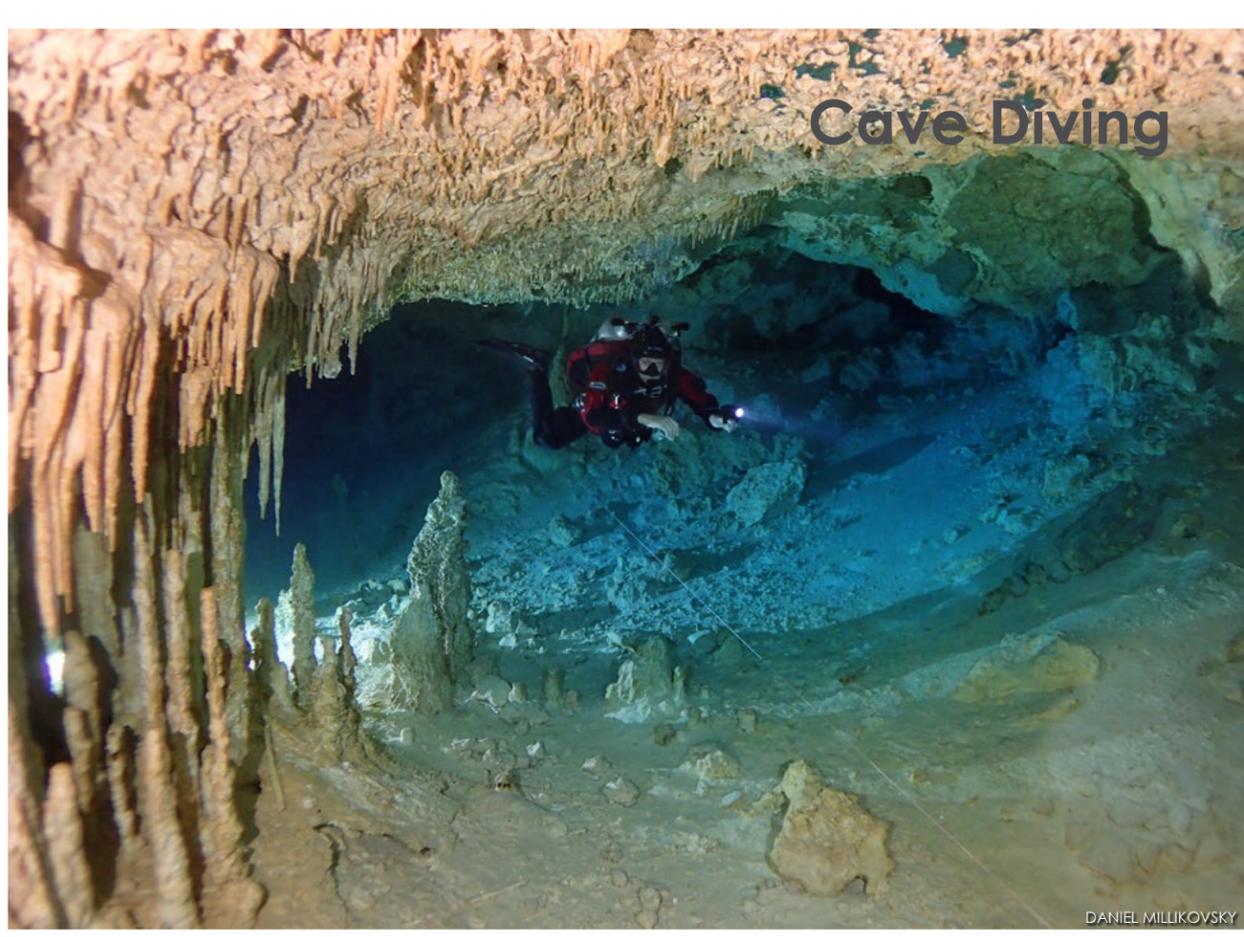
In fact, technical diving originated

from cave diving and great pioneers such as Sheck Exley (1949-1994), to whom we owe the starting point of some of the safety protocols that are still used today. This diving specialty had its boom initially in Florida in the United States, in the early '70s.





REINALDO ALBERTI



Cave Diving

DANIEL MILLIKOVSKY



IVONE BENDER

Cave diver in Cenote Taak Bi Ha, Tulum, Mexico (above); Cave divers in Cenote Concha (top left and right)

There are several types of caves, differentiated by the soil, structure and geological history; among these are sea caves, coral caves and lava tubes. There are also dissolution caves, created by the dissolution of carbonate sediments (usually limestone and dolomite) of carbonic acid, and the action of water flow through an aquifer. They are commonly found in karst terrain and are the most familiar cave type to cave divers.

The Yucatán Peninsula in Mexico is famous for the beauty of its cenotes, which comprise caverns and caves with stalactites, stalagmites, columns, tree roots and labyrinthine passages. These structures manipulate rays of sunlight within the cavern areas, creating incredible visual

effects. Once entering the cave zone, one will find structural forms and passages that are truly majestic and must be experienced and explored to be described.

How can I start cave diving?

In this type of diving, a gradual build up of skills within the activity is definitely required, and important skills and protocols must be mastered to be able to enjoy cave diving safely—divers must be able to apply the appropriate technique in specific circumstances.

The pillars of cave diving are: buoyancy, trim, and holding position in the water column, i.e. hovering. In addition to these aspects, we must also add an appropriate and stand-

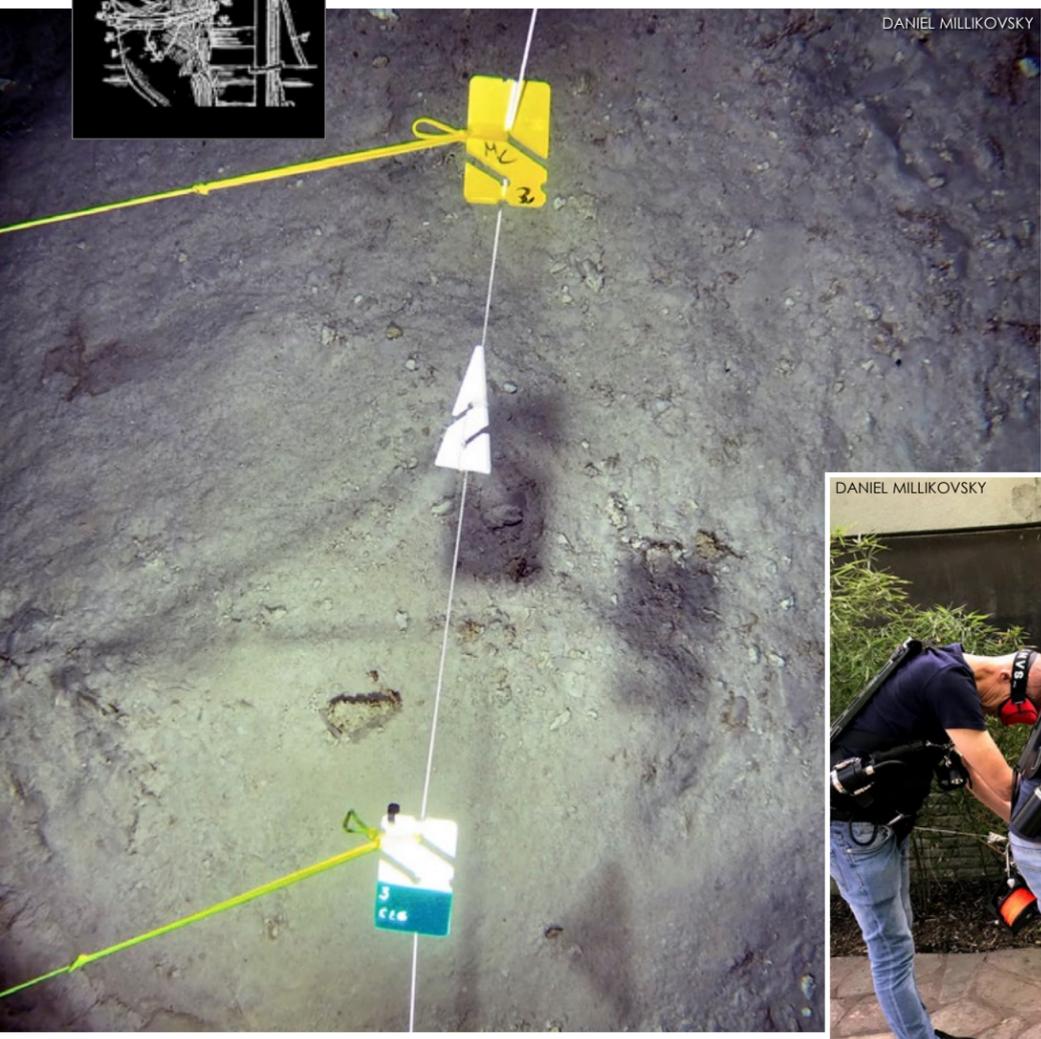
ardized gear configuration, like NTEC (NAUI Technical Equipment Configuration), and several efficient propulsion techniques, among the other skills covered in formal training.

The route to follow to achieve proficiency is to start learning technical diving within a comprehensive training program, such as the one provided by the NAUI Intro to Tech course, which includes the above fundamental principles and skills. From there, one can obtain technical diving certification, combined with diving experience, then you can move forward to new challenges. If your path is towards overhead environments, then cavern training would be the next step, after which you can continue with cave training.

tech talk



Correct use of primary and secondary reels, line and directional and personal markers, such as arrows, REM and cookies, are critical skills for safety and navigation in cave diving (below and right)



DANIEL MILLIKOVSKY



DANIEL MILLIKOVSKY

Land drills are part of training (left); Cave divers study a map of a cave system to plan for a cave dive (right).



Cave Diving

DANIEL MILLIKOVSKY

Dive training in caves has four phases that must be fulfilled to achieve a performance that allows one to enjoy cave diving safely and make the right decisions. First, like in any dive course, there is theory that supports the activity, and this must be learned to know the scope, objectives and limits. Geological aspects of the various formations are also studied, and much of the theory is focused on all the safety protocols that will allow us to leave the cave efficiently and enjoy this wonderful environment.

The training then continues with a very important phase, which involves dry skills, or what are

called "land drills." In this instance, real scenarios that the diver will face are simulated in the field. Here, you learn the skills of handling a primary reel and its correct installation, finger spool (secondary reels) specific to making jumps and gaps, and the correct use of directional and personal markers for correct navigational decisions (arrows, REM and cookies).

Situations like loss of visibility, out-of-gas emergencies, how to share gas, loss of the line and/or the loss of a team partner are also included in the training and practice. All these are covered, in addition to

protocols for planning cave dives, reducing the human factor and resolving possible situations with the right technique to achieve successful diving experiences.

The third stage of training can be done according to logistics, initially in a pool, where one can advance some skills that will then be repeated in the open water area of the cenote and the cavern. This is the fundamental process in which one applies everything learned in a dry environment and in a space suitable for practice, reducing one's environ-

mental impact as much as possible, thereby preserving the cave zone. There are specific dive sites and cenotes dedicated only for training for this purpose.

Finally, one comes to the expected final phase: diving the cave zone. This is the time to emphasize planning and navigational decisions with the team as well as all the safety protocols, which must be practiced and executed on absolutely all dives as a mandatory procedure. Then, and only then, can one begin to live the new challenge of exploration, discovery and returning to the light, as a result of proper training and methodology.

When is the right time to cave dive?

The first question to ask is whether the desire to dive into these environments is being driven by mature

decision-making, rather than group pressure or competition. Once this has been determined, the second question to ask is what experience you, as a recreational or an open water technical diver, have had and if you are willing to face the demands and requisites of this specialty. Every effort pays off and is well worth it, but it is important to consider these questions.

Getting certified in cave diving is not an easy or quick process. One has to be willing to invest the time and equipment, and possibly the cost of traveling abroad to fulfil the last phase of training,

which is quite literally to do the very cave dives for which one has embarked on the journey to learn cave diving. The prize of visiting the underworld is coming!

Where can one dive in caves?

The first and second phases as well as part of the third phase of the cave diver course can be done locally (in the student's or instructor's country). Tulum, Mexico, is not the only location one can complete the training and certification but it is perhaps an ideal destination for this important stage.





Cave diver in
Cenote Tak Be Luum
near Tulum, Mexico

DANIEL MILLIKOVSKY



Remains found in a cenote (above) of a *Gonfoterio* specimen (left), an extinct elephant-like species that lived 10,000 to 10 million years ago

cave diving in this area as well as many state parks where everything is designed for the cave diver. In Florida, the environmental conditions in the caves vary from a little to a lot of

water current, which is more challenging and extra demanding, compared to the cenotes of Mexico. This is where other propulsion techniques and other cylinder configurations should also be used, as the consumption factor swimming into the current is generally increased. It is very common to use high-pressure steel cylinders here, precisely to meet this particularity; and divers can have excellent and safe dives using the rule of thirds, with the certainty that when returning with the current, they will comply with the protocols of predictability.

In addition to Florida and Mexico, as cave diving locations in the Western Hemisphere, we can add the Dominican Republic and the famous crystal caves

Mexico is undoubtedly the first best option for continued cave diver training and certification due to the great diving conditions, logistics and surface support there. The diversity of cenotes and their indescribable beauty allows one to discover new places continuously, even when doing the same circuits over and over again. It is amazing to think that there is an incredible parallel world beneath the earth, as you walk in the jungles of the Yucatán.

Once one has gained more advanced experience, a diver can consider Florida—and the High Springs area there, which has miles of very famous caves—where it all started in North America. There is also great support for



DANIEL MILLIKOVSKY

Cave Diving

of Abaco in the Bahamas; both locations have adequate support for cave divers. Finally, Brazil is also known for the cave diving in its Bonito region. At the moment, these sites in Brazil are closed for the activity, as they are in the process of complying with protocols of the local cave diving association in order to be able to reopen to the cave diving community.

A final thought

Cave diving is not for everyone, and the decision to do it must be made

after having done many dives in diverse conditions; this is the way one builds experience and grows as a diver. There is no need to rush, as any empty gap in training or experience can produce an anticipated frustration or even an accident. The steps have been described above, and the sensory gift is unique, if you decide to go for it. Just be patient, maintain continuity and make sure you receive quality training, in order to have the best experience and minimize the risk. Welcome to The Final Frontier! ■

Daniel Millikovsky has been a NAUI Instructor exclusively for 22 years, a Course Director for 20 years, and in 2016, became a Course Director Trainer and Representative in Argentina. He is a very active NAUI Technical Instructor Examiner for several courses, including OC and CCR mixed gas diving and has also been a member of the NAUI Training Committee since 2020. He owns Argentina Diving, a NAUI Premier, Pro Development, and Technical Training Center based in Buenos Aires, Argentina. For more information, go to: argentinadiving.com



wreck rap



Alexander Arhipov was the first diver to discover medieval Russian artifacts at the bottom of the Gogol River in Russia's Oryol region.

Text by Oleg Shabunya
Photos by Stanislav Trofimov
and Oleg Radyush

In the spring of 2021, Oryol divers discovered the site where the Battle of Sudbischen took place in 1555. This battle between the Russian army and the Crimean horde was a fateful event, in name and in nature, in the history of Russia during the era of Ivan the Terrible.



STANISLAV TROFIMOV

Stone marker designating the site of the ancient Murava Route, or Muravsky Trail, in Russia's Oryol region

16th Century Discovery

Battle of Sudbischen

STANISLAV TROFIMOV

Within the framework of the project "Water Trade Routes of the Oryol Region," the Oryol dive club "DIVO" organized a mid-spring expedition to the vicinity of the legendary ancient Murava Route, which ran along the cen-

ter of Russia, passing through the Oryol region. This was the main historical road between Crimea and Moscow. Many a trader's and ambassador's travels, as well as ancient wars, took place along this horse trail between the Oka and Don rivers. The Crimean Tatars made numer-

ous raids along it.

In addition to the overland route, waterways along the Murava Route were also actively used. Researching these waterways was very relevant to the expedition because of several significant historical events that took

place in the Oryol region, which until now had remained a mystery. It was these circumstances that determined the primary objectives of the expedition, such as the search for ancient piers and marinas, as well as sites of crossings and bridges, and other historical structures.





Preparation of hydro-ejector equipment for dredging sediments from the river bottom (above); Divers dredge the sediments into a sifter (right) to catch artifacts (left); Archaeologist Oleg Radyush is surprised by the findings from the bottom of the river (lower right two).

tion, the archaeologists highly recommended using a hydro-ejector (or water eductor) to dredge muddy sediments in the sectors of the river where medieval objects might be found. Despite the freezing April water temperatures and rather capricious visibility, the hydro-technical work continued throughout the day. As a result, it was possible to find a significant number of arrowheads, as well as many elements of horse tack and harness, unambiguously indicating the localization of fighting in this area. Archaeologist Oleg Radyush noted: "Most likely, there could have been a shooting battle... probably, during the erosion of the coastline, this part was washed away and accumulated near the dam. Considering that the village of Sudbishi was nearby and the battle occurred somewhere here, we can assume that this was an episode of the Sudbischen battle."



to some estimates, at least three million Russians fell prey to Tatar slave traders over the course of a century.

Excavation

The members of the DIVO expedition decided to seek the assistance of a team of archaeological specialists from the Russian Academy of Sciences' Institute of Archaeology. Further work was carried out under the auspices of the scientists. On the eve of the excava-

tion, the archaeologists highly recommended using a hydro-ejector (or water eductor) to dredge muddy sediments in the sectors of the river where medieval objects might be found. Despite the freezing April water temperatures and rather capricious visibility, the hydro-technical work continued throughout the day. As a result, it was possible to find a significant number of arrowheads, as well as many elements of horse tack and harness, unambiguously indicating the localization of fighting in this area. Archaeologist Oleg Radyush noted: "Most likely, there could have been a shooting battle... probably, during the erosion of the coastline, this part was washed away and accumulated near the dam. Considering that the village of Sudbishi was nearby and the battle occurred somewhere here, we can assume that this was an episode of the Sudbischen battle."

Residents of the surrounding villages and settlements have previously found various artifacts in these places, but these were single specimens, in comparison with the finds made by the expedition divers. In the unanimous opinion of

archaeologists, this was an explicit reference to the Battle of Sudbischen. With the indisputable evidence, it could be argued that the discovered fragments of weapons and

ammunition belonged to the era of Ivan the Terrible. However, only subsequent full-scale archaeological field research will be able to bring final clarity on this matter.



STANISLAV TROFIMOV

Panorama of the site of the Battle of Sudbischen (above); A coin from the time of Ivan the Terrible was one of the artifacts found (right).



OLEG RADYUSH

Staff from the Russian Academy of Sciences' Institute of Archaeology investigate the coastal zone of the river, using metal detectors (right) and conduct geodetic surveys (top right).



STANISLAV TROFIMOV

STANISLAV TROFIMOV



STANISLAV TROFIMOV



Battle

Searching for material traces of military history outside settlements or fortifications is very problematic. Finding items that relate to an episode of a legendary battle at the bottom of the river is a rare piece of luck, offering a unique chance to reconstruct an historical event.

Land-based surveys

After the completion of the underwater part of the archaeological survey, members of the expedition began to carry out complex search activities on land, under the guidance and support of the archaeologists. During these land-based surveys, the site of a real clash was discovered, which took place, judging by the artifacts

excavated from the ground, no later than the middle of the 16th century.

Where the metal detectors signaled a find, historical specialists marked these places with special flags. This was followed by a geodetic survey of the area with an accurate referencing of all detected objects, using a tachometer and GPS navigator.

The list of finds was impressive, and included more than 150 arrowheads of various shapes and sizes, lead bullets and buckshot, a blade fragment, a quiver hook, belt pads and girth buckles, horseshoe nails, and fragments of shoes and horseshoes. During the expedition, more than 900 items were discovered in total, including the artifacts handed over by the divers. There are now

plans to organize further large-scale excavations, which will become a new stage in the historical and archaeological research of the defense system of the southern borders of the Moscow state in the 16th and 17th centuries.

Concluding thoughts

The archaeologist Oleg Radyush summed up the results: "With my archaeological team, upon the invitation of Sergey Kulikov—the head of the "DIVO" dive club—we arrived at the place of unexpected finds and saw



OLEG RADYUSH

Another artifact found was a cross dated to the 16th century.



OLEG RADYUSH

Arrowheads found at the battle site (above); Bullet and arrowhead (top center)



wreck rap



Artifacts found included belt buckles, belt hooks, anvil, and a gun lock mechanism (below)



DIVO dive club team members at the Battle of Sudbischen memorial in Oryol, Russia



OLEG RADYUSH



OLEG RADYUSH

and held in our hands the artifacts extracted from the bottom of the river. We were not confident that there was any relation [of the finds] to the Sudbischen battle. With relative accuracy, it was possible to establish only the historical period—the late Middle Ages.

“Every day, there were more and more discoveries. After studying the

surroundings, we were able to localize the place of events: a plot of land approximately 900 by 400 meters was literally covered with various metal objects of that era, indicating that a major battle came about on this field. Then we found lead bullets and a coin minted in the first half of the reign of Ivan the Terrible, which made it possible to significantly narrow down the time frame of the battle—the middle of the 16th century.

“By now, in these three weeks of archaeological research, more than 900 artifacts have been found in the vicinity of the Gogol River—about 400 arrowheads, more than 50 bullets, many other metal objects, as well as one lead core and a matchlock. All this made an assumption about the discovery of the site of the Sudbischensky battle even more probable. It became one of the first battles in the history of the confrontation between Russia and the Khanate of Crimea, in which both sides used firearms, both relatively heavy and manual.”

The location of this historical discovery has since attracted many people, including scientists and tourists. The governor of the Oryol

region, Andrei Klychkov, noted:

“The event that happened in our region has not only value on a district or regional scale, but at least an all-Russian, or perhaps even a European and global scale.”

Finally, we should note that the discovery of the artifacts, which allowed us to accurately ascertain the battlefield, was a rare event. Even though the tactical course of the battle itself has been studied in detail as reported by the sources of the 16th century, the site where it took place still remained unknown. However, the spearhead, accidentally found by a diver at the bottom of the river near the village of Sudbisch, initiated a cascade of events that would fill the “blank spot” on the map of the legendary battle. ■

A note from DIVO: Dear friends and colleagues, we work all over the world and will be glad to cooperate in archaeological, scientific expeditions and filming projects. Email the expedition team leader, Sergey Kulikov, who is head of the Oryol dive club “DIVO” in Russia, at: ssm.72@mail.ru, or go to: dive-orel.ru



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ARMED FORCES OF MALTA



Watch on YouTube

Malta scuttles patrol boat, creates new artificial reef

The decommissioned army patrol boat was scuttled on Saturday morning off Zonqor Point in a bid to stimulate dive tourism.

The operation was organised by the Tourism Authority together with the Ministry for Tourism and the Association of Professional Diving Schools of Malta, Gozo and Comino.

The boat was scuttled and sank between the wrecks of *St Michael* and *Melita*, two tugboats that also

serve as scuba diving sites.

According to the Professional Diving School Association, the vessel is resting on the seabed at a depth of around 20 metres, whereas Television Malta states the depth is 27m.

The former Armed Force of Malta (AFM) patrol boat was decommissioned in 2005 as the AFM sought to upgrade its ageing fleet, and had long been scheduled for scuttling, but the process took longer than expected. In 2012, it was planned to have been scuttled outside Marsalforn Bay in

Gozo, but those plans were never carried out after environmental authorities flagged concerns.

In a comment to Television Malta, the executive head of the Malta Tourism Authority, Johann Buttigieg, explained the plan to submerge the patrol boat was conceived over a number of years—in fact, seven years—to establish the proper environment after studies. He said that similar arrangements are being made for the vessel *Hephaestus*. ■ SOURCES: TIMES OF MALTA, TV MALTA

the human diver

counter-errorism in diving

Improving diver and instructor performance by recognising and working around our fallability



Human Factors in Diving

Online, webinar and face-to-face training, and consultancy

The human diver is the only company which focuses solely on the research, development and delivery of human factors, non-technical skills, just culture and psychological safety within the diving domain. This training is applicable to all facets of diving: recreational, technical, cave, instructor development commercial, scientific and public safety diving and changes attitudes to success and failure.

“We cannot solve our problems with the same thinking we used when we created them.”

Albert Einstein

The training is based on published research and practice from aviation, healthcare, space travel, nuclear and other high-risk industries and then translated into the diving sector to make it real.

With a few exceptions, none of the training programmes delivered by agencies and companies across the diving industry deliver materials which look at how to improve decision-making, situation awareness, communications, teamwork, leadership & followership and performance shaping factors, and yet 99.9% of course graduates believe that our concepts and tools should be included in all diver training materials, but especially instructor and supervisor development.

Course attendees are those who want to develop their own performance. They are not interested in a 'tickbox' course, they want to critically appraise their knowledge, skills and attitudes. Interested?

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for training, free materials including THE diving safety documentary 'If Only...'



Text by Rico Besserdich

Scuba diving is not really an inexpensive hobby, considering the costs of training, equipment and travelling. Furthermore, many divers love to capture images and videos of all the things they have seen underwater. So, underwater photography then adds an additional burden onto one's piggy bank.

Powerful cameras, lenses, solid and reliable underwater housings, plus all the other extras such as ports, underwater strobes, etc., can make a "professional" underwater photography system an investment that can easily exceed US\$10,000. This kind of expensive system will, of course, if configured correctly, produce technically sound images.

However, let's remember the good ol' saying: "It's not the camera that makes the image. The photographer does." This message gives one hope—especially when the will to take images underwater is strong but the budget is limited to, let's say, US\$500.

This article introduces a few solutions for underwater photography within this economic limit. In case some of you may believe "cheap stuff delivers cheap results," I would like to point to Tim Laman (timlaman.com) who won the grand title



Olympus Tough TG6 camera and PT-059 housing

Underwater Photography

On a \$500 Budget

of Wildlife Photographer of the Year in 2016, with an image that was made with a camera that easily fits into the US\$500 budget and is introduced in this article, among other models. It was Laman

who won this internationally desired and respected award, not his camera.

Before we begin, let's briefly summarize what we need to take images underwater:

- a) Any kind of camera and a designated housing, which protects it from water, or
- b) A so-called aquatic camera,

which comes in one piece and is designed to operate in water

Note: Some aquatic cameras have limits regarding their maximum operational



photo & video

depth, whilst cameras supported by an extra, designated housing can usually operate within the limits of recreational diving, meaning 40m. Yet, it really simply depends on where, how, and most of all, how deep you want use your camera.

Olympus Tough TG-6

The Tough TG-6 is Olympus' newest flagship of compact outdoor cameras, which has become popular among scuba divers, too. This is the sixth model in this series, featuring many improvements over older models.

The camera features an f/2, 4.5-18mm (35mm equivalent: 25-100mm) built-in zoom lens, which covers all the basic needs, from macro to wide-angle to telephotography. The image resolution is 12MP (megapixel). Various video-capturing options (up to 4K) are supported as well.

Unusual for its class, the TG-6 is equipped with a high-speed, high-sensitivity, back-lit

CMOS image sensor and a TruePic VIII image processor—the same image processor used in the OM-D E-M1 Mark II professional model. This allows for low noise and high-resolution image quality. Furthermore, the TG-6 supports shooting in RAW format.

Good to know for underwater photography enthusiasts is that the Olympus TG-5 offers five different dedicated underwater modes: macro, underwater microscope, underwater wide, underwater snapshot, and underwater HDR. There are three underwater white balance options from which to choose, in order to achieve the optimal colour reproduction, depending on water depth. Each of the five underwater modes has the optimal underwater WB pre-set (which can be changed if desired). Furthermore, focus stacking and focus bracketing do add useful functionality to the macro-modes of this camera.

As its name already indicates, the TG-6 is designed for

“tough” outdoor use. It is shock-proofed, freeze-proofed, and (of course) water-proofed. The depth rating of this aquatic camera is 15m. Retail price: US\$449. For more information, go to: asia.olympus-imaging.com

Pro tip: Once your piggy bank is topped up, go for an extra housing (around US\$300). This will keep the camera even safer and allows one to take it down to a maximum depth of 40m. The camera can capture video, yes, but it is mostly designed for photographers. The TG-6 can be extended with various accessories such as a fish-eye converter, underwater strobes, and strobe diffusers, among others.

Ricoh WG-70

The Ricoh WG-70 is an aquatic camera in compact format. It is depth-rated to 14m. The WG-70 captures images in 16MP resolution and shoots video in Full HD. It also offers a High-Speed Movie mode for recording slow-motion video and an Underwater Movie mode especially designed for underwater movie recording. Movie and Underwater Movie modes offer shake reduction, reducing the effects of camera shake.

The WG-70's Digital Microscope mode makes it easy to take impressive macro photographs, which capture details that cannot be resolved by the naked eye. The camera is equipped with 6-LED Ring Light, which helps to light up even the smallest macro subjects, right in front of the camera's lens. The 4x optical zoom lens covers a focal range of 28 to 100mm (35mm equivalent).

The underwater mode uses white balance optimized for underwater photos,

Minolta MNN40WP digital camera

\$500 Budget



making colours appear more natural. In total, the WG-70 includes 25 different shooting modes. The camera does not support shooting in full manual mode; however, automatic settings can be altered by using the exposure compensation function. SD/SDHC/SDXC Memory Cards are supported as a storage device. Retail price: US\$246.95. For more information, go to: ricoh-imaging.co.jp

Pro tip: The included LED lights are very useful for underwater macro photography.

Minolta MN40WP

The Minolta MN40WP Digital Camera shoots 48MP pictures and 2.7K Ultra HD video. This aquatic camera in a compact format comes with a 16x digital zoom lens, a 3" Rear TFT LCD screen and a 2" Front TFT LCD “selfie” screen. Special features include Panorama Shooting and Face & Smile Detection. The MN40WP is depth-rated to three metres. It supports microSD cards up to a maximum of 128GB. Retail price: US\$149.99. For more information, go to: minoltadigital.com

Pro tip: As it is limited to just three metres of depth, this camera is a fun tool for

very shallow dives and snorkelling. However, image resolution and video quality promise good results when using the camera in its limits.

GoPro HERO8

Named the “grandfather” of all action cameras, GoPro is mostly known for its video-capturing capabilities. However, it can shoot stills, too—even underwater.

The HERO8 Black supports up to UHD 4K video resolution and time-lapse, up to 1080p240 slow motion and super-slow-motion video. Still images can be captured in up to 12MP resolution in bursts of up to 30 images per second with the updated SuperPhoto, with HDR support that helps reduce blur and enhance detail in low-light situations.

The LiveBurst function allows you to record 1.5 seconds before and after your photo, to give you more choices for the best frame. The inbuilt lens offers four choices of focal length: Narrow, Linear at 24.4mm, Wide at 16.5mm, and SuperView at 15.1mm.

Paired with a smartphone with the



Ricoh WG-70 aquatic camera in compact format





photo & video

GoPro app installed, stills and videos can be edited, stored or shared within the app. Furthermore, the HERO8 can be controlled by voice commands, but that might be not the easiest thing to do when scuba diving.

The way it comes right out of the box, the GoPro HERO8 is depth-rated to 10m. However, an additional housing (which is still within our budget) would make a GoPro dive-ready, up to 60m. Retail price: US\$299.99 (Additional



housing: add US\$49). For more information, go to: gopro.com

Pro tip: Despite this camera's limits regarding individual settings for photography, someone still won the grand title of Wildlife Photographer of the Year with an image made with a GoPro—even with a much older model, to be precise. Go for the extra housing.

For just US\$49 more, the GoPro can dive down to 60m. With hundreds of different accessories available, GoPro is a very practical and modular system.



GoPro HERO8 action camera (above), shown inside an extra housing (upper left)

Fujifilm FinePix XP120 aquatic compact camera



Fujifilm FinePix XP120

The Fujifilm FinePix XP120 Lime is an aquatic compact camera that offers wireless sharing, and a robust water, shock, freeze and dustproof construction. Utilizing a 16.4MP CMOS sensor, this camera can capture stills as well as Full HD 1080p video. It is depth-rated to 20m.

The inbuilt Fujinon 5x optical zoom lens, with a 28-140mm equivalent focal length range, covers a variety of photography scenarios, and the optical image stabilization minimizes the appearance of camera shake for sharper handheld shooting. The "underwater mode" adjusts the white balance in order to obtain natural colours when diving.

In addition to straight photos and movies, the XP120 also enables the creation of Cinemagraphs, where a still photo contains select moving elements to compile a unique multimedia image. Time-Lapse Movies can also be produced in-camera, as can wide-format panoramas and other creative effects. Built-in Wi-Fi is a feature that enables wireless sharing of images or videos with a smartphone or tablet. Retail price: US\$389. For more information, go to: fujifilm.com

Pro tip: As always, Fujifilm cameras are a far cry from being cheap.

Diveroid waterproof phone case

This device is obviously not an

underwater camera, but it can turn something you probably own and use every day—your smartphone—into an underwater camera. Diveroid is a solid underwater case compatible with (almost) all modern smartphones, regardless of whether they are based on iOS or Android. It is depth-rated to 40m.

Together with the case comes the Diveroid app (iOS and Android), which allows one to trigger several smartphone camera functions with just three buttons. The app has an inbuilt algorithm, which autocorrects white balance, thus taking care of correct colours. Furthermore, the app includes a dive computer function, showing depth and dive time. Retail price: US\$428. For more information, go to: en.diveroid.com

Pro tip: The inbuilt cameras of many modern smartphones are, in terms of image quality, often superior to "classic" compact cameras. With a trustworthy housing, a smartphone can become a surprisingly good underwater camera.

Final word

No doubt, high-end professional underwater camera systems do still have their reasons for existence—not just because a "great" camera is included but also because their modular systems allow for specific configurations (of equipment modules) for specific photographic tasks. Even so, some professional underwater photographers still struggle to earn the money back that they once spent on US\$10,000-20,000 (or more) of photography equipment. Again, there is no doubt that, in the right



Diveroid waterproof phone case

\$500 Budget

hands, such pricy gear will deliver extraordinary images. "Extraordinary" is then pretty much a question of personal perception and preferences.

Being able to capture some of the wonders of the underwater world and share them later with others can truly be called "extraordinary" as well. The good news is: It does not have to cost the world. Technology is just a humble servant to your imagination. Remember, a Wildlife Photographer of the Year grand title was awarded for a photo captured by an old model action camera. Even with just a US\$500 budget, or even less, never forget: The next grand title could be yours.

"Everyone knows the songs of John Lennon. None cares which brand of piano he used to compose them." — Daniel Botelho ■

Rico Besserlich is a widely published German photographer, journalist and artist based in Turkey. Visit: Maviphoto.com. See his latest book at: Songofsilence.com.

Judith Gebhard Smith



P O R T F O L I O

portfolio

Intrigued by the pairing of art and science, American artist Judith Gebhard Smith creates stirring, atmospheric and haunting pastel drawings and encaustic paintings of marine life and underwater scenes inspired by her experiences diving exotic locations around the world where she has met diverse and curious creatures of the underwater realm. *X-Ray Mag* interviewed the artist to learn more about her artwork, creative process and perspectives on the planet's fragile oceans and reefs.

Text edited by Gunild Symes
All artwork by Judith Gebhard Smith

X-RAY MAG: Tell us about yourself, your background and how you became an artist.

JS: I literally began drawing on most available surfaces as soon as I was able to hold a crayon. My parents encouraged my creative pursuits with an abundant supply of art materials, but never considered art as a suitable career choice. Since my marks in high school science classes were above average, parents and teachers suggested that I might like



Sulawesi Sirens: Eagle Rays, pastel, 14 x 18 inches, by Judith Gebhard Smith



Sulawesi Sirens: Collector Crab Wearing Urchin, pastel, 20 x 23 inches (above), and *Close Encounter*, encaustic, 8 x 14 inches (previous page), by Judith Gebhard Smith

to pursue a career in medicine. After two years in a pre-medical course in university, I chanced to meet an individual working for a scientific book publisher who asked me if I had considered becoming a medical illustrator. After researching this, I changed my field of study from pre-medicine to art history, graduating with a major in art history and a minor in the biological sciences. I spent three years in the Faculty of Medicine at the University of Toronto, obtaining my post-graduate degree in medical illustration. After my eight years working as the medical artist for McGill University in Montreal, Canada, my husband

and I moved to Washington State where I returned to the joys of producing fine art.

X-RAY MAG: Why marine life and underwater themes? How did you come to these themes and how did you develop your style of drawing and painting?

JS: We were sailors when we moved to the West Coast, and my husband started diving in order to be able to clean the bottom of our racing boat. The water in Puget Sound is pretty dark and very cold





Sulawesi Sirens: Porcupine, pastel 14 x 18 inches (above), and Sulawesi Sirens: Peacock Mantis with Eggs, pastel, 18 x 18 inches (left), by Judith Gebhard Smith

most of the year. So, I was not really tempted to swim in it. But on a trip to South America, we stopped in the Dutch Antilles for my husband to experience tropical diving. I snorkeled above the divers. When they turned back toward the boat, I followed, encountering a

wind-driven current and a foot of chop. As the divers swam leisurely back to the boat and climbed out, I was struggling to make it back to them without swallowing half the sea through my rental snorkel. It was then that I knew that I wanted the freedom of my own air supply, and

to the beach, donning an ill-fitting rental 8mm suit with a hood that would only allow me to turn my head to the left. The water was a bone-chilling 42°F, but I did not feel it once I caught sight of a baby octopus feeling its way along a wall, looking for a crack where it could

escape my gaze. I was “hooked” forever. It seemed a natural segue to paint this underwater world and the emotions that I have experienced there.

X-RAY MAG: Who or what has inspired you and your artwork and why?

JS: In the early days of my fine-art pursuit, I was heavily involved in printmaking, and fascinated by the work of Leonard Baskin. I also admired the drama of Caravaggio's paintings. While there is

a dark side to my imagery, peopled by crows and ravens and birds of prey, there is also a playful influence in these works, demonstrating a mixed reaction to the world around me. However, I developed health issues from the use of solvents, so I moved on to try my hand at neon sculpture and even some metal welding, which was still pretty much centered on bird imagery.

In the early '90s, I found and fell in love with pastels. My painting style was influenced by the Nabis, Paul Gauguin, the



I Sea You Mantis, encaustic, 15 x 13 inches, by Judith Gebhard Smith



Hammerhead, encaustic on wood, 8 x 10 inches, by Judith Gebhard Smith

Fauve movement painters, Franz Marc and several of the German expressionists. Seeking to escape the precision of my early medical artwork, I pushed myself further toward abstract expressionism—Franz Kline being a favorite.

X-RAY MAG: *What is your artistic method or creative process?*

JS: A pastel painting usually begins with using a sanded paper substrate that has the ability to capture the pigment crystals in its “tooth” or rough surface. I start with a rough drawing using vine charcoal and then work toward a finished painting with pastel sticks. Sometimes I create my own surface using pumice and gesso spread onto a stiff mat board. I often use water to mix into the dry pastel

to give a fluid appearance to the image. Recently, I have been using pastel with some water and/or acrylic inks on canvas, subsequently sealing the work with acrylic varnish.

“Encaustic” is best explained with the following quote from *The Art of Encaustic Painting*:

“Encaustic from the ancient Greek *enkaustikos*, means “to heat” or “to burn.” Heat is used at every stage of encaustic painting. The medium consists of beeswax melted with a small amount of resin to impart hardness; it becomes paint when pigment is added to the molten wax. Painting requires the artist to work quickly, for the wax begins to harden the moment it leaves its heat source. What makes encaustic unique—



Kelp Dream, encaustic, 12 x 10 inches, by Judith Gebhard Smith



Crabby Night, encaustic on wood, 16 x 20 inches, by Judith Gebhard Smith

indeed, what makes encaustic *encaustic*—is the application of heat between layers of brushstrokes. Heat binds each layer to the one set down before it, so while the image may consist of discrete compositional elements, structurally the entire surface is one carefully crafted mass, a whole ball of wax, if you will."

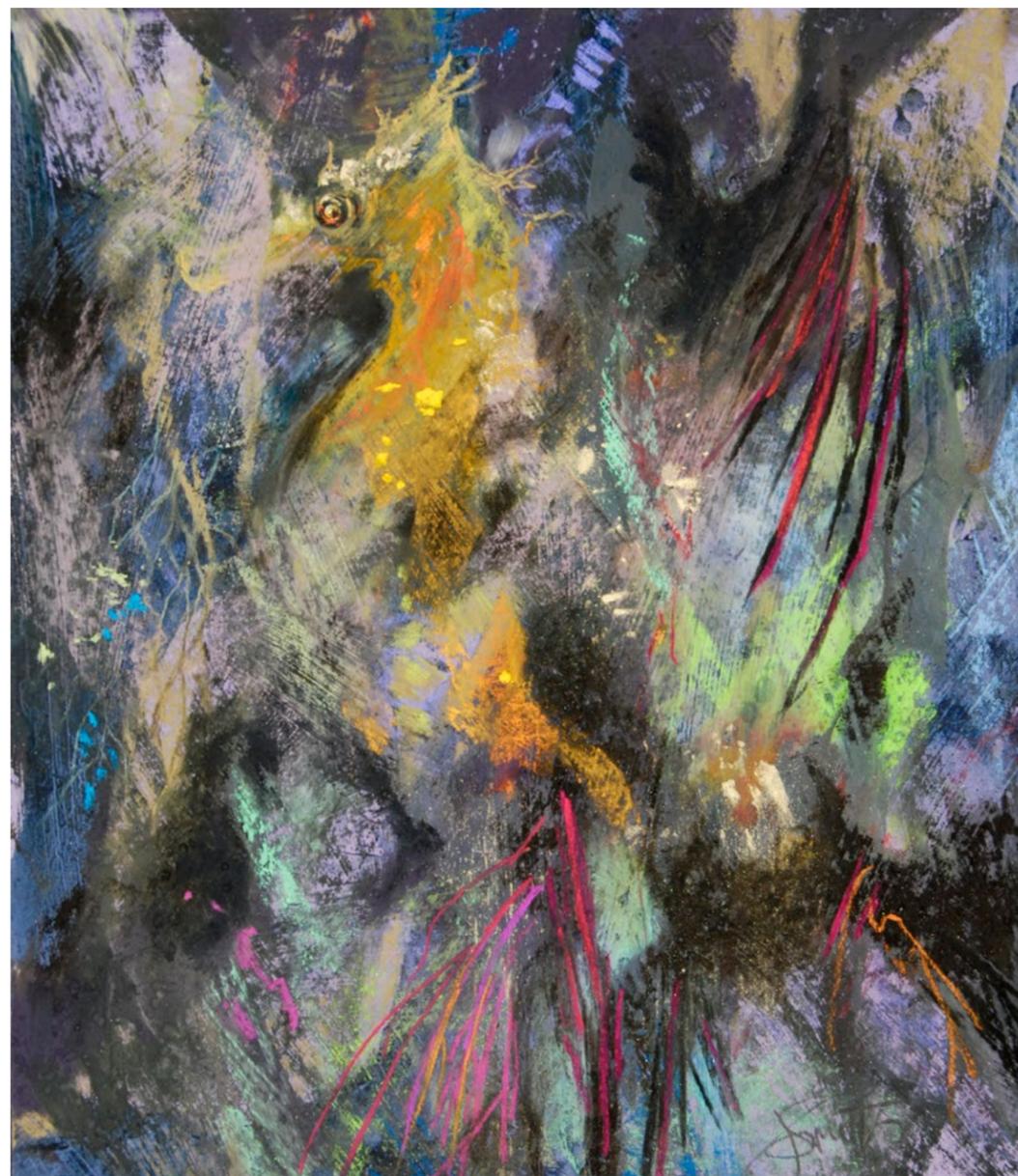
— Joanne Mattera,
The Art of Encaustic Painting

I occasionally use some of my husband's underwater photographs for reference, but generally, I rely on quick underwater sketches on my slate with a 6B graphite pencil, and my memory. My early medical art experience, doing rapid

sketching in the operating room, has proven useful in this effort.

X-RAY MAG: What is your relationship to the underwater world and coral reefs? How have your experiences underwater influenced your art? In your relationship with reefs and the sea, where have you had your favorite experiences?

JS: I began diving when I was 40 years old and have been fortunate to have done more than 800 open water dives. It is difficult for me to describe the ecstatic feeling of freedom that I experience when I roll backwards into the water; for me, diving feels like flying without wings and without fear of falling. It is the privilege of being in another world where everything is new and dif-



LEFT TO RIGHT: *Night Dive Sea Apple*, pastel, 11 x 13 inches; *Night Dive Hippocampus*, pastel, 13 x 11 inches; *Jellies I*, encaustic on clay board, 20 x 16 inches, by Judith Gebhard Smith

ferent and magical.

My diving experiences include the Caribbean, the Red Sea, Mozambique, the Coral Triangle and many Pacific Island groups. I have stroked moray eels (this was early on, before I knew not to touch); had a chunk taken out of my fin by a titan triggerfish; swum with whale sharks beneath a native fishing bagan in Cenderawasih Bay, West Papua; descended into the Tulagi Tunnels,

Solomon Islands, with hundreds of lobsters covering the walls; and first encountered a flamboyant cuttlefish in Lembeh Strait.

My dive logs turned into underwater journals illustrated with watercolor paintings of whatever marine creatures I had the good fortune to see that day. A few years ago, a friend was perusing these logs and asked why I had never used them as resources for larger paintings. I did not have an answer, so I began that afternoon.

X-RAY MAG: What are your thoughts on ocean conservation and coral reef management and how does your artwork relate to these issues?

JS: I believe that if people could see what is underwater through diving themselves or more practically, through art and photography, that they would do everything in their power to preserve what is there. It has disturbed me greatly

to have witnessed, in some parts of the world, how humans have been heedless of the damage they are doing to the reefs, and the oceans in general.

X-RAY MAG: What is the message or experience you want viewers of your artwork to have or understand?

JS: Cherish what we have been given here and work to keep it safe.

X-RAY MAG: What are the challenges or benefits of being an artist in the world today? Any thoughts or advice for aspiring artists in ocean arts?

JS: Being an artist has never been an easy way to make a living, although there are many aspects of the art world that will sustain one financially. I think artists are extremely lucky to have the ability to see things slightly differently



Shell We Dance, encaustic, 11 x 14 inches (above); *Under Pressure*, encaustic on chalkboard, 16 x 20 inches (top right); and *Turban Shell*, encaustic, 7 x 5 inches (right), by Judith Gebhard Smith



than others, and it is our responsibility to present that special sight to other people, to engage them in a different perspective. We have the power to communicate the beauty and necessity of a healthy ocean to the rest of the world, and it is a privilege to be able to do so.

X-RAY MAG: How do people—adults and children—respond to your works?

JS: In a gallery setting, people generally respond to my work with questions about diving. One little boy asked, “Do you really see stuff that looks like that?” indicating a painting of a mantis shrimp with eggs. I answered, “Yes, and so very much more.”

X-RAY MAG: What are your upcoming projects, art courses or events?

JS: I have a show (not marine life) coming up in September at the Childhood's End Gallery [in Olympia, Washington State], and I am considering ideas for a children's book about sea creatures. ■

For more information and to purchase artwork, please visit the artist's website at: nightwingstudio.com.