Should I do a Nitrox Course? :: Ear Problems :: Ecology –Wolffish :: Kate Jonker Portfolio

X-Ray Mag

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September 2022
Number 114

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Kimbe Bay

Northeast Coast
Taiwan

US Wrecks
Northeast

Training
Do What You Teach

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Deep Diving

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UW Photo
Compositing

SOUTH PACIFIC
Fiji Islands

COVER PHOTO BY MATTHEW MEIER

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COVER PHOTO: *Scalefin anthias on pinnacle at Instant Replay dive site, Volivoli, Fiji Islands*
Photo by Matthew Meier (**MatthewMeierPhoto.com**)

contents

Diver on the *Pinta* wreck, New Jersey, USA. Photo by Olga Torrey

columns...

plus...

Understand how it works

Oh, the new dive computers… Aren't they sleek and fancy-looking? Some of the latest wearable tech even goes with fancy dress. As this issue is about to be published, we got news that Apple is introducing a new model of the Apple Watch, which is also a dive computer. I did not quite see that coming, but on second thought, why not? It is very much in line with contemporary trends in sport instrumentation, and other brands have been at it for a good while. Heck, Apple even made me want to buy one, at least for a long minute. It looks very cool. I will not be getting one though, as I do not need yet another dive computer or watch.

When dive instrumentation also becomes stylish accessories or fashion statements, I only hope users also fully appreciate how they function and understand their limits. Reading the manual, for example, would be a good idea. And fingers crossed that some proud owner of such a fancy instrument does not get tempted, or led astray, to use it for any sort of diving before being properly certified. Ignorance can kill, as the saying goes.

In my previous editorial, I pondered on what many decades of diving had taught me and was worth passing on to the next generation. To that effect, I wrote a few words regarding equipment and training—that it was all cruder and less sophisticated in the old days, and that I harboured no nostalgic feelings toward it. It is much easier, safer and more pleasurable to go diving these days, thanks in large part to much better and more comfortable dive equipment and much-improved technology, which has indeed become quite sophisticated.

But with growing sophistication and automation, there is also a risk that we become disconnected or do not understand how all this tech really works. When I was taught to dive, using tables was the norm. I do not miss using them either, as they were crude and very inflexible. But they gave me a more innate understanding of how saturation and decompression work, and we all pretty much had no-deco limits memorised back then, because we looked at them every time we went diving—it stays with me to this day. We were also forced to give our dive planning a bit more thought, right from basic training.

A while back, I wrote an article about models, including the algorithms used in dive computers. It was probably a bit of a dry and terse read; I give you that. But one of the salient points I was striving to make is that computers are just performing simulations, not actual measurements of what is going on in your tissues (i.e. in regard to on- and off-gassing), and that their underlying algorithms rests upon various assumptions, which have to hold true for the simulations to be trustworthy.

This point still applies. Even the fanciest instrument is only reliable within certain bounds or design limits, which we must still observe. That Apple Watch and other brands' instruments can monitor your heart rate and other health parameters does not mean they can also monitor your tissue saturation or decompression status. That aspect still remains a mere simulation, essentially educated guesswork, however advanced it may be.

Be safe.

— Peter Symes
Publisher & Editor-in-Chief

DAN

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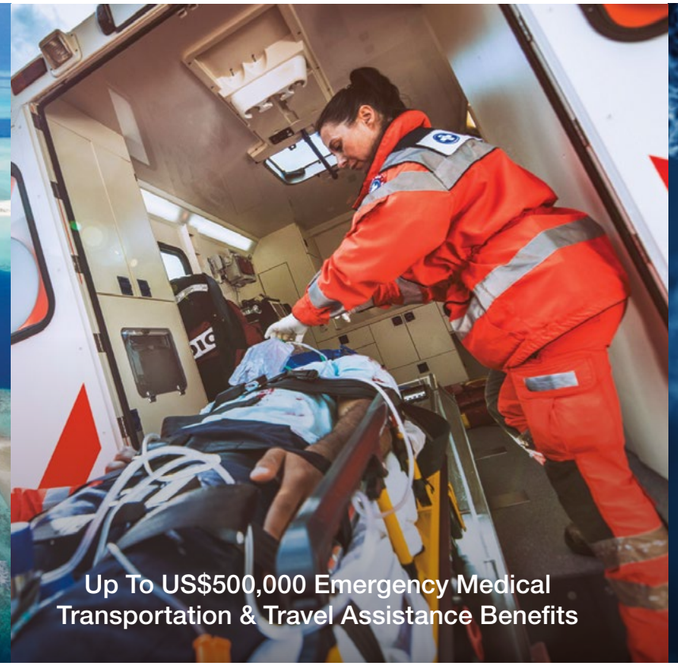
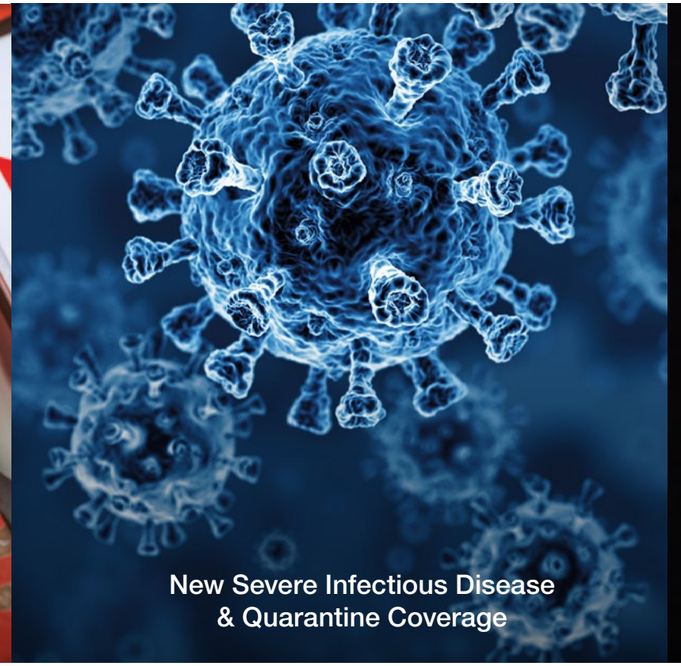
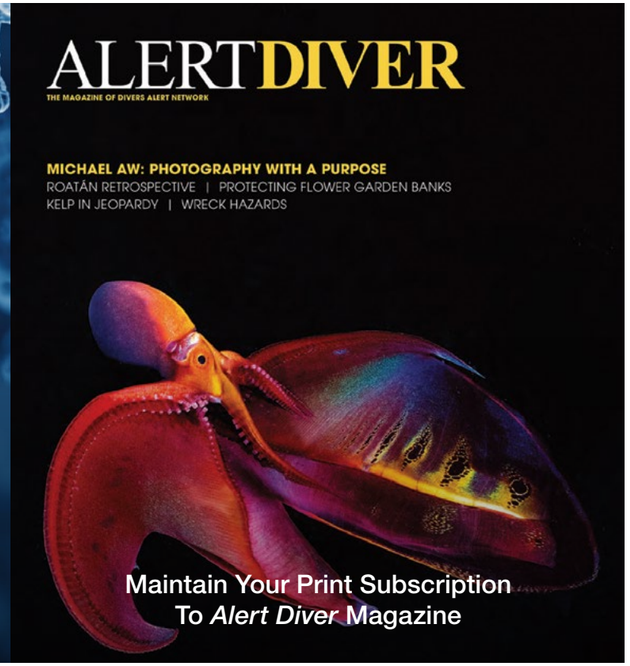






from the deep

NEWS

Edited
by Peter Symes

AIMS' Long-Term Monitoring Program measures the status and trend of reefs in the Great Barrier Reef World Heritage Area.

Continued coral recovery recorded across two-thirds of the Great Barrier Reef

A rare piece of good news: The northern and central Great Barrier Reef have recorded their highest amount of coral cover since the Australian Institute of Marine Science (AIMS) began monitoring 36 years ago.

Published in early August 2022, AIMS' Annual Summary Report on Coral Reef Condition for 2021/22 shows another year of increased coral cover across much of the Reef. The report summarises the condition of coral reefs of the Great Barrier Reef (GBR) from the Long-Term Monitoring Program (LTMP) surveys of 87 reefs conducted between August 2021 and May 2022 (reported as "2022").

The survey found average hard coral cover in the upper region and central areas of the reef increased by around one-third. However, the average coral cover in the southern region (from Proserpine to Gladstone) decreased from 38 percent in 2021 to 34 percent.

AIMS CEO Dr Paul Hardisty said the results in the north and central regions were a sign the Reef could still recover, but the loss of coral cover in the southern region showed how dynamic the Reef was.

He emphasises that the loss of coral cover elsewhere in the reef suggests it is still susceptible to threats, like marine heatwaves. The report added that due to climate change, these disturbances that could reverse the progress in coral growth were likely to become more frequent and longer-lasting.

"A third of the gain in coral cover we recorded in the south in 2020/21 was lost last year due to ongoing crown-of-thorns starfish outbreaks," he said. "This shows how vulnerable the Reef is to the continued acute and severe disturbances that are occurring more often, and are longer-lasting." ■

SOURCE: AUSTRALIAN INSTITUTE OF MARINE SCIENCE

The increasing frequency of warming ocean temperatures and the extent of mass bleaching events highlights the critical threat climate change poses to all reefs, particularly while crown-of-thorns starfish outbreaks and tropical cyclones are also occurring. Future disturbance can reverse the observed recovery in a short amount of time.

— AIMS monitoring programme team leader Dr Mike Emslie

news

Edited by Catherine GS Lim

Gummy squirrel (*Psychropotes longicauda*)—one of the new species discovered

DEEPCCZ EXPEDITION / NOAA / PUBLIC DOMAIN

More than 35 new deep-sea species discovered

Researchers have discovered new deep-sea species, from starfish and segmented worms to sea cucumbers and coral, at the Clarion-Clipperton Zone in the central Pacific.

More than 35 potentially new deep-sea species have been discovered at the Clarion-Clipperton Zone (CCZ) in the central Pacific.

Ranging from starfish and segmented worms to sea cucumbers and various types of coral, these specimens were collected using a remotely operated vehicle.

In total, 55 benthic specimens were collected from seamounts and abyssal plains. Of these, 39 were found to be potentially new to science, with nine that were referable to known species.

According to an article in *The Guardian* website, 36 of the specimens were found at more than 4,800m deep, with two found on a seamount slope at 4,125m and 17 at between 3,095 and 3,562m deep.

The findings of the discovery, published in a recent issue of the *Zookeys* journal, suggest that they represent a mere fraction of the marine animals yet to be discovered in the deep sea.

DEEPCCZ EXPEDITION / NOAA / PUBLIC DOMAIN

Psychropotes verrucicaudatus, a type of sea cucumber

A step forward

This discovery is significant as the marine animals from this area were previously studied using only photographs. The retrieval of actual specimens is a significant step forward.

"Without the specimens and the DNA data they hold, we cannot properly identify the animals and understand how many different species there are," said lead author Guadalupe Bribiesca-Contreras, of the United Kingdom's Natural History Museum.

Although the threat of deep-sea mining activity looms over the fate of the CCZ, the researchers intend to press on with their investigations.

"Whilst deep sea mining is a very valid environmental concern, we are in a very positive situation where we have been able to conduct a lot of fundamental research while the industry is held back from full-scale-exploitation," said Adrian Glover, who leads the Natural History Museum's deep-sea research group, in an article on the Museum's website.

"A big societal decision with regard deep sea mining is on the horizon and our tole is to provide as much data as we can to inform that decision as best we can," he added. ■ SOURCES: ZOOKEYS

DEEPCCZ EXPEDITION / NOAA / PUBLIC DOMAIN

Chrysogorgia soft coral

CSR Malaysia representative gives a certificate of recognition to Diveheart Malaysia, received by Hj. Syed Abd Rahman, Diveheart Malaysia Ambassador (below and bottom right)

Diveheart Malaysia recognized at national sustainability awards event

In August, Diveheart Malaysia received recognition at the Sustainability & CSR Malaysia Awards 2022, which is Malaysia's premier event honoring and promoting sustainability and corporate social responsibility.

Diveheart Malaysia was given the Certificate of Appreciation for "Meaningful Community and Sustainability Initiatives" during the awards ceremony at Mandarin Oriental Hotel in Kuala Lumpur.

The Corporate Sustainability and Social Responsibility annual event is proudly organized by CSR Malaysia, under the auspices of Pertubuhan Amal Tanggungjawab Kemapanan Dan Korporat Malaysia (a national body for Sustainability and Corporate Social Responsibility), to recognize outstanding corporations in Malaysia that have excelled in their roles as agents of change in the socio-economic and environmental transformation of Malaysia.

About CSR Malaysia

CSR Malaysia's aspirations for Malaysia go further than just profits or erecting world-class buildings and infrastructure. The caring organizations that are recognized by the awards event promote sustainable economies by helping marginalized communities and taking environmental measures to preserve Malaysian heritage for future generations. The event aims to celebrate the sustainability and corporate social responsibility achievements of these outstanding corporations and also inspire other corporations to follow their footsteps.

The judging criteria for the Sustainability & CSR Malaysia Awards consider the following:

- Alignment of the practices of the company with the Sustainable Development Goals (SDG) by the United Nations
- The company's pledge that its practices are not in conflict with the SDGs of the United Nations
- Clear purpose and goals of the company's sustainability initiatives
- Impact created by or the significance of the company's sustainability initiatives
- Frequency of sustainability and corporate social responsibility events held by the company
- Total amount of contributions given
- Transparency in reporting sustainability and corporate social responsibility initiatives
- Creative implementation of the sustainability and corporate social responsibility activities
- Strength of the sustainability and corporate social responsibility team
- Sincerity and effectiveness of each initiative

Diveheart Malaysia Ambassador Syed Abd Rahman would like to thank everyone in making this recognition possible for Diveheart in Malaysia. He wrote, "Our humble and sincere appreciation goes to all the Diveheart volunteers and adaptive divers."

About Diveheart

A nonprofit organization, Diveheart is a volunteer-driven group whose mission is "to build confidence, independence and self-esteem in children, veterans and others with disabilities, using zero gravity, adaptive scuba and scuba therapy."

For more information about Diveheart Malaysia, please go to: **kidsscuba.com/dive-heart**

During the event, Diveheart adaptive diver Ms Suhaili Yusof, was certified as Malaysia's first double amputee PADI scuba diver by His Majesty Sultan of Terengganu.

COURTESY OF DIVEHEART MALAYSIA

Empowerment of Diveheart women in Malaysia

Text by Dr Ron Salden

Diveheart Malaysia continues to make waves and extend its successful collaborations with partners and the disabled community in Malaysia. In August 2022, Diveheart was invited by Universiti Malaysia Terengganu (UMT) for the opening ceremony of the UMT Diving School.

The UMT Diving School is located on Bidong Island, which is situated off the coast of the state of Terengganu and is a marine research island for the university. Dr Ron Salden has the story.

On 8 August 2022, a special day for our Diveheart adaptive divers and Diveheart Malaysia team, we were invited for the launch of the UMT Diving School, which was officiated by His Majesty DYMM Sultan of Terengganu, Tuanku Mizan Zainal Abidin.

Ms Suhaili Yusof, Diveheart adaptive diver was certified as Malaysia's first double amputee PADI scuba diver by His Majesty Sultan of Terengganu. During the event, Diveheart Malaysia Ambassador Hj Syed Abd Rahman then briefed His Majesty Sultan of Terengganu on Diveheart Activities in Malaysia and presented a Diveheart Malaysia t-shirt to the Princess of Terengganu.

COURTESY OF DIVEHEART MALAYSIA

Diveheart Malaysia Ambassador Hj Syed Abd Rahman (second from left, kneeling) with participants of Diveheart Malaysia's event on Bidong Island

Getting there

The trip started on 6 August 2022 at the Kuala Terengganu Duyong jetty where UMT moors its vessels. Diveheart participants were welcomed by marvelous weather and the prospect of a fabulous dive trip. As with each Diveheart event, socializing is a big part of its success, and it is always amazing to reunite with friends and make new ones.

Participants

During this trip, Diveheart volunteers joined the group to support our Diveheart adaptive divers engaging in the empowering underwater experience. We had four Diveheart participants with different special abilities. They were accompanied by their own group of volunteers, which included a PADI adaptive technique specialty instructor and divemasters. The Diveheart Malaysia media team participated both on land and underwater to document the extraordinary experience.

As an active Diveheart volunteer, working as an educational psychologist at Heriot-Watt University Malaysia's Putrajaya Campus, I was one of the Diveheart Malaysia adaptive speciality instructors invited to the event and expressed my gratitude for the invitation by giving special-edition Heriot-Watt University-Diveheart t-shirts to the UMT Dive School organizing committee.

Buddy teams

On arrival, all four Diveheart adaptive divers, with their respective buddy teams, went for a shore dive at the UMT Dive School house reef, which features a wide variety of underwater structures. As each special-ability diver has different abilities and preferences in terms of independence underwater, their buddy teams adapt to maximize the enjoyment for the Diveheart adaptive divers while ensuring their safety. After each dive, everyone had big smiles on their faces, feeling reinvigorated, having shared a wonderful underwater experience together.

The Diveheart team completed two boat dives at the main jetty on Bidong Island, which visibly thrilled all the participants. During the dives, water visibility was superb, providing beautiful scenes of the fabulous coral reef with rich marine life. Each Diveheart adaptive diver was accompanied by their own respective buddy teams. In water, the groups met each other a few times, which provided wonderful opportunities to share the fun and have various Diveheart photo and video shoots.

Doing two boat dives certainly multiplied the level of enjoyment, so there were even bigger smiles on all our Diveheart adaptive divers' faces. A bountiful dinner followed, and everyone felt tired but incredibly fulfilled at the end of the eventful day.

Sharing the experience

All good things do come to an end, and so on 9 August 2022, everyone packed up their dive equipment and got ready for the boat ride back to the mainland. Having enjoyed the company of old and new friends, and wanting to continue spending time together, plans to attend future Diveheart events were eagerly shared.

In short, not only does Diveheart offer inclusive empowering events but also friendships that will last a lifetime. Indeed, together we can "imagine the possibilities!" See the **video >>>**

About Diveheart

A nonprofit organization, Diveheart is a volunteer-driven group whose mission is "to build confidence, independence and self-esteem in children, veterans and others with disabilities, using zero gravity, adaptive scuba and scuba therapy." ■


VISIT MALTA

Dramatic moment during the sinking of the 60m-long tanker *Hephaestus* off the southeastern coast of Malta's Gozo Island

Sinking of the Hephaestus

Gozo, Malta's smaller sister island, has got a new dive site. On 26 August, the former tanker was scuttled to become the latest addition to the islands' growing collection of artificial reefs.

The 60m-long, former tanker *Hephaestus*, which was scuttled at Xatt l-Aħmar, just 30m off Gozo's southeastern coast, on 29 August had run aground on rocks in St Paul's Bay in Malta three and half years ago and subsequently written off.

The wreck sat stranded there for six months before being towed to the port of Valletta. Eventually, the tanker was thoroughly cleaned and prepared for sinking before being towed to be sunk off Gozo. Here, the wreck now lies upright at a depth of 40m, close to three other artificial reefs: The *Karwela*, *Xlendi* and *Cominoland*.

The operation was handled by the Malta Tourism Authority in collaboration with the Professional Diving School (PDSA) and the Gozo ministry.

Diving the wreck

Our good Polish colleagues from Divers21 went to witness the scuttling and were among the first to dive the new wreck. They reported that, "The greatest depth near it is around the stern, where at the bottom, the computers will show us 47m. Therefore, we can boldly go to the *Hephaestus* even as recreational divers."

I am not so sure about the "boldly" part, as it appears to be a tad too deep for entry-level or novice divers. Having Advanced Open Water or the equivalent thereof, or even better such as Deep Diver or Advanced Nitrox qualification, would be required and certainly safer.

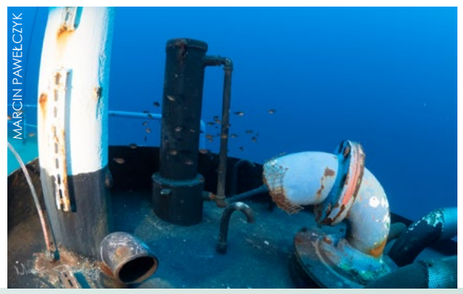
Tourist attraction

Tourism minister Clayton Bartolo stated that the new shipwreck will attract more high-quality tourists and divers, reported Newsbook.com.mt.

"Diving tourism is an important niche, in which we continue to invest. Moreover, it will also attract more tourists to Gozo," he told the outlet. ■ SOURCES: MALTA TOURISM AUTHORITY, DIVERS24

Scenes from the newly sunken artificial reef *Hephaestus*


MARCIN PAWEŁCZYK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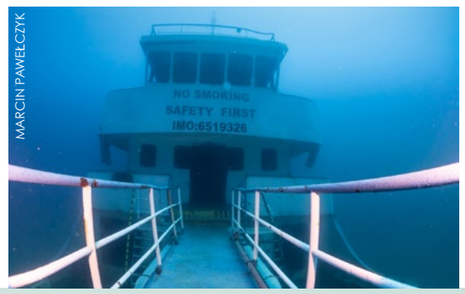

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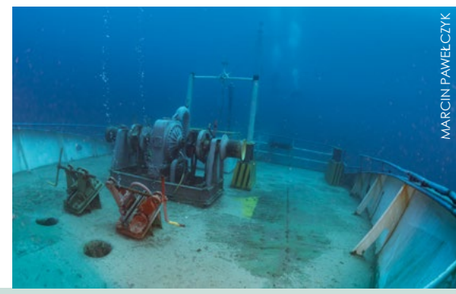

MARCIN PAWEŁCZYK

Divers find First World War US shipwreck off Cornwall

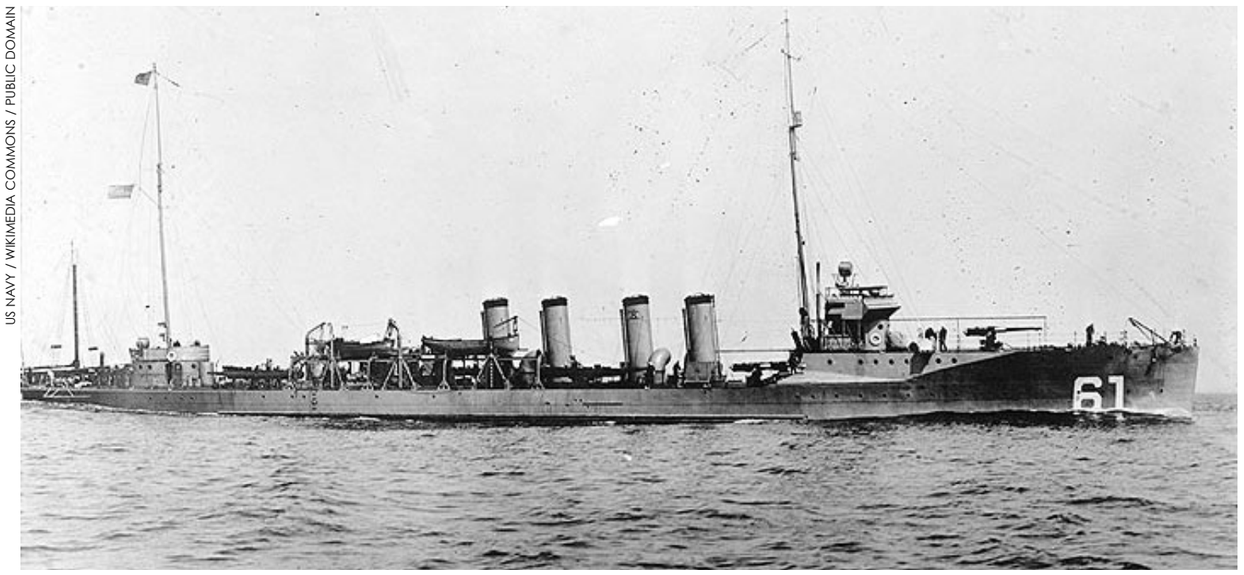
British divers have found the USS *Jacob Jones*, a US shipwreck from the First World War which has been missing since it was sunk in 1917, 40 miles off the coast of the Isles of Scilly.

The USS *Jacob Jones* was the first American destroyer ever to be sunk by enemy fire. After the United States entered World War I in April 1917, *Jacob Jones* was sent overseas. On 6 December, *Jacob Jones* was steaming independently from Brest, France, for Queenstown, when she was torpedoed and sunk by the German submarine U-53 with the loss of 66 men out of a crew of 150. The vessel sank in eight minutes without issuing a distress call.

According to Uboat.net, it was the commander of the German submarine, Kapitänleutnant Hans Rose, who radioed the American base at Queenstown with the approximate coordinates of the sinking before departing the area.

Ever since the *Jacob Jones* has rested on the seabed, its exact position unknown. That is until an experienced diving team dubbed Dark Star, who has a long history of deep diving exploration and has identified wrecks from all over the United Kingdom, set out to find the wreck.

On 11 August, the team found the vessel off the coast of the Isles of Scilly at a depth of 115m (377ft). It was immediately clear that the wreck was that of the *Jacob Jones* as its name was written on parts of the shipwreck. Numerous artefacts were located, including the ship's bell.



US NAVY / WIKIMEDIA COMMONS / PUBLIC DOMAIN

Historical photo of the USS *Jacob Jones*

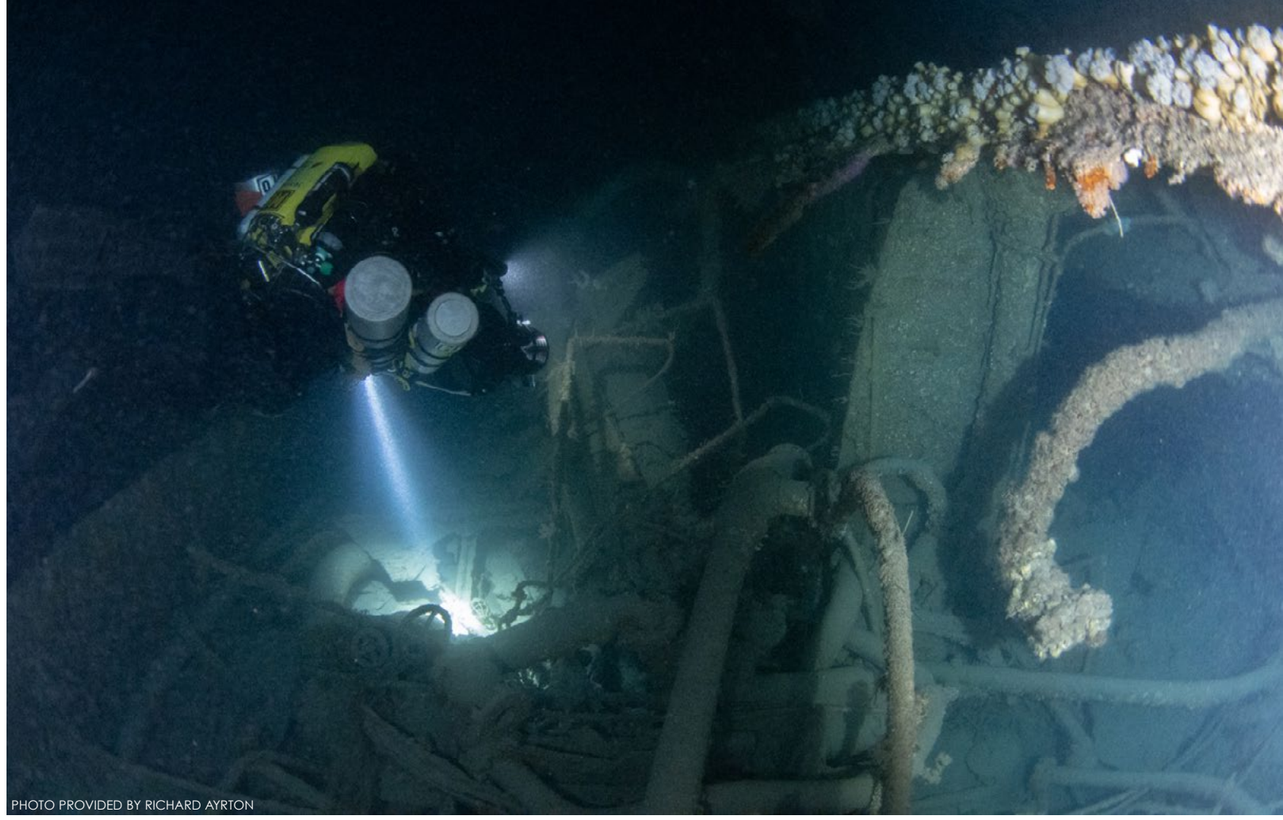


PHOTO PROVIDED BY RICHARD AYRTON

This was the first item seen that made diver Richard Ayrton think this was the *Jacob Jones*, he said. It was a gun mount; the gun barrel can just be seen in the muddy sea bed below the stray rope. The ship at this point was lying over almost upside down, said Ayrton.

Report

Richard Ayrton, one of the divers who took part in the expedition, writes:

"As a team member and photographer for the UK-based Darkstar dive team, headed up by Mark Dixon, it was exciting to be part of the expedition to locate the USS *Jacob Jones*. The original research, checking UK hydrographic charts as well as historic documents was carried out by Steve and Barbara Mortimer and assisted from the US by historian Michael Lowrey who was able to help with U-boat archive documentation.

"Our target wrecks were a long way from the nearest port being over 50 miles from Land's End Cornwall, we needed good weather conditions and thankfully we were blessed with such in early August 2022.

"The dive boat Darkstar has been based in Plymouth, UK, and we loaded kit here, then met the boat farther west at Falmouth. First dive, something of a checkout, was on the 70m deep HNorMS *Eskdale*, which gave us all a fascinating insight into destroyer shipwrecks. We moved onto the port of Newlyn, a large fishing port west of Penzance and the closest to Land's End. "On the first day diving the targets we found ourselves on a Collier in 105m, a super dive in its own right with good but dark visibility. Unfortunately, we could

PHOTO PROVIDED BY RICHARD AYRTON

The ship's bell

wreck news

The USS *Jacob Jones* has been missing since 1917

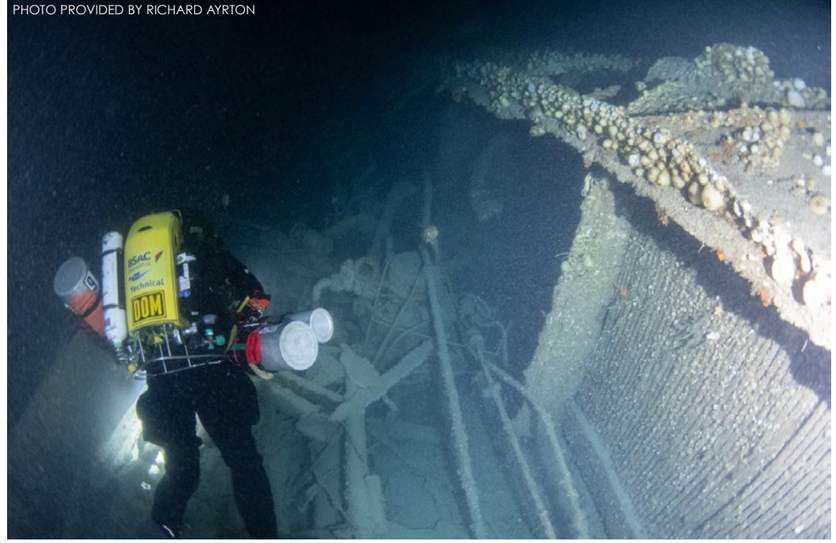


PHOTO PROVIDED BY RICHARD AYRTON

find nothing to identify the wreck other than a stoneware jug marked Swansea (South Wales). We were sure that it had never been dived before, but it was otherwise unremarkable.

"That evening, charts were checked, positions reviewed and the target for the following day decided. A rather less substantial mark, it proved to be what we were after.

"Conditions were not perfect but acceptable. Currents that far into the Atlantic can be difficult to predict, and we did have some problems getting the decompression station attached to the main shot line.

"I was diving with Dom Robinson. We both had DiveX Piranah scooters, which proved invaluable on the dive as a significant current was running throughout. The scooters enabled us to power down the shotline and then get around the wreck much more effectively than the free-swimming divers.

"Deeper by several meters than the previous day, I quickly saw a gun base on the almost upturned wreck. Then moving forward past machinery, I spotted the ship's bell! And bridge gear. A very exciting moment!

"Dom and I turned the bell over, creating a massive silt cloud, so we swam off to look at other things before returning. When I was able to see part of the name 'Jacob' on the side of the bell, we knew we had found USS *Jacob Jones* and had a whoop through our rebreather loops and a handshake before setting off to see more of the wreck, passing boilers and engine machinery before getting to the stern with bent and twisted propeller shafts.

"From there, we powered our scooters back to the safety of the blinking strobes on the shotline and our long ascent back to the surface.

"All divers were using AP Diving Inspiration rebreathers. I was using 8/80 trimix diluent. My dive worked out at 25 minutes from the start of the descent to returning to the shotline, and I was able to surface at 3hrs 20minutes. Water temperature was 11°C below 30m but rose to 20°C on the 6m decompression stop (which was very welcome)." ■


PHOTO PROVIDED BY RICHARD AYRTON

Control wheel, covered with marine life

wreck news

Edited by
Peter Symes

BRENDAN CHAVEZ, COURTESY ALLEN EXPLORATION / FAIR USE

Numerous priceless artifacts including: solid gold and silver coins, jewelry, uncut gemstones and silver bars weighing over 70 pounds have been recovered so far.

350-year-old Spanish shipwreck yields massive treasure

An expedition, led by Allen Exploration, has recovered a trove of priceless artefacts from a shipwreck over 350 years old in the Bahamas. The artefacts, which include jewel-encrusted pendants and gold chains, will be on display at the new Bahamas Maritime Museum.

The *Nuestra Señora de las Maravillas* (*Our Lady of Wonders*) sank with a cargo of gold, silver, and gems on the western side of the Little Bahama Bank in 1656. The Spanish galleon was part of a fleet sailing to Spain from Havana with royal and privately-consigned treasures from the Americas. Failing to navigate shallow waters, however, it collided with the flagship of the fleet and hit a reef. Of the 650 people on board, only 45 survived.

The ship went down on the western side of the Little Bahama Bank, over 70km offshore, but the newly discovered treasures were found across a vast debris trail spanning more than 13km.

There have already been several successful attempts to retrieve the ship's cargo, with almost 3.5 million items recovered between the 1650s and 1990s, according to shipwreck specialist Allen Exploration, which carried out a two-year expedition from 2020. Allen Exploration, with Bahamian and US marine archaeologists and divers, was licensed by the Bahamian government to explore the *Maravillas* scientifically and is committed to displaying the finds in a new museum in the Bahamas.

Discoveries

Among the discoveries were a 1.76-meter-long gold filigree chain and several bejewelled pendants that once belonged to knights of the Order of Santiago, a centuries-old religious and military order. One of the gold pendants features a large oval Colombian emerald and a dozen smaller emeralds, which experts believe may represent the 12 apostles, alongside the Cross of St. James. Three other knightly pendants were also discovered, including one shaped to look like a golden scallop shell, CNN reports.

"When we brought up the oval emerald and gold pendant, my breath caught in my throat," Allen stated, adding: "How these tiny pendants survived in these harsh waters, and how we managed to find them, is the miracle of the *Maravillas*."

About Allen Exploration

Allen Exploration (AEX) is a diversified investment company that invests in many different asset classes and actively manages several businesses.

AEX actively invests in stocks, real estate, private equity, and venture capital. AEX is currently restoring the northernmost Bahamian island, Walker's Cay, to its previous glory. Allen Exploration has partnered with The Bahamian government to search for and document historic period shipwrecks and the maritime history of The Bahamas. ■

SOURCES: ALLEN EXPLORATION, BAHAMAS MARITIME MUSEUM.COM

Earliest English medieval shipwreck uncovered

The remains of a medieval ship and its cargo dating back to the 13th century have been uncovered off the coast of Dorset by maritime archaeologists from Bournemouth University.

The survival of a vessel such as this is extremely rare, and there are no known wrecks of seagoing ships from the 11th to the 14th centuries in English waters. The discovery makes this the earliest English designated wreck site where hull remains can be seen, Bournemouth University writes.

The shipwreck was preserved due to unique environmental factors, according to maritime archaeologists now excavating and analyzing the site.

"Very few 750-year-old ships remain for us to be able to see today, and so we are extremely lucky to have discovered an example as rare as this, and in such good condition," Tom Cousins, a maritime archaeologist, said in a statement to Bournemouth University. "A combination of low-oxygenated water, sand and stones has helped preserve one side of the ship, and the hull is clearly visible."

The vessel is clinker-built—made from overlapping planks of wood—and was carrying a cargo of Purbeck stone. Quarried on the Isle of Purbeck on the southern coast of England, Purbeck stone is a form of limestone made from densely-packed shells of freshwater snails. The stone is also referred to as Purbeck marble, due to its ability to be highly polished.

The shipwreck is referred to as the 'Mortar Wreck,' since much of the cargo contained within the wreck also includes several Purbeck stone mortars, which are large stones used by mills to grind grains into flour. ■

SOURCE: BOURNEMOUTH UNIVERSITY

COURTESY OF BOURNEMOUTH UNIVERSITY

The 13th century ship with its cargo of medieval Purbeck stone is fascinating because it is the earliest English protected wreck site where hull remains are present

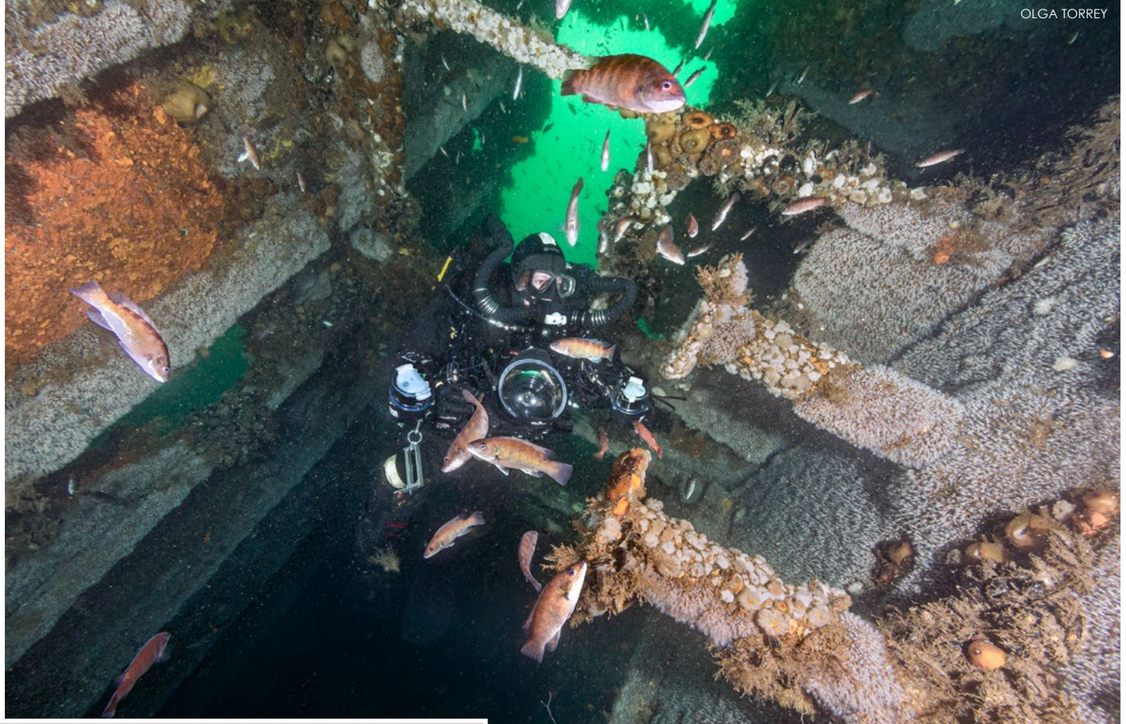
— Duncan Wilson, Chief Executive of Historic England

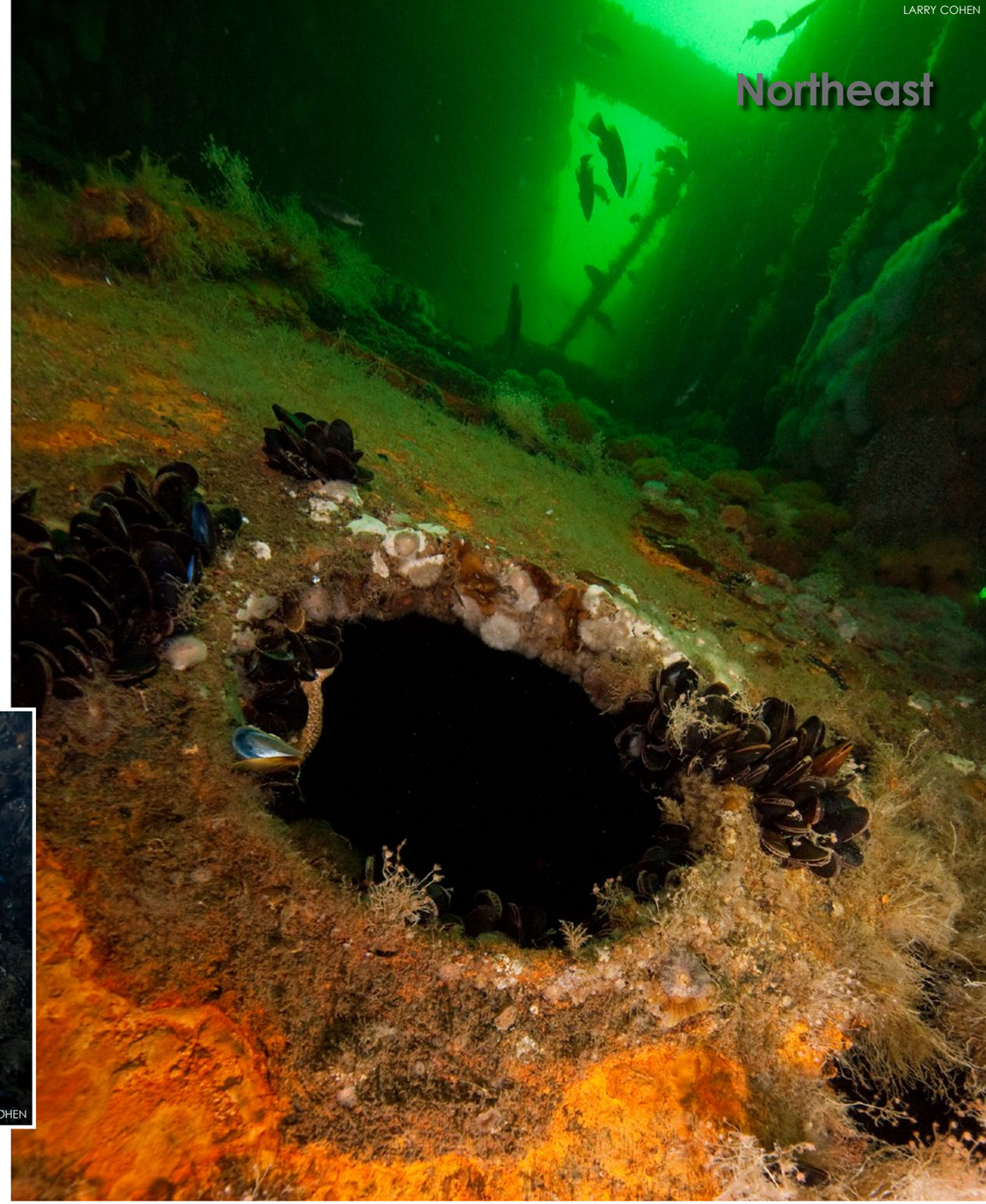
Northeast Wrecks

Part II: Shipwrecks of Collision Off New York & New Jersey

Text and photos by Larry Cohen and Olga Torrey

OLGA TORREY


OLGA TORREY


LARRY COHEN

Northeast

Larry Cohen inside the *Stolt Dagali's* galley (right); Hatch opening on the starboard side of the *Stolt* (far right); Bollard on the stern of the *Stolt* (center); Historical photo of the *Stolt Dagali* (below); Cohen entering the *Stolt Dagali* (previous page)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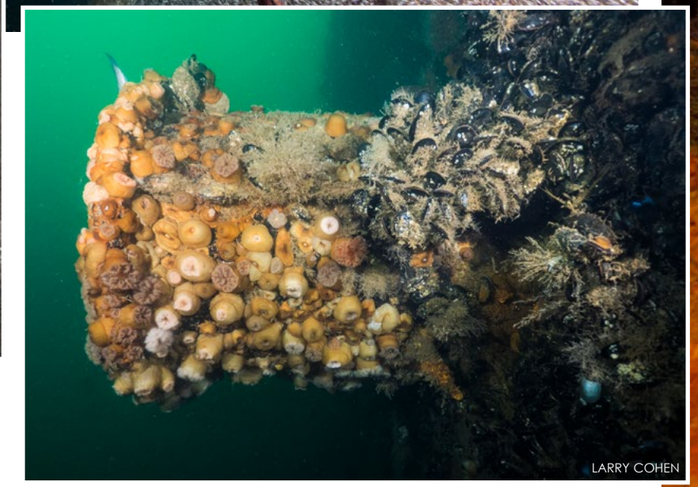
LARRY COHEN

The US eastern seaboard, along the New York and New Jersey coasts, is littered with ships that sank due to collision. Larry Cohen and Olga Torrey present several of these wreck sites, which wreck divers enjoy diving.

Stolt Dagali

The *Stolt Dagali* was a Norwegian tanker built in 1955 in Denmark. She was 12,723 gross tons—582ft long, with a 70ft beam. On 26 November 1964, Thanksgiving Day, at 2 a.m., she collided with the 25,338-ton ZIM Israel liner *Shalom*, 18 miles off Manasquan Inlet, New Jersey. The *Shalom* was sailing fast through thick fog while misreading her radar. As a result, she hit the slow-moving M-class tanker *Stolt Dagali* and sliced her in half. The 143ft long stern section of the *Stolt Dagali* sank in 130ft of water, and almost half the crew was lost. The bow section of the *Stolt Dagali* was salvaged and refitted with the stern of the CT *Gogstad*. In the summer of 1965, the ship was named the *Stolt Lady*.[1]

The stern of the *Stolt Dagali* is an impressive wreck sitting in 130ft of water. The top starts at 65ft. The highest point of the wreck is the port. Starting the dive at 65ft feels like doing a wall dive. The structure is covered with hydroids, anemones, encrusting sponges, and mussels of various colors. There are always large schools of fish around the ship. There are large openings so you can penetrate the superstructure. It is also possible to visit the engine room.

The *Stolt Dagali* is a true multi-level dive that new and experienced divers can enjoy. There is plenty to see above 75ft for the new diver. The experienced diver can explore the ship's interior and the wreckage down to 130ft. Getting to the wreck

[1] NJSCUBA.NET


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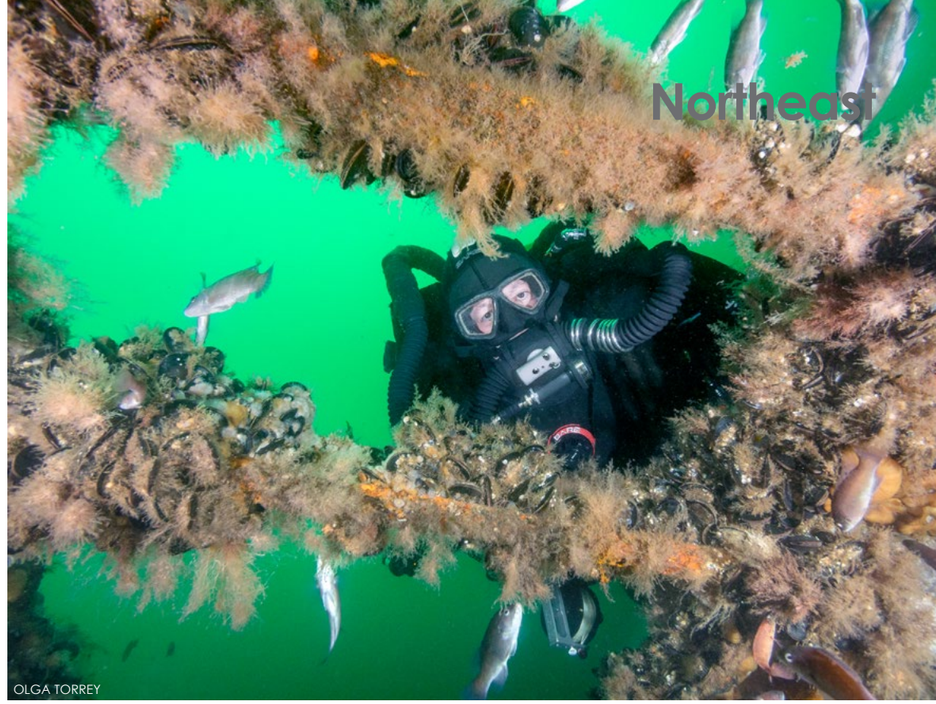
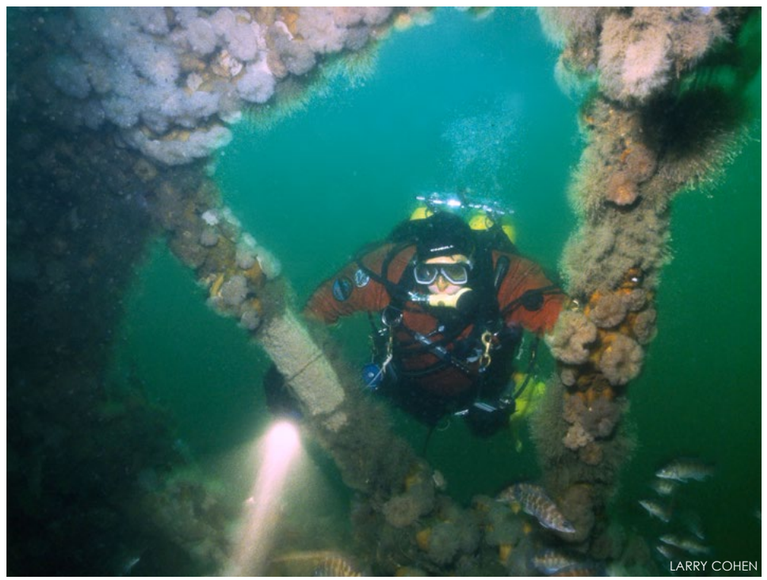

OLGA TORREY


LARRY COHEN


LARRY COHEN


OLGA TORREY

CLOCKWISE: Inside *Stolt Dagali's* galley; Boiler in *Stolt's* engine room; Exterior of *Stolt*, which is covered with mussels; Part of one of *Oregon's* boilers; Diver on the *Oregon's* steering quadrant; Top of the engine's rocker arm on *Stolt*

site is a long boat trip from Point Pleasant and other New Jersey marinas, but it is worth the ride. Visibility is usually good, and most of the time, there is not much current. The *Stolt Dagali* is a wreck worth visiting.

SS *Oregon*

The Cunard Liner SS *Oregon* is one of the most historic wrecks off the South Shore of Long Island, New York. The ship, which was 7,500 gross tons and 518ft long, with a 54ft beam, was built in Scotland in 1881. The *Oregon* was built for speed and luxury. Before being sold to the Cunard Line, it was owned by the Guion Line, and, in 1884, it won the Blue Riband as the fastest liner on the Atlantic. The *Oregon* was a steamship but was still rigged with sails. Its hull was made of iron, since steel was costly.

On 6 March 1886, the ship set sail from Liverpool, heading to New York. There were 647 passengers (186 First Class, 66 Second Class, and 395 Steerage) and a crew of 205. The ship also carried 1,835 tons of cargo and 598 bags of mail. At about 4:30 a.m. on March 14th, she collided with an unknown schooner. The schooner sank right away with everyone on board.

The *Oregon* now had a hole one passenger said was large enough for a horse and carriage to pass through. The crew attempted to plug the hole with canvas, but the captain gave the abandon-ship

LARRY COHEN

WIKIMEDIA / PUBLIC DOMAIN

Most of the *Oregon* is 125ft deep or so, and home to marine life, (above); Print of SS *Oregon* (left) by Currier and Ives (1835-1907)

order two hours later. The ship had ten lifeboats and three emergency rafts on board. Unfortunately, this was only enough for the passengers, but men from the boiler room pushed ahead of the women and children. The first lifeboat was launched only with those men. Officers and another group of men restored order in the evacuation.

At 8:30 a.m., the pilot boat *Phantom* and the schooner *Fannie A. Gorham* responded to flares launched by the *Oregon* and saved all the passengers and crew. At 10:30 a.m., eight hours after the collision, the *Oregon* sank bow first in 125ft of water. For some time, her mast stayed above water.

Cunard sent divers to the site to determine if the ship was salvageable. Since the hull broke open, this was not possible. The loss was US$3,166,000. This included US$1.25 million for the ship, US$700,000 for cargo, US$216,000 in passenger baggage, and US$1 million for valuables in the mail. The *Oregon*'s purser saved a large shipment of diamonds that was in the safe.[2]

The *Oregon* is about 18 miles off Fire Island, along the New York coast. This offshore wreck is worth visiting but is an advanced dive. Most of the ship has collapsed and is in 125ft of water. The massive triple-cylinder steam engine comes up to 85ft. Many dive boats use this as the tie-in point. In front of the engine, the nine boilers are still intact. Another site, which is great

[2] WIKIPEDIA.ORG

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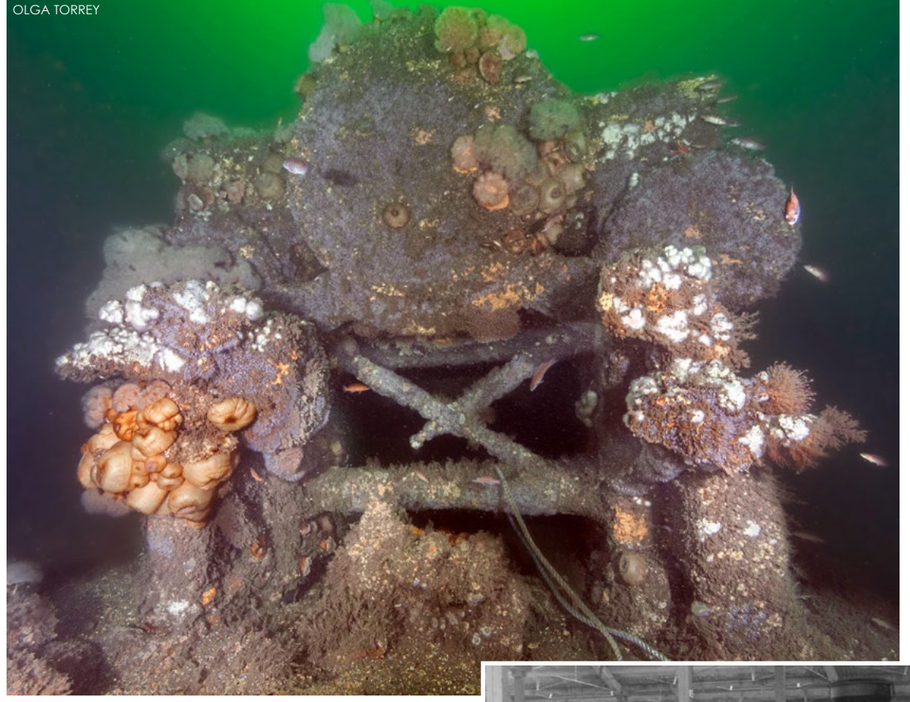
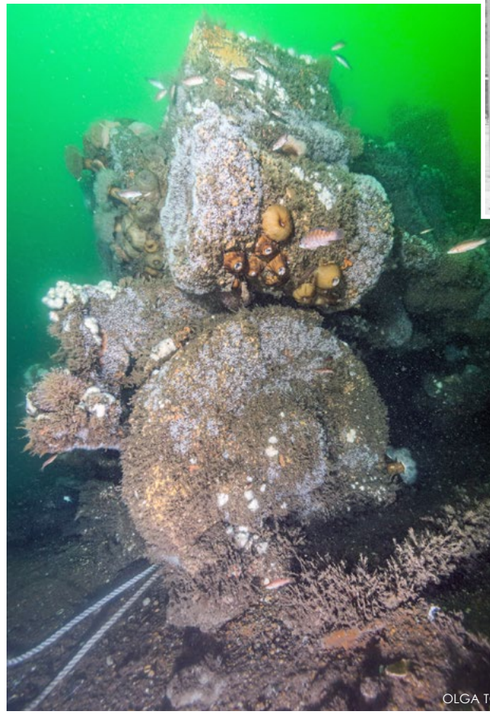
OLGA TORREY



OLGA TORREY

Northeast

OLGA TORREY



OLGA TORREY

WIKIMEDIA / PUBLIC DOMAIN

LARRY COHEN

CLOCKWISE: Left-hand fireman's side drive wheel of one of the sunken locomotives; Fireman's side leading wheel (called a pony wheel) underneath the left cylinder; Larry Cohen with locomotives; Valve gear on one of the sunken locomotives; The Pioneer, ca. 1852; Right front (engineer's side); Lower front side of one of the sunken locomotives

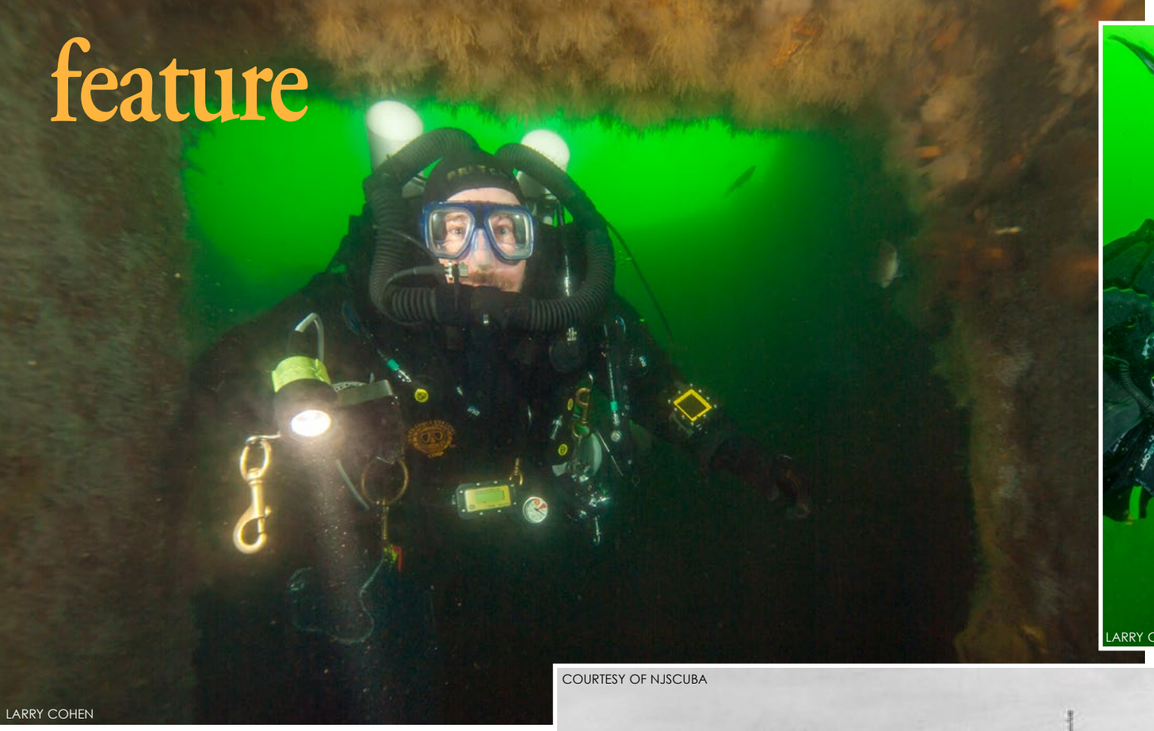
for photographs, is the large 20ft-across steering quadrant in the stern. The rest of the ship is low-lying and in disarray. The outer edge of the *Oregon* is still noticeable, but running a line is still a good idea on this wreck.

There is a large amount of marine life here, and the wreck is home to many giant lobsters. In addition, the Cunard Line's fine china and items from the passengers' baggage are prized artifacts that divers are still recovering.

Locomotives

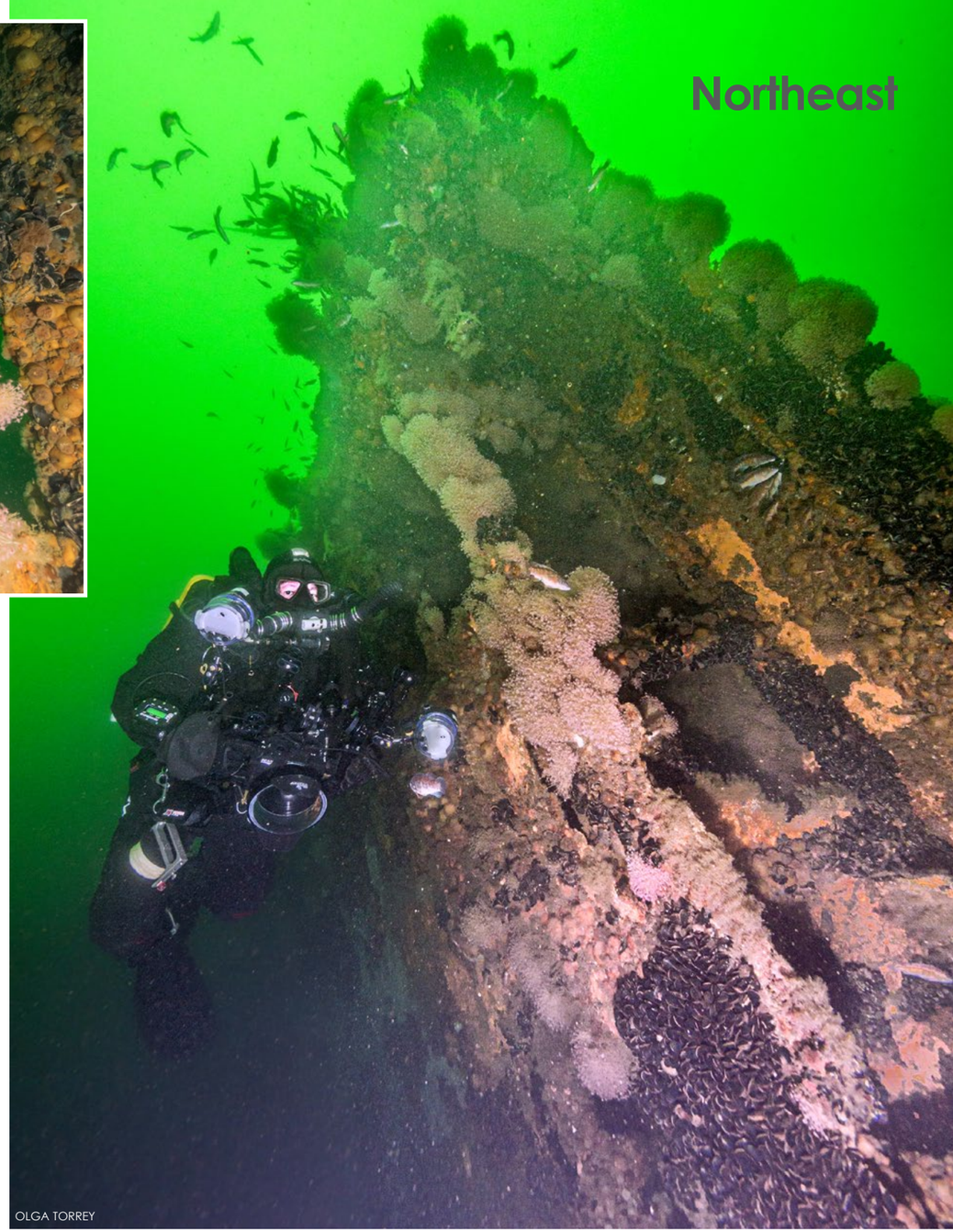
Not all wrecks underwater are ships. One of the strangest sites underwater is the site of two tiny locomotives, located off the central New Jersey coast. It is also a mystery how they ended up in the water. Captain Paul Hepler of the *Venture III* discovered the locomotives in 1985, NOAA surveyed them in 1991, and Dan Lieb with the New Jersey Historical Divers Association (NJHDA) did more research in the early 2000s.

This tiny dive site is not visited often but is of archaeological significance. David Dunn, director of the Railroad Museum of Pennsylvania, said, "the six-wheeled engines are among the earliest American workhorse locomotives, designed during



LARRY COHEN

LARRY COHEN



OLGA TORREY

Diver on the *Pinta,* a Norwegian freighter built in 1959(above); Olga Torrey exploring the *Pinta* (top center); *Pinta* is covered with anemones, hydroids and mussels (far right); Historical photo of *Pinta* (right)

COURTESY OF NJSCUBA

an era when these machines were considered the space shuttles of the mid-19th century." Based on the way the engines are built, it is believed they might be from Seth Wilmarth Union Works. This company from South Boston manufactured locomotives from 1848 until 1855.

It is a puzzle how they ended up in the water. Based on their position, it is believed that they were swept overboard in bad weather, or their lashings broke, and they slid off the deck.

Peter E. Hess, a Wilmington lawyer representing the New Jersey Museum of Transportation, won legal protection for the engines. The museum wanted to prevent divers from removing artifacts and, at some point, would like to raise the locomotives.[3]

The locomotives are in 85ft of water, and it is a long boat ride to get to the wreck site. Visibility is usually not good, but it is still a fascinating historical site worth visiting as a second dive.

Pinta

The *Pinta* was a Norwegian freighter built in 1959 in Denmark. She was 1,000 gross tons—194ft long, with a 31ft beam. On 8 May 1963, the small ship collided with the 7,547-ton freighter the *City of Perth,* seven miles east of Shark River Inlet, New Jersey.

She was carrying Central American lumber, unloaded most of it in Norfolk, Virginia, and was heading to New York. At around 8 p.m., the *City of Perth* rammed the *Pinta* forward of the bridge. The ship took on water and sank within the hour. The crew of 12 abandoned the vessel in one of the lifeboats. The *City of Perth* picked them up and took them to safety.[4]

The wreck sits in 85ft of water, and she is lying on her port side. The *Pinta* still looks like a ship but, over the years, has been decaying. The top of the wreck is covered with anemones, hydroids and mussels. Because of the wreck's small size and the lumber in the cargo holds, it is a squeeze to penetrate the vessel. Nevertheless, it is still worth getting inside to capture some sizable lobsters.

These are just a few of the fascinating wrecks that sank off the New York and New Jersey coasts due to collision. Our next and last article in the series will explore ships sunk on purpose, as part of state artificial reef programs. ■

SOURCES: NJSCUBA.NET, WIKIPEDIA.ORG

Larry Cohen and Olga Torrey are well-traveled and published underwater photographers based in New York City, USA. They offer underwater photography courses and presentations to dive shops, clubs and events. For more information, visit: ***liquidimagesuw.com*** *and* ***fitimage.nyc****.*

[3] NJSCUBA.NET

[4] NJSCUBA.NET

Fiji Islands

Fabulous Diving in theSouth Pacific

Text and photos by Matthew Meier

Diver and pair of large red sea fans at Caesar's Rock, Coral Coast (above); Scalefin and bicolor anthias over yellow soft corals at Mellow Yellow, Viti Levu (previous page)

Scalefin anthias, sea fans and soft corals on top of a pinnacle at G6 dive site, Viti Levu, Fiji (above)

***Bula!* Fiji is open, and some of the friendliest people in the South Pacific are eager to welcome you back to their tropical oasis. Matthew Meier has the story.**

I have been fortunate to visit Fiji in years past, and it is one of the few dive destinations that I have returned to on multiple occasions. The country's amazingly colorful coral reefs, abundant fish life and beautiful landscapes, as well as the warmth and caring of the Fijian people, keep me coming back. I look forward to revisiting favorite dive sites, exploring those yet unknown and embarking on adventures alongside friends old and new. This is a country steeped in tradition and culture that I could move to tomorrow and feel right at home.

The island nation of Fiji officially re-opened its borders to fully vaccinated travelers on 1 December 2021, and I was privileged to make an extended visit in early March. For more than a year, during the height of the pandemic, Fiji was off limits to foreign travelers and the country even restricted inner island travel for residents to help minimize the spread of the virus. While I was there, the country was upwards of 94% vaccinated, counting 100% of employees in tourist-related jobs.

Viti Levu Island

The first stop on our epic adventure was to the northern shores of Viti Levu Island to dive the fabled Bligh Waters. Named for Lieutenant William Bligh of the English Royal Navy who, along with 18 loyal crew members, sailed through these seas in 1789 on a 23ft (7m) launch, cast adrift following the infamous Mutiny on the Bounty. Bligh and his sailors ultimately survived the ordeal, traveling more than 3,600 nautical miles before safely coming ashore in Timor, Indonesia.

Winter months in the northern hemisphere equate to summer in Fiji, which comprises warm, humid and sometimes windy topside conditions, the occasional scattered thunder-

storm and water temperatures in the low 80s. Visibility can be affected by particulate matter caused by rain run-off and the churning of the ocean from passing storms but it still exceeded a gratifying 60ft on most of my dives—slightly less than the 100+ feet of visibility I had experienced during previous July and August visits but a massive improvement on the 5 to 15ft I am accustomed to in California.

Fiji has been dubbed the soft coral capital of the world, and many of the iconic dive sites within the Bligh Waters substantiate that moniker. We had the pleasure of diving sites such as Mount Mutiny, Purple Haze, Vatu Express, Maytag, G6, Instant Replay and, one of my personal favorites, Mellow Yellow. As the name implies, magnificent golden soft corals blanket its two submerged pinnacles while contrasting red and purple sea fans and green sun coral formations break up the scene and provide shelter for aggregations of vibrant reef fish.

Most of these sites lay within the 42 sq mi (110 sq km) Vatu-i-Ra Conservation Park, which was established in 2017 as a means of protecting the park's abundant biodiversity. Visitors are charged a FJ$15 annual fee, which helps sustain the park's management and also contributes to an education fund for children of the local Nakorotubu District.

Vatu Island. Vatu Island, or "bird island" as it is known, is located at the northern end of the park and supports notable colonies of seabirds as well as serves as a nesting site for hawksbill sea turtles. On a three-tank dive day, when the tide cooperates,

Scalefin anthias, dark green black sun corals and soft corals at Black Magic Mountain (above); Blacklip butterflyfish, scalefin anthias, and large sea fans at Instant Replay (top left); Yellow thorny seahorse on the house reef at Volivoli (center inset)

Pair of Clark's anemonefish on house reef at Volivoli (top left); Sea fans, scalefin and purple anthias at Maytag dive site, Viti Levu (top right); Aggregation of scalefin and purple anthias swimming over leather soft corals on top of a pinnacle at Black Magic Mountain dive site, Viti Levu (above)

divers can spend their after-lunch surface interval walking on the sand at Vatu Island surrounded by hundreds of terns, gulls and frigate birds.

Alternating two- and three-tank dive days, we departed the resort each morning for a 30- to 40-minute transit out to our first dive site. The commute afforded conversation to get to know our fellow divers and also time to leisurely gear up before having to hit the water.

Maytag. On this particular two-tank morning, we first dropped into Maytag, named for the occasional washing-machine-type movement of the water possible here, and were rewarded with a steady drift and several large sea fans exploding with fish life. The current was such that I was able to kick into it, maintaining position, while doing my best to let the fish get used to my presence, so as to time my shots with their synchronized movements.

Instant Replay. After everyone was back on the boat, the captain moved us farther down the reef for dive number two at a site called Instant Replay. Following our guide, we floated past several coral bommies adorned with stunning sea fans and radiant soft corals that were swarming with fish. During our safety stop, I was captivated by the electric hot pink soft corals near the top of the reef, which were smothered with schooling orange-colored anthias and purple fusiliers. It was a spectacular morning that encapsulated part of why I keep coming back to Fiji.

Soft corals sustain themselves on passing food particles. When the current is running, they inflate their bodies with water to maximize surface area, thereby increasing their chances of catching a meal.

Successfully diving soft coral is all about the current. The trick for the dive operator is to find a dive site with enough current to open up the corals but not so much current that divers are whisked away without a chance to appreciate, much less photograph, the scene. It is a delicate balance of timing that requires close attention

Dancers and singers performing as part of a traditional *meke* for a *lovo* feast at Volivoli (top left); Flock of black noddy or white-capped noddy (*Anous minutus*) sea birds attacking a bait ball in the water off Vatu I Ra Island (above); *Kava* plant roots drying in the sun (right); Wooden lounge chairs in silhouette at sunset, sitting under palm trees on the edge of the Pacific Ocean at Volivoli (left)

to the tides, the evaluation of conditions once onsite and, of course, years of experience.

During the pandemic when the resort was empty and boats were shuttered to save on fuel, one of the owners and his now 12-year-old daughter made over 100 shore dives to pass the time and advance her dive qualifications. What they discovered was a whole new world of muck diving and dozens of new macro critters they never knew existed.

I made a check-out dive upon my arrival, and in just 30 minutes, I saw multiple pipefish, shrimp gobies, clownfish in anemones, juvenile filefish, brilliant tube worms and one very shy yellow seahorse. Fiji will forever be known for its phenomenal coral reefs, but it is always nice to have other options, and I think a little critter-hunting in the muck is a great way to spend the afternoon and perhaps practice your macro photography.

Fijian dance, music & song

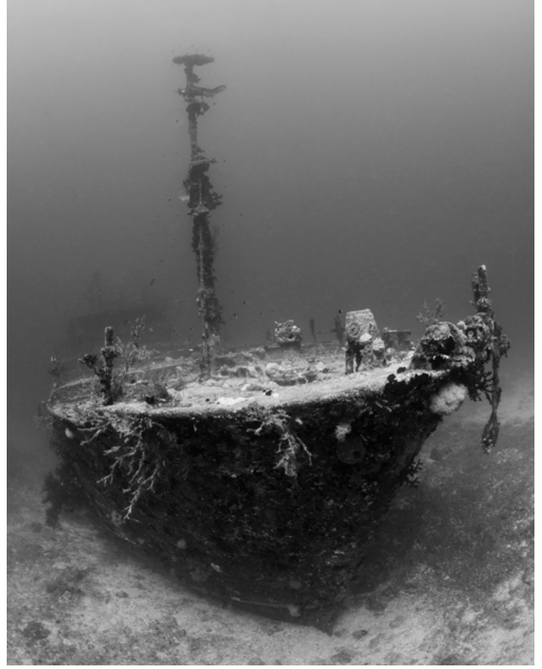
One evening, we were treated to a *meke* and *lovo* dinner down by the beach. Meke is a mingling of traditional Fijian dance, music and song used for the telling of stories. Male dancers are typically dressed as warriors, carrying spears or clubs, while the women often perform a fan dance in traditional skirts. The musicians maintain a steady beat for the dancers and are frequently seated on mats in the background.

Lovo is a celebratory meal reserved for special occasions in Fijian culture and also refers to the underground oven used to cook the feast. Meat, chicken, fish and pork, along with various root vegetables, are wrapped in banana leaves and palm fronds before being roasted for hours over hot coals and stones placed in the earth. The food is delicious, and the cultural experience is not to be missed.

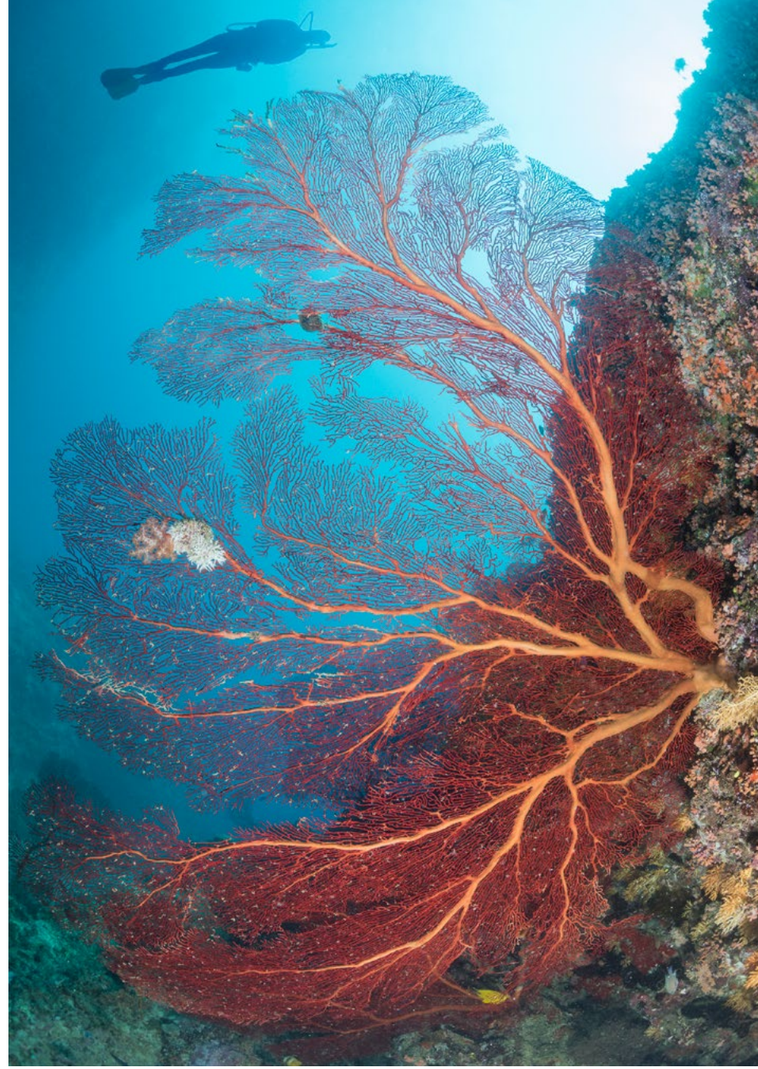
After the dinner and dancing, we were invited to share in a *kava* ceremony. Kava is a traditional Fijian drink made from the root of the yaqona plant which can elicit a euphoric, calming feeling. It is customarily consumed during greetings, gatherings and offered as a sign of respect when visiting a neighboring village. The root is dried and crushed, before being placed in a cheesecloth and mixed with water in a communal wooden bowl, creating a brown, muddy concoction.

The peppery liquid is then imbibed from a half-coconut shell, ideally in a single gulp, often leaving the lips, mouth and tongue a bit numb. Participants sit around the bowl and take turns drinking as the coconut shell is ceremoniously passed around the circle. Not exclusively used for special occasions, the kava ritual is part of daily life for many Fijians.

Bidding goodbye to the Bligh Waters, we traveled around the eastern half of the island on the Kings Highway past Suva, the nation's capital, to Pacific



Diver with yellow, white and brown soft corals at Golden Arch (left); *TASU II* wreck at 7 Sisters (above); Diver with large red sea fan (right) and massive colony of plate corals growing on the side of a pinnacle (bottom right) at 3 Nuns



Palms trees on the Pacific shore at Waidroka

Harbor. Intermittent rain showers occasionally limited our driver's visibility, making for quite a memorable journey.

Coral Coast

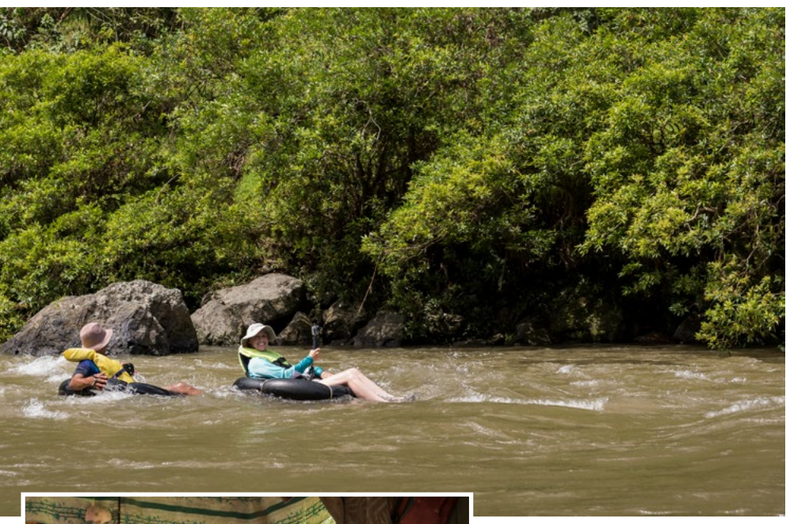
When we finally arrived at the island's southern perimeter, known as the Coral Coast, we found our new home situated at the water's edge, on its own private inlet and surrounded by remote tropical jungle. The picturesque, secluded grounds conveyed an immediate sense of peace and tranquility.

Beqa Lagoon. A majority of the scuba diving on the southern coastline occurs within the confines of Beqa Lagoon, which is protected by a sizable offshore barrier reef. The underwater topography is striking—predominantly comprised of pinnacles, bommies and walls punctuated with hard corals, sea fans and, somewhat less frequently than the Bligh Waters, soft corals. The branching hard corals attract a variety of reef fish, which pulse into the water column in search of food before any perceived threat triggers a coordinated retreat to the safety of their maze-like homes.

7 Sisters / TASU II wreck. Our first day on the water was a three-tank dive starting with the *TASU II* shipwreck at a site called 7 Sisters. In addition to its seven namesake pinnacles covered in hard corals and sea fans, the former 200-ton Taiwanese fishing vessel was interesting to circumnavigate, sitting upright on the sandy bottom, encrusted with marine life.

3 Nuns. Even larger sea fans awaited us at a site called 3 Nuns for our second dive before we were treated to a delectable picnic lunch on the beach at Yanuca Island. Ringed by shallow coral reefs, the infrastructure of an abandoned surf resort is all that remains on this beautiful uninhabited sanctuary.

Golden Arch. At our final dive site, appropriately named Golden Arch, we discovered a large swim-through, capable of enveloping multiple divers, extensively cloaked in yellow soft corals. Several smaller arches in the rocky terrain provided a wider array of gaudy soft corals, along with a myriad of sea rods, sponges and sea fans to round out a great day of diving.



Yanuca Island and the surrounding shallow coral reefs (top left); Waterfall at Navua River (top right); Freshwater eel in a tributary of the Navua River (right); Long-boat cruise and river-tubing tour of Navua River (above left and center); Traditional weaving of mats at Sabata Village (left)

Navua River & Sabata Village

An inner-tube float down the Navua River was on the agenda for the following day, starting off with a 13.7-mile (22km) journey upriver, past numerous waterfalls and small sets of rapids, in long wooden canoes. Our eventual destination was the village of Sabata where we met a few of the local residents and learned about traditional Fijian life.

The 50+ inhabitants survive off the land without electricity or running water. Fish and freshwater eels are plucked from the river; pigs and chickens are raised for food; and taro, cassava and other vegetables, along with kava plants, are cultivated on the surrounding hillsides.

During our visit, we witnessed kava root drying in the sun and several huts filled with woven mats at various stages of completion. The mats, which are frequently gifted for special occasions, have immense cultural value and are often the only furniture found in a Fijian home.

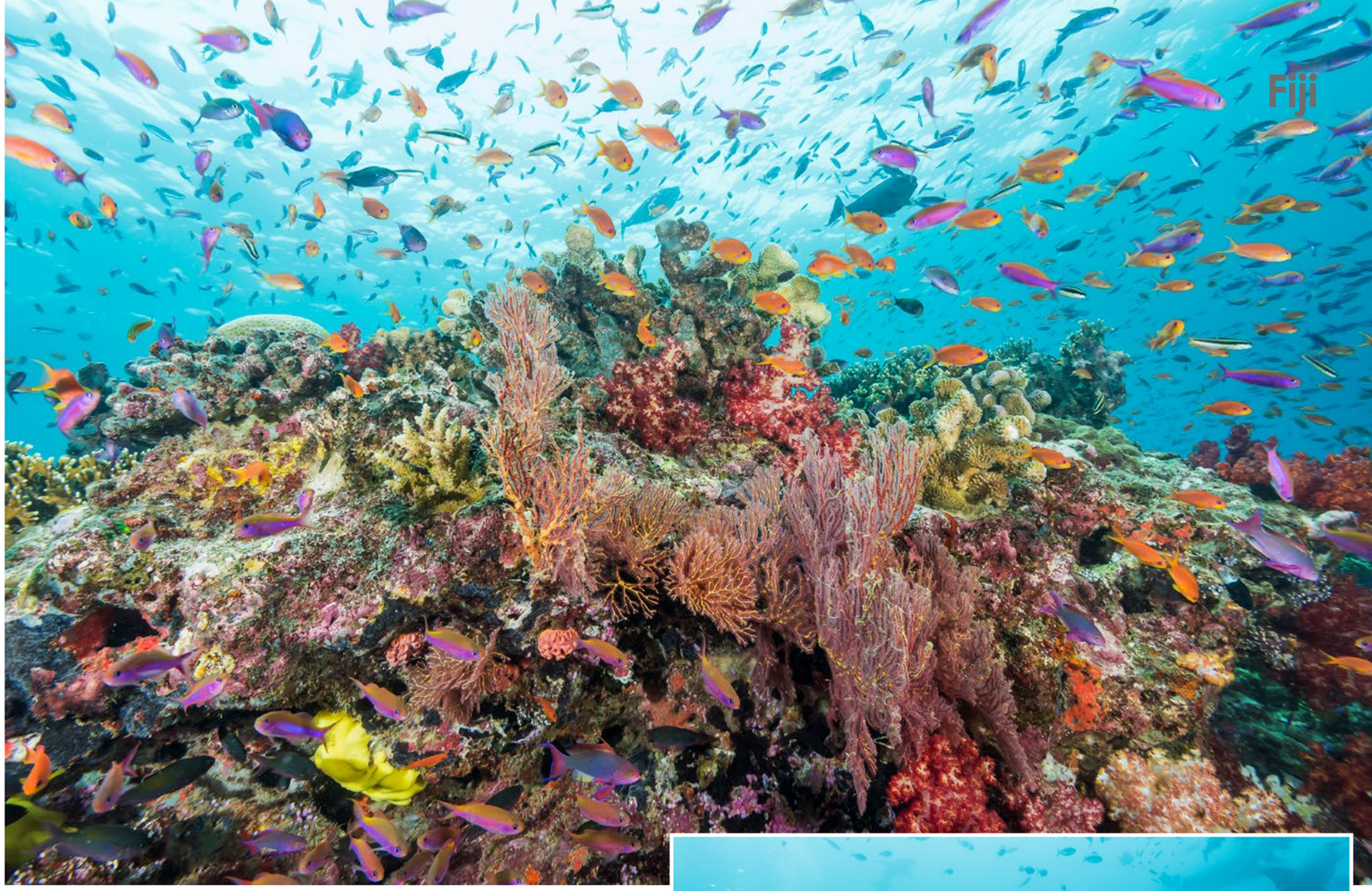
Waterfall hike

After the village tour, we embarked on a waterfall hike culminating with a revitalizing and welcome dip in the cool water pool at its base. Lunch in the shade along the shoreline followed, and then it was time to don life vests and clamber onto our inner tubes for a refreshing float back downstream.

It was relaxing to slowly travel past the steep canyon walls, and at times invigorating, as we navigated the gentle rapids. Thankfully, the guides helped control our descent through the more sizable waves, leaving very little for us to do but enjoy the ride.

Coral Coast activities

The coral coast may as well also be known as the adventure coast. In addition to river tubing, guests can partake in river rafting, jet boat safaris, cave tours, waterfall hikes, jet skiing, dune buggy treks, zip lining, sky diving, cultural tours, wildlife park excursions, golf outings, paddle boarding, surfing and shark diving. Additionally, on the grounds of the resort, we had access to a slackline, volleyball, a swimming pool, jungle hikes, kayaks, stand-up paddle boards, yoga, darts and a pool table.



Scalefin and magenta slender anthias swimming above sea fans and colorful soft corals at Caesar's Rock, Coral Coast (above and left); Bull shark with fishing hook stuck in its mouth (top left) and sicklefin lemon shark with golden trevally (right) on shark feed dive in Pacific Harbor

Pacific Harbor shark diving

The shark diving in Pacific Harbor is world renowned and excitement levels were high as we pushed off from the dock for a two-tank dive. After tying up to the mooring line, we were briefed on what to expect and how to behave underwater.

Submerging to 60ft (18m), the group knelt in an arc behind a short rock wall as numerous sharks circled the bait canisters suspended in front of us. Several healthy bull sharks made their presence known, while a lemon shark, with golden trevally escorts, paid particular attention to my strobes, as nurse, reef and blacktip sharks stayed close by in hopes of a free meal. After 20 to 30 minutes of steady activity, the sharks were rewarded with the contents of the bait box as we ascended to shallower depths to inspect the surrounding coral reef and an inverted shipwreck.

Animated voices filled the air back onboard as we recounted our exhilarating experiences, and after a surface interval, we were all psyched to get back in with the sharks for round two. I had hoped one of the semi-resident tiger sharks would make our acquaintance, but alas, she did not materialize. As a sort of consolation prize, a dive guide presented me with a couple of shark teeth found on the bottom after the bait was devoured.

More Coral Coast diving

Caesar's Rock. Still pumped with elevated serotonin levels from our adrenaline-filled morning, we stopped at a site called Caesar's Rock to explore its pinnacles and sea-fan-filled swimthroughs. I was fascinated to examine

Blacklip butterflyfish and Indo-pacific sergeants on hard coral pinnacle at Ponti's Playground, Coral Coast (top left); Clark's anemonefish and orangefin dascyllus, Coral Coast (top center); Diver with hawksbill sea turtle at Frigates Wall, Coral Coast (above); Surfing at Frigates, Coral Coast (left); Whitemargin stargazer hiding in rubble at Coral Gardens, Rainbow Reef, Taveuni (right)

the various caverns cut into the site's five pinnacles, but the highlight for me was the bountiful fish life oscillating above the healthy hard corals near the surface. I spent the second half of the dive and my entire safety stop looking for fish-filled photo ops.

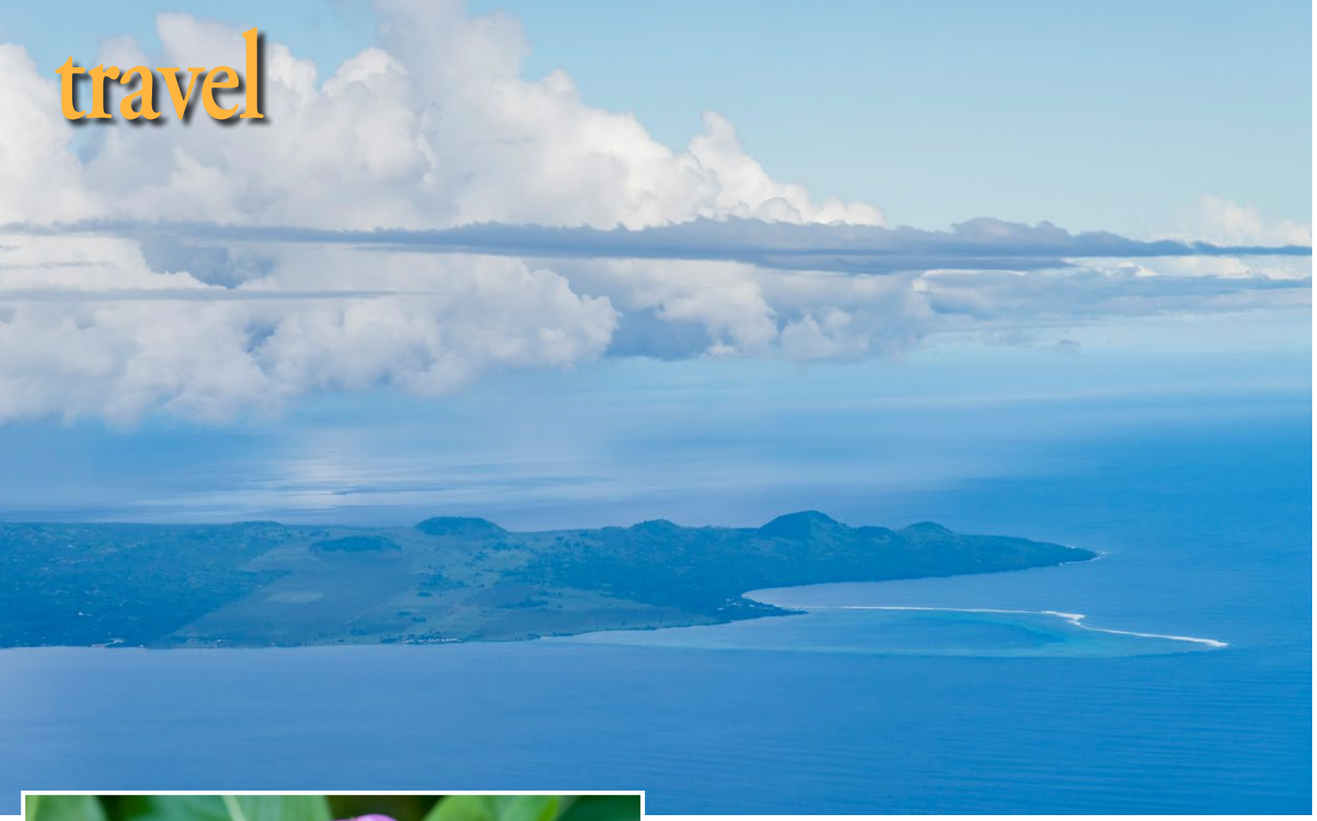
Frigates. Our second temporary home was as much a surf resort as it was a dive resort, and on our final day on the water, we made the trek out to the famous surf break Frigates to dive the barrier reef, which gives life to its standing waves. We were joined by the resort's surfing guide, so I could also attempt to photograph him in action.

A weather system had rolled in overnight and the flat calm seas from the previous day were replaced with a steady chop and gusty winds. Not ideal for surfing or diving, but with an hour's transit to the reef, we forged ahead with the hope of an improved forecast onsite.

Once moored, we assessed the surf conditions and decided to make a dive on the wall in anticipation of better waves. Underwater, we were greeted with a gentle current and lazily drifted past massive hard coral formations of spectacular topography.

Towards the end of the dive, the unmistakable silhouette of a zebra shark caught our attention, resting on the sand some 50ft (15m) below, and as I was doing mental gymnastics to determine if it was worth my air consumption to investigate, we came face to face with a hawksbill sea turtle. Decision made, chalk up a win for the sea turtle.

The sea state was slightly improved after our dive, but Frigates was still not showcasing its characteristically clean barrels. Undeterred, our surf pro paddled into the lineup, and for the next two hours, fought an abnormal surface current



Aerial view of Vuna Reef at the southern end of Taveuni Island (above); Purple frangipani flowers, also known as plumeria, on Taveuni Island (left)

and westerly swell, working his tail off to catch only a handful of waves. Uncharacteristic conditions aside, I still managed a few nice shots of him up on his board and was also able to put the drone up to capture unique perspectives of the expansive barrier reef break as another rainstorm crossed the horizon in the distance.

On to Taveuni

Repacking our gear and departing the Coral Coast, we drove along the Queen's Highway on the western shoreline of Viti Levu, returning to the airport in Nadi for the short flight to the island of Taveuni. The 70-minute plane ride on board a small 19-seat puddle jumper offered incredible aerial views of the Bligh Waters, Rainbow Reef and Vuna Reef.

Landing at the northern tip of Taveuni, also known as the Garden Isle, we hopped into a van to transfer down to the southern end of the island—arriving at our third home away from home just in time to unpack, freshen up and enjoy another superb lovo feast and meke celebration.

Rainbow Reef

The island of Taveuni is separated from the much larger island of Vanua Levu by a narrow body of water called the Somosomo Strait. Beneath the surface, the strait contains a compilation of dive sites famous for their multicolored soft corals, collectively known as Rainbow Reef.

Large colony of cabbage coral, *Turbinaria reniformis*, at Cabbage Patch, Rainbow Reef, Taveuni Island (above); Scalefin anthias, chromis, butterflyfish and colorful soft coral reef at The Corner, Rainbow Reef, Taveuni Island (right); Large expanse of white soft corals on the Great White Wall, Rainbow Reef, Taveuni Island (left)

Great White Wall. This includes the acclaimed Great White Wall, which is consistently included in top-10 lists of the world's favorite dive sites. This towering vertical wall, comprised solely of white soft corals, is only accessible twice a day at slack tide when the current slows just enough to allow divers to drift past while the soft corals are still fully engorged. Jump in early and the current will catapult you past the wall in a matter of seconds; too late and the soft corals will have retracted to a small fraction of their former selves. For a chance to dive this site, I now plan my trips to Taveuni almost entirely around the slack tide schedule.

Situated at the southern end of the island, the transit from the resort to Rainbow Reef is anywhere from 20 to 30 minutes, depending on the destination. The dive sites for each day are chosen based on the tides at a given time, which affects the current flow for the soft corals.

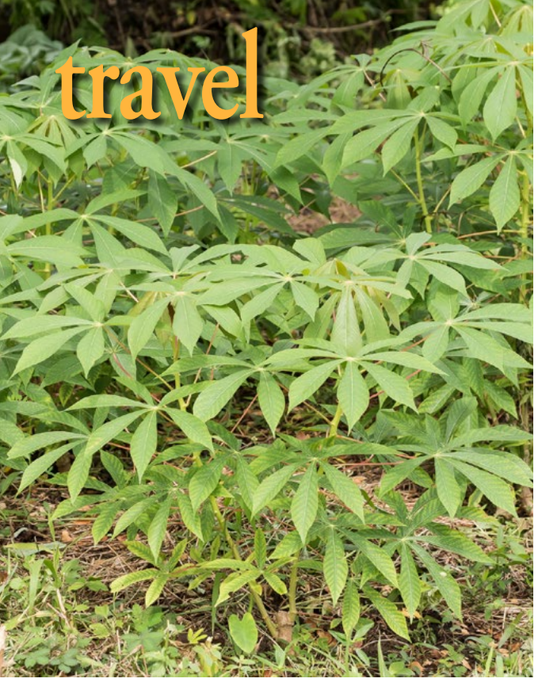
Vuna Reef. The resort's location also offers divers the unique opportunity to dive Vuna Reef, which is a mere five to ten minutes farther south. Since it is the only operator that visits this reef, divers will have unfettered access to sites such as Fish Factory, Yellow Fin Wall, Pinnacle, Incredible Reef and my personal favorite, Orgasm—for reasons that appeal to both my inner juvenile mentality and the eruption of colors and fish life that are found there.

Purple Wall. Pulling away from the dock for a two-tank dive, we headed north towards Purple Wall. Near to the Great White Wall, this site showcases a robust fusion of hard corals with a variety of purple soft corals across an expansive vertical structure.

Giant striding into the water, my buddy and I were greeted by a pair of zealous spadefish that proceeded to swim circles around us for the majority of the dive. Gliding past the reef with our spadefish escorts, we marveled at the vast purple canvas as hundreds of cautious anthias came out to say hello. A lovely start to the day, though dive number two at a site called The Corner was even more impressive.

The Corner. This spectacular mix of hard and soft corals, in a kaleidoscope of colors, warranted the title of "rainbow reef" all on its own, and the fish life on this particular dive was truly remarkable. I was positively in awe at the variety of species dancing in front of my lens.

Cabbage Patch. If you somehow tire of colorful soft corals, ask about diving Cabbage Patch at the far northern end of Rainbow Reef. This site contains one of the largest colonies of cabbage corals I have ever seen, its scale can be hard to comprehend. I love analyzing the textures and patterns of its various landscapes but could also spend hours looking into the individual folds of the corals in



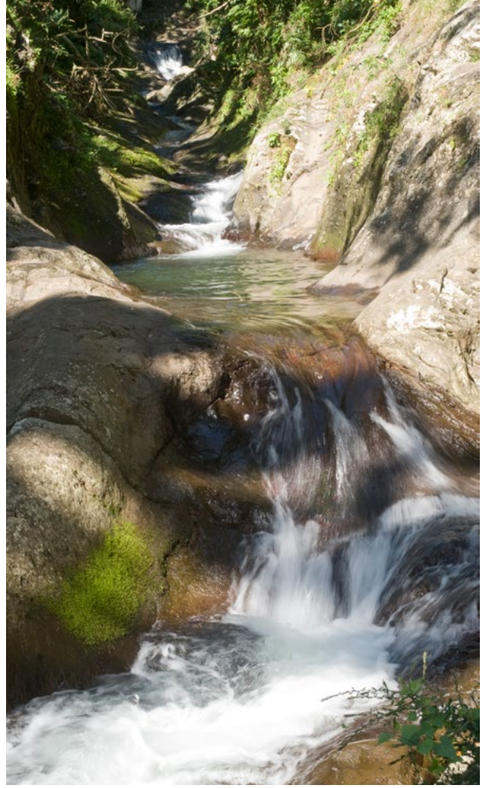
Blue chromis and three-spot dascyllus on hard corals (above) and bullethead parrotfish hides in its mucus cocoon within the coral reef at night (right) at the Paradise Taveuni House Reef; *Chromodoris kuniei* nudibranch at Steve's Corner (top right); The community cooperative house garden at Paridise Taveuni had taro plants and a bee box (left), piglets and chickens (far left), and cassava plants (top left).

search of concealed fish and other hidden treasures.

House garden. In the past few years, the resort's back-of-house garden has been expanded to include a larger variety of vegetables and herbs, generously used in the kitchen by the talented chefs. As part of a cooperative project with the local community during the pandemic, chickens and pigs are now raised on the property for eggs and meat. Extra provisions are shared with the nearby villages at reduced rates and guests can tour these new farm facilities. There is also an on-site bakery making fresh bread and sweets daily, which are available to both guests and locals alike. The restaurant's subsequent menu, while not entirely farm to table, is certainly healthier, extra flavorful and more self-sufficient with all of these additions.

House reef. On the first day or so of our visit, I was fighting a head cold and opted to dive on the house reef so I could descend slowly, stay shallow and try not to damage my ears. Obviously, it is not ideal for anyone to be diving while under the weather, but sometimes, while on assignment, you have to make the best of a less-than-perfect situation. Plus, the house reef is absolutely gorgeous, full of hard and soft corals with lots of cool critters to uncover.

There is a resident blue ribbon eel, different species of clownfish in anemones, stonefish, parrotfish, lizardfish, nudibranchs, giant clams and countless brightly colored chromis, anthias and fusiliers swimming amongst the branching corals. At night, an entirely different cast of characters emerges from their daytime hiding spots within the reef, making this a great location to grab a flashlight and explore after dark. As the sloping reef levels out to a sandy bottom at around 60ft (15m), you can find garden eels and other



Ocean water sprays out of the Southern Blowhole, creating rainbows in the sunlight (above); The Wairiki Catholic Mission (top left); A series of small waterfalls over polished rocks allows for a slippery ride down through the rainforest at the Waitavala Water Slide (top center); Common myna bird and collared kingfisher (center insets)

The largest of three waterfalls at Bouma National Heritage Park and Tavoro Waterfalls can be found on an all-day hiking tour.

benthic creatures, and if you are really lucky, a whitemargin stargazer will reveal itself.

Day tours

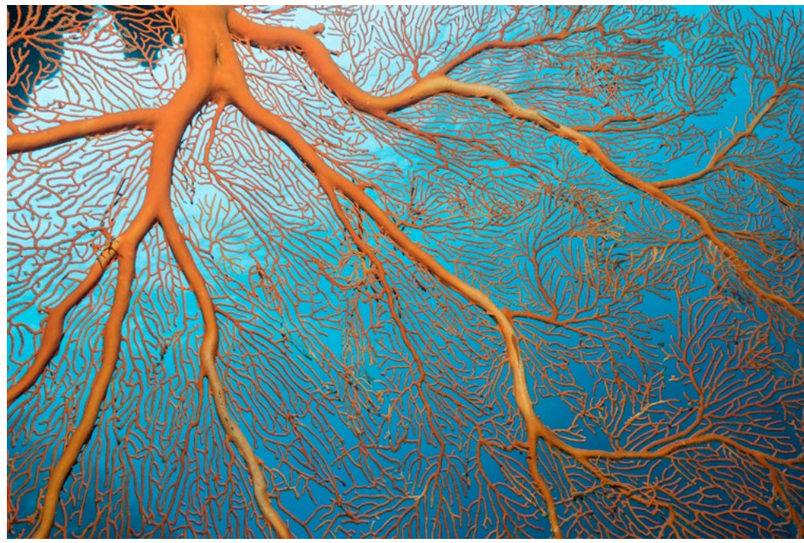
Taveuni Island is bisected by the International Date Line, and as part of numerous available day tours, you can straddle the 180th meridian line, standing with one foot in today and one in tomorrow. Near the Date Line marker is the impressive Holy Cross Church and Wairiki Catholic Mission, as well as an athletic field where you can often watch school kids practicing rugby. Built in 1907, this is one of the oldest churches in Fiji, and for those that are so inclined, you are welcome to join the parishioners in sitting on woven mats for Sunday service.

Waitavala Water Slide. Higher up into the mountains of this lush tropical island is the Waitavala Water Slide, which comprises a series of small waterfalls flowing over naturally polished rocks allowing for a thrilling and slippery ride down through the rainforest.

Blowhole. At the far southern end of the island, you can tour a local village and also marvel at the famous Blowhole, which shoots water high into the air with incoming waves. If the children are out of school when you stop by, be prepared to take a lot of pictures while being mobbed by adorable youngsters wanting to see themselves in the back of your camera.

Tavoro Waterfalls. For those wanting an all-day adventure, the Bouma National Heritage Park and Tavoro Waterfalls tour offers picturesque hiking and three different waterfalls to explore.

Birdwatching. For avian fans, Taveuni has some of the best birdwatching in Fiji with the possibility of seeing over 100 different species.



Wedding decorations (left), newlyweds posing for photos on a bluff overlooking the Pacific Ocean (top left), and the infinity pool at sunset (above) at Paradise Taveuni; Close-up detail of a pink soft coral, *Dendronephthya sp.*, Rainbow Reef, Taveuni Island (top right); Large red sea fan against the blue at Purple Haze dive site, Viti Levu (right); Lizardfish pair at Lone Rock, Rainbow Reef, Taveuni Island (bottom right)

Romantic sunsets & weddings

Magnificent sunsets were nearly a nightly occurrence during our visit, as the resort looks west out over the ocean from atop a small lava rock cliff. Photographically, I savored the opportunity to compose reflections in the infinity pool while using my better half to silhouette a human element into the images.

We even witnessed an exchange of wedding vows when a couple eloped on the bluff under a lone palm tree, late in the day after our final dives. Sand from two coconut shells was ceremoniously mixed to symbolize their union, as 19 of the bride and groom's favorite strangers (fellow resort guests) looked on. A stunning array of local flowers gathered by the staff was used in the bride's bouquet and to elaborately decorate the altar, palm trees and marriage dining table. It was a beautiful and a truly unforgettable evening.

Afterthoughts

Our time in Fiji was magical and as always, came to an end far too soon. I will miss the clear warm waters, the brightly colored soft corals and all of the wonderful people. Try as I might, there is no way in this one article to do justice to all the fabulous dives and memorable escapades from this trip. So, if you have not yet been to Fiji, it is time to experience it for yourself, and for those who know of what I speak, start planning your return trip. I am heading back again soon and hope to see you there. ■

*The author would like to thank Tourism Fiji (**fiji.travel**) and Fiji Airways (**fijiairways.com**) for helping to coordinate travel and flights. He would also like to thank Volivoli Beach Resort (**volivoli.com**), Waidroka Bay Resort (**waidroka.com**) and Paradise Taveuni Resort (**paradiseinfiji.com**) for generously hosting this adventure. Thank you to Aqua-Trek (**aquatrek.com**) for looking after us on the shark dive and River Tubing Fiji (**rivertubingfiji.com**) for a fun day on the river. Lastly, thank you to Scubapro (**scubapro.com**) and Blue Abyss Photo (**blueabyssphoto.com**) for their assistance with underwater dive and photo gear.*

*Matthew Meier is a professional underwater photographer and travel writer based in San Diego, California, USA. To see more of his work and to order photo prints, please visit: **MatthewMeierphoto.com**.*

Papua New Guinea's

Kimbe Bay

in West New Britain

Text and photos by
Pierre Constant

Kimbe Bay, located in the West New Britain province of Papua New Guinea, is open to visitors again after two years of pandemic restrictions. What awaits are beautiful dive sites, diverse marine life and coral reefs with great fish action. Pierre Constant shares his adventure there.

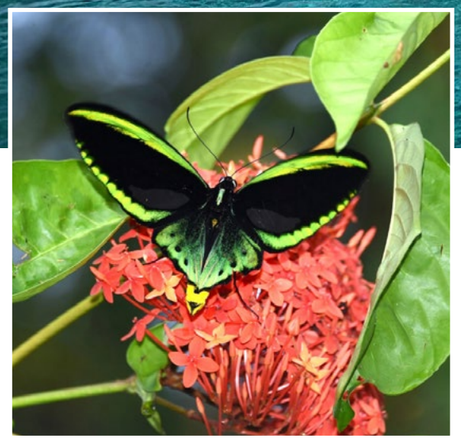
Of all the islands of Papua New Guinea, New Britain is certainly the most active volcanically. Reaching 520km in length and 146km in width, it is the largest island of the Bismarck Archipelago with a total land surface of 36,520 sq km. New Britain's chains of volcanoes are mostly found along the northern coast, around Rabaul in East New Britain, and along the Willaumez Peninsula, around Kimbe in West New Britain. As a whole, however, the 27 volcanoes are aligned all along the length of the island, from the southwest to the northeast.

Geology

In this part of the West Pacific, the tectonic plates configuration is rather complex. A long time ago, the Indo-Australian Plate (in the south) subducted under the Pacific Plate (in the north) at the New Britain/Bougainville/Makaira trench. When the Indo and Australian Plates separated, each moved northwards at a rate of 3.7cm per year and 5.6cm per year respectively (Keren Francis, 2018).

Located in the collision zone between the Australian Plate and the Pacific Plate, the Solomon Sea Plate is a microplate, a 250,000 sq km slab of oceanic crust, which is in subduction under both the New

The reef at Restorff Island (above); Sunrise on Mt Otto, central eastern Kimbe Bay (top right); Granular seastar on reef wall at Katherine's Reef (top left); Red whip coral at Vanessa's Reef (previous page)



Common green birdwing, *Ornithoptra priamus poseidon* (left); Kimbe Island (above); Papuan hornbill (male), *Rhyticeros plicatus* (inset)

Britain and Bougainville islands. Consequently, the Solomon Sea Plate is in subduction under the South Bismarck Plate to the northwest, and this has created the line of volcanoes known today.

Two episodes of volcanic activity occurred: one in the mid or late Eocene (Basaltic and Basaltic/Andesitic), the other one from the Miocene to the present. Reef limestone was deposited in the late Oligocene and early Miocene, followed by andesitic flows in the late Miocene.

History

According to archaeologists, the arrival of humans dates back to 20,000 to 40,000 years before the present. Evidence of early settlements was found at Kupona Na Dari, on Numundo Plantation, 10km west of Kimbe in West New Britain. Obsidian tools and pottery were unearthed from deep ash layers, which revealed at least 14 eruptions.

In the 17th century, explorer Harper Matthew claimed New Britain for the crown of England. However, William Dampier was the first British man to set foot on the island on 27 February 1700, giving the island its name. Whalers from Britain, Australia and America made ports of call during the 19th century, for water, food and wood.

A German protectorate was established over New Britain and New Ireland in November 1884, called Neu Pommern. The island group was renamed the Bismarck Archipelago and integrated into German New Guinea. The northeastern Gazelle Peninsula was converted into plantations of copra, cotton, coffee and rubber.

At the brink of WWI, on 11 September 1914, the Australian Naval and Military Expeditionary Force took over the island, which, together with the German colony, was incorporated in the Territory of New Guinea by mandate of the League of Nations to Australia. The Japanese Marines landed on 23 January 1942 and occupied Rabaul for the next two years.

Bungalow, built in traditional style, at the resort (above); Red-knobbed imperial pigeon, *Ducula rubricera* (left); Island imperial pigeon, *Ducula pristinaria*, at Restorff Island (bottom)

Eventually, the US 1st Marine Division disembarked at Cape Gloucester on 27 December 1943 to invade New Britain.

Today, the indigenous people of New Britain fall into two main groups: the Papuans, who have lived here for tens of thousands of years, and the Austronesians, who arrived 3,000 years ago. At least 50 different languages are recognised on the island.

Getting there

It takes one hour to fly from Port Moresby, the capital of Papua New Guinea, to Hoskins, from which the airport pick-up minibus takes you west to Kimbe and Walindi Plantation Resort. It is a 90-minute ride on a pot-holed road, across vast areas of oil palm plantations.

Walindi has been the highlight of diving Kimbe Bay for the last 40 years now. It comprises stylish wooden bungalows in an attractive garden setting, with big old trees covered in ferns and epiphytes, casuarina trees, palm trees, decorative plants and beds of flowers, not to mention, a manicured lawn.

It is a haven for birds such as the island imperial pigeon (*Ducula pristinaria*) and the red-knobbed imperial pigeon (*Ducula rubricera*), which perches itself on tall casuarina trees. Noisy eclectus parrots, which are green if male and red and blue if female, fly above once in a while, as do the rather shy Papuan hornbills (*Rhyticeros plicatus*). Ravishing common green birdwing butterflies (*Ornithoptera priamus Poseidon*) flutter around the flowers at any time of the day.

Originally from Perth, where he worked for the agriculture department, Max Benjamin arrived in 1966. He bought Walindi, an abandoned coconut plantation, in 1969 and turned it into an oil palm plantation. As a spearfishing enthusiast, he pioneered all the dive sites of Kimbe Bay. His wife, Cecilie, met him in 1972 and became a dive instructor in 1982. Following a dive trip the couple took to the Red

Ellisella sp. red whip coral with school of barracuda in the background (left), tomato anemonefish, *Amphiprion frenatus*, on white anemone (above), orange sponge and blue spiky sponges (lower right) at Vanessa's Reef; Walindi dive boat at Kimbe Bay (right)

Kimbe Bay

Sea, the idea of a dive resort emerged, which became a reality in 1983.

Since then, Walindi has become internationally renowned through the images of underwater photographers from around the world who have visited it. In the past, when he served as president of the Papua New Guinea Divers Association (PNGDA), Max was often seen at international dive shows and festivals. Sadly, he passed away in 2019, struck by a fulgurant lung cancer. He was succeeded by his son Cheyne Benjamin, now 38 years old, who has a bachelor's degree in environmental science and ecotourism, with another degree in filmmaking and natural history from Flinders University in Adelaide. Ema, his wife, has a bachelor's degree in hotel management.

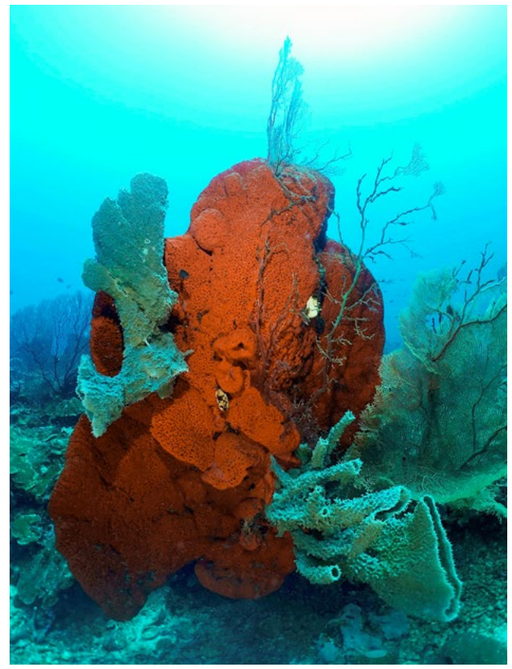
Diving

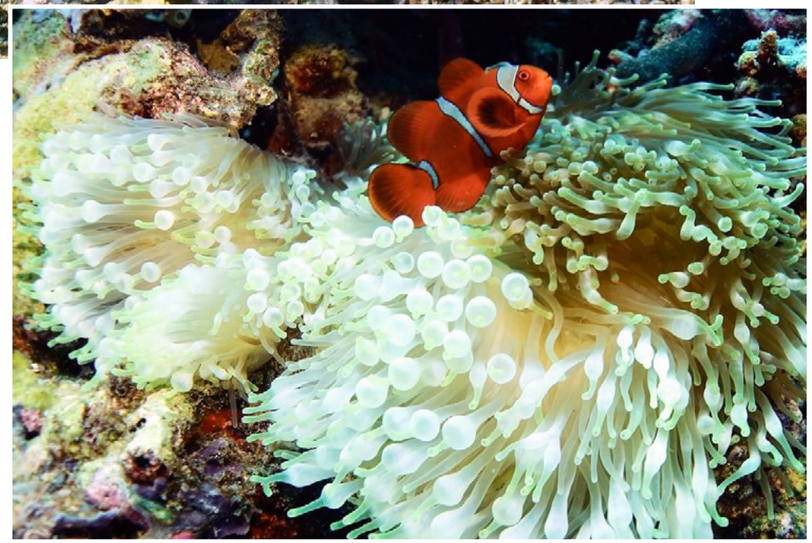
Run by friendly Oscar, the dive centre manager, and his team of dive guides and divemasters, the Walindi dive centre conducts two to three dives per day, depending on the number of divers, interests and requirements. There are about 25 dive sites, located on the eastern side of the Willaumez Peninsula, under the towering volcanoes, such as Wangore stratovolcano (1,155m). These are mostly isolated reefs.

Farther away, in the northern or eastern areas of Kimbe Bay, are a number of seamounts with usually crystal-clear waters and great fish action. These were, by far, my favourite dives for their enchanting schools of fish. However, these sites can be a one-hour boat ride away, whereas most reef dives were 30 to 45 minutes away; however, visibility at the nearer sites was often affected by the presence of rivers at the Willaumez Peninsula.

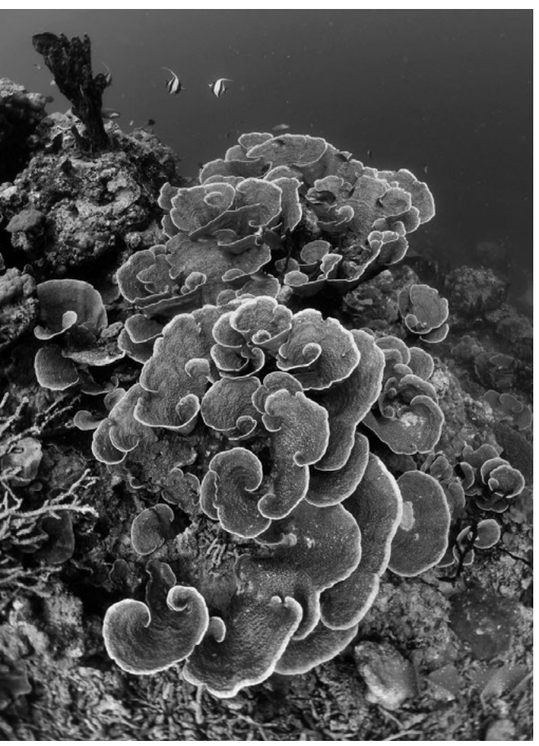
Vanessa's Reef. One of the closest dive sites, Vanessa's Reef, is mostly a slope dive. A colourful place for giant sea fans, bushes of red whip corals (*Ellisella sp.)*, undulating gracefully like strands of hair in the mild current. At Kimbe Bay, being a paradise for sponges, one will be delighted by its elephant ear sponges (*Ianthella basta*), pale blue rope sponges, spiky blue sponges, barrel sponges and voluminous ear-shaped orange sponges. Yellowback fusilier and chevron or blackfin barracuda (*Sphyraena qenie*) complete the scene, with magnificent sea anemone (*Heteractis magnifica*) housing pink skunk anemonefish. Oblivious to my presence, a mimetic and photogenic crocodilefish was dozing off on the sea floor.

Katherine's Reef. This is a triangular reef pointing northwest, with sheer walls on the eastern and southern sides. Swimming around is no problem and allows you to discover caves and overhangs. A great place to see nudibranchs, I came across *Aegires serenae*, a nudibranch sporting greyish green and yellow colours, with a cross of appendages on its





Shallows on the reef top (top left), *Chromodoris lochi* nudibranch (above) and spinecheek anemonefish (left) at Katherine's Reef; Sarasvati anemone shrimp at Restorff Island (top right)

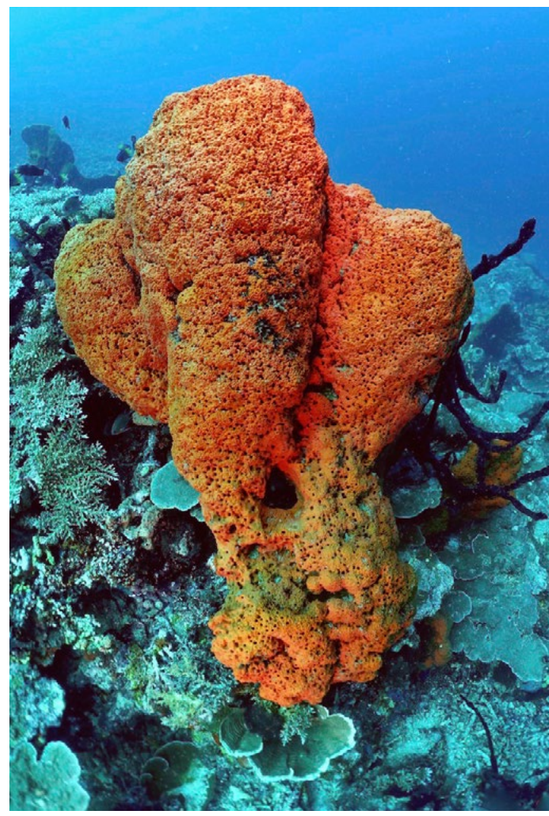


Leaf coral at Katherine's Reef

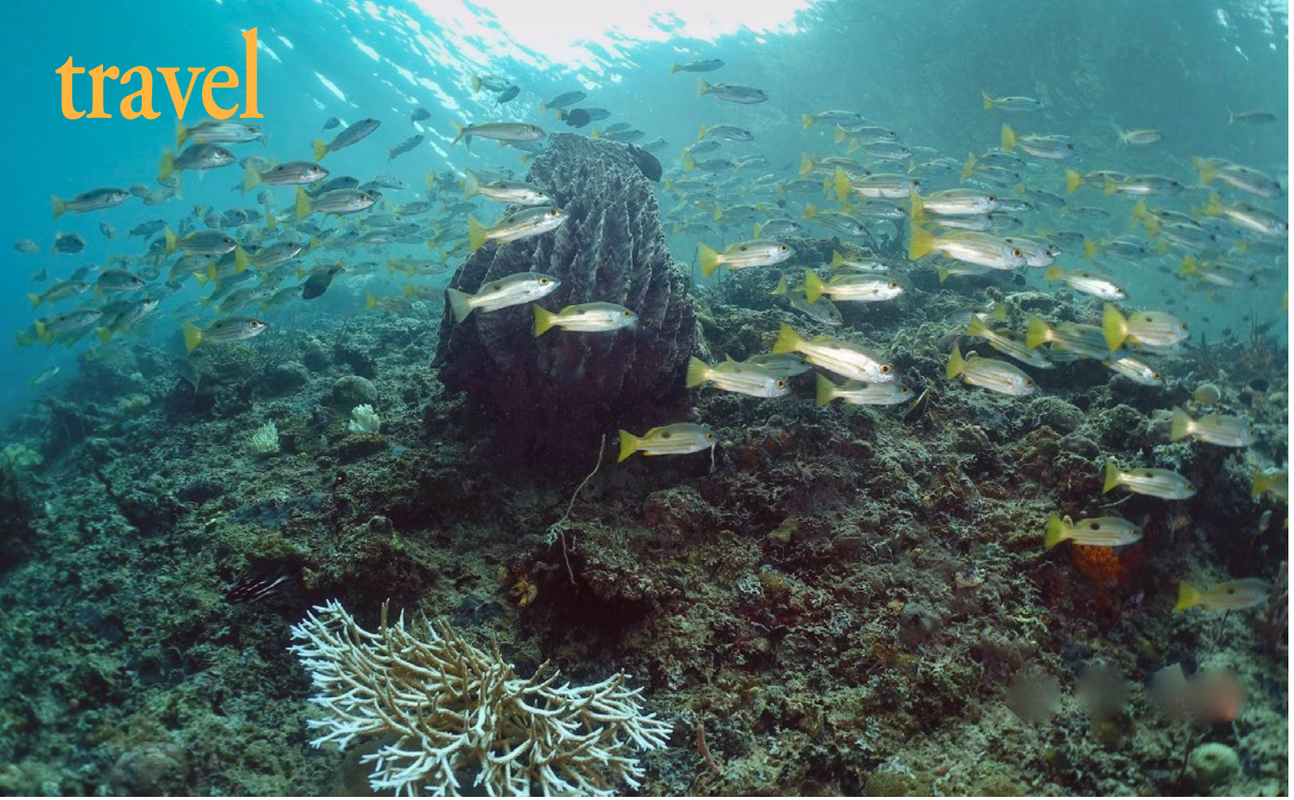
back; as well as *Chromodoris lochi* in pale blue, with two black lines along the back, and white or pink rhinophores and gills.

The southern wall had four different species of anemonefish, including orange-fin (*Amphiprion chrysopterus*), Clark's (*Amphiprion clarkii*), false percula clownfish (*Amphiprion ocellaris*), pink skunk anemonefish (*Amphiprion perideraion*) and spinecheek (*Premnas biaculeatus*). Schools of striped fusiliers and yellowtail fusiliers (*Caesio cuning*) cruised along. A granulated sea star (*Choriaster granulatus*) was seen on a reef wall.

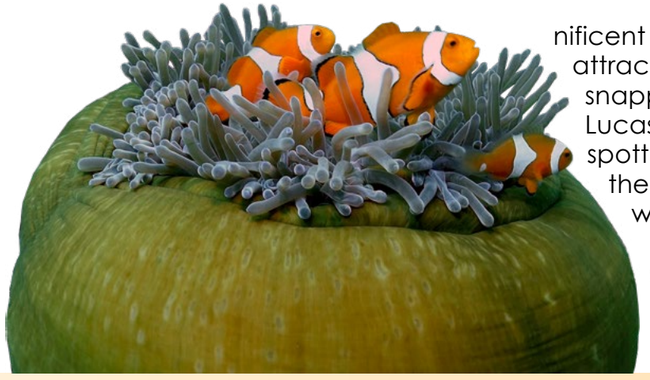
Restorff Island. Restorff Island has two different dive sites with spotted garden eels (*Heteroconger hassi*), which have two black spots, on the sandy floor; spearer mantis shrimp in their burrows; cushion stars (*Culcita novaeguinea*); Sarasvati anemone shrimp (*Periclimenes sarasvati*) on soft corals; a collection of mag-



Giant orange sponge at Katherine's Reef

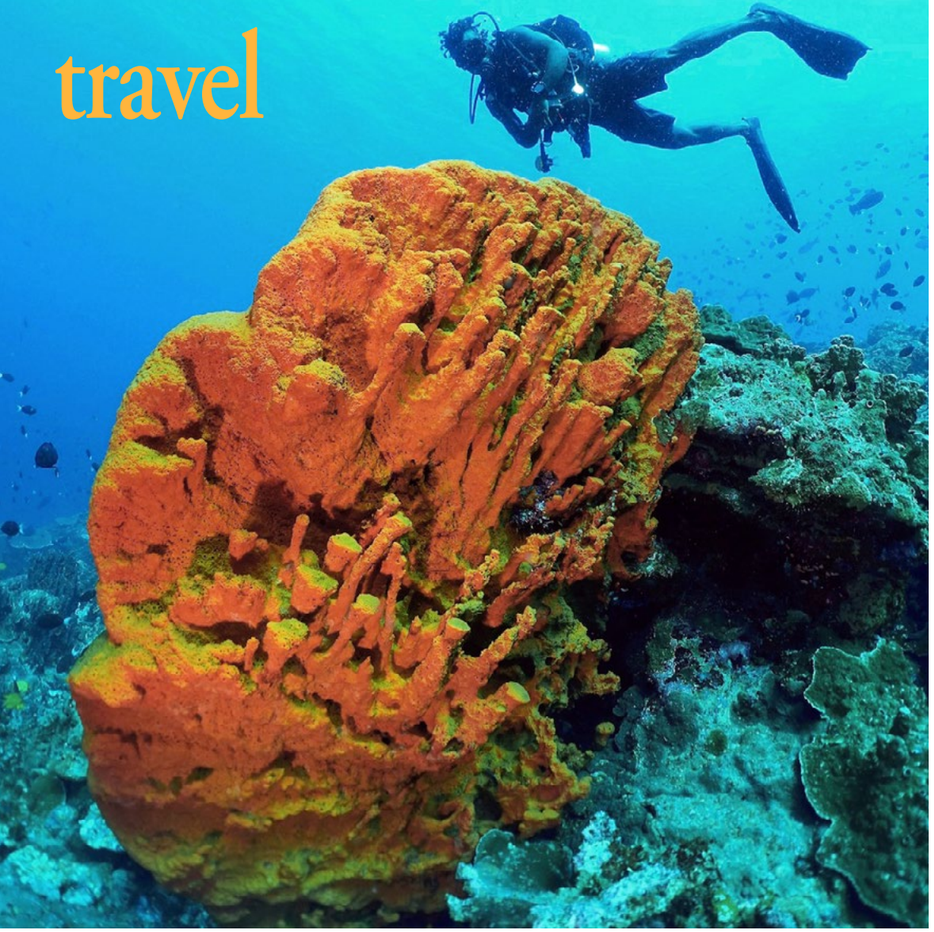


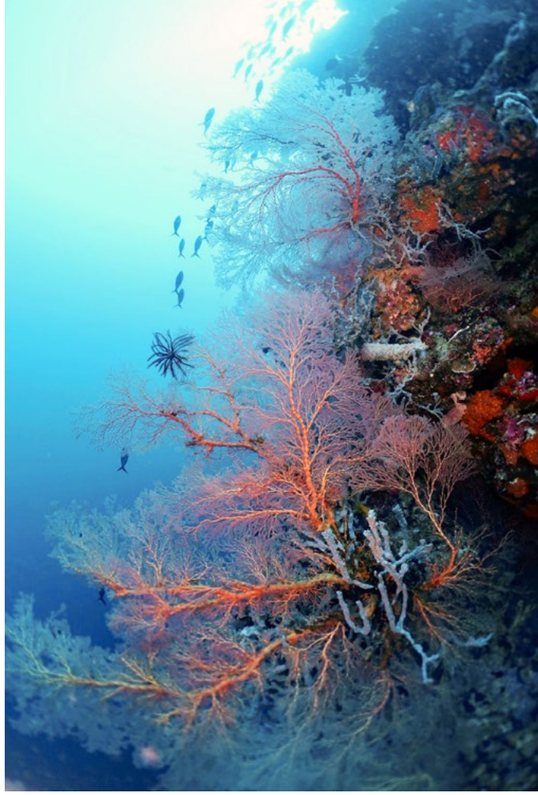
Long-spot snappers and barrel sponge (above), and diver with *Montipora sp*. coral (top right) at Restorff Island; *Alveopora lizardi* coral (left), pink skunk anemonefish in red sea anemone (right), *Galaxea paucisepta* coral (centre), zig-zag or cockscomb oysters, *Lopha cristagalli*, (far right), *Goniopora sp*. or flowerpot coral (bottom right), False clown anemonefish in green anemone (below), and *Phyllidiopsis sp*. nudibranch (bottom left) at Restorff Ridge

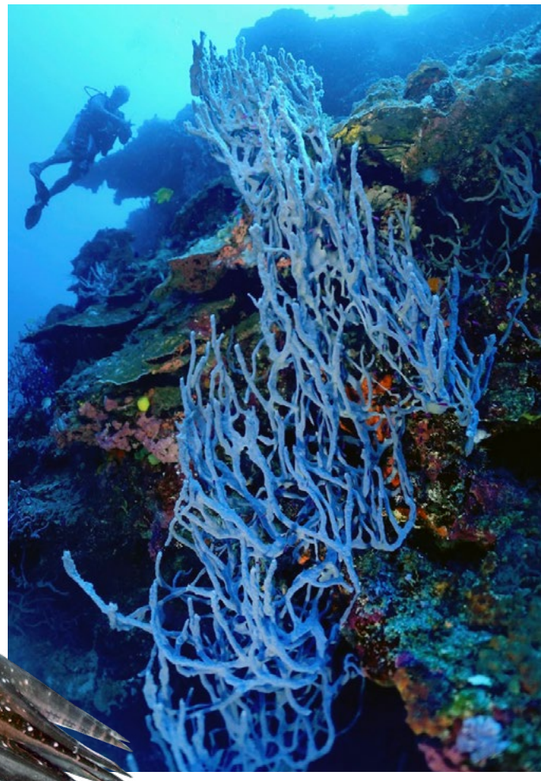


nificent sea anemones; and an attractive school of long-spot snapper (*Lutjanus fulviflamma*). Lucas, the divemaster, even spotted two mandarinfish in the coral rubble, though they were very shy.

Restorff Island is the chosen anchorage for midday picnics, which take place near a white sandy beach. Covered with lush jungle, the island teems with different species of pigeons, which coo at all times. Species include the island imperial pigeon (*Ducula pristinaria*) and the yellowish imperial pigeon (*Ducula subflavescens*). Brahminy kites in reddish brown and white nest on the island and fly above regularly. I also witnessed a beach stone-curlew (*Esacus magnirostris*), rather weary







Diver with large orange sponge (above), school of pinjalo snapper (top centre), seafan on wall at 25m (top right), orange sponge and coral on the wall (centre), diver with teira batfish (right), and black snapper (left) at Inglis Shoals

of our presence, which had laid a big, speckled egg on the edge of the beach.

Inglis Shoal. Slightly oval in shape with a bump on the eastern side, this seamount rose up from the deep to about 4m below the surface. It comprised mostly slopes on all sides, up to 24 to 28m, when it turned into steep walls. Fish action was just ideal here, with a swirling school of barracudas, often mixed with bigeye jacks, sleek or bluespine unicornfish (*Naso unicornis*), Vlaming's unicornfish (*Naso vlamingii*), black snapper (*Macolor niger*), bluefin jacks and the odd school of pinjalo snapper (*Pinjalo lewisi*) in crimson red.

The roundhead parrotfish (*Chlorurus strongycephalus*) was present, as well as the pretty black stripe or Fowler's surgeonfish (*Acanthurus fowleri*). Four cuttlefish (*Sepia pharaonis*) also showed up on this dive. Although rather

Cuttlefish at Inglis Shoals

Rope coral at Inglis Shoals

White bonnet anemonefish in anemone (top left) and orange-fin anemonefish (left) at North Ema's Reef

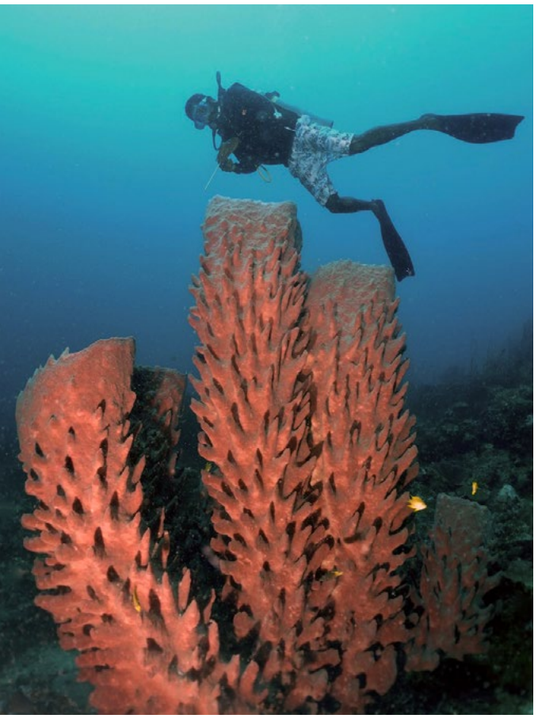
School of whitetongue jacks at Bradford Shoals (above); Cushion star at North Ema's Reef (centre inset)

Juvenile hawksbill turtle at North Ema's Reef

shy, a school of oceanic triggerfish (*Canthidermis maculatus*) hovered in the blue. On a second occasion, I discovered a highfin coral grouper (*Plectropomus oligacanthus*), hiding in a small cave.

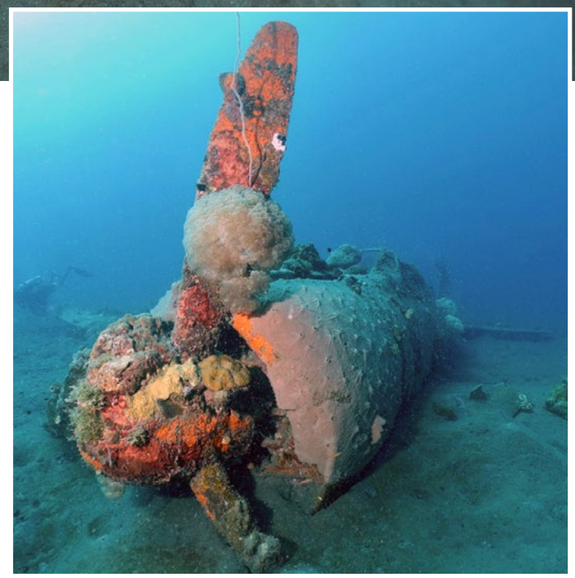
North Ema's Reef. Being close to the mainland of the Willaumez Peninsula, east of Mt Wangore volcano, this site had poor visibility. However, I managed to encounter a young hawksbill sea turtle. The highlight of the dive, at a depth of 10m or so on the wall, was a white bonnet anemonefish (*Amphiprion leucokranos*), which is endemic to both Papua New Guinea and the Solomon Islands.

Bradford Shoals. One hour away from Walindi, straight to the north, this seamount was simply fascinating, due to the clear waters and amazing fish action. We followed the mooring line down to the top of the reef at 21m. Right away, we were met by a large school of bigeye jacks, with a nearly similar-looking species of fish, very unfamiliar to my eyes. It turned out to be the whitetongue jack (*Uraspis helvola*), which is distinguished by a low inconspicuous dorsal fin and silvery body with dark chevron bars on the sides. The species is noted to be rare in the Asian Pacific region. Just below, a group of teira batfish (*Platax teira*) cruised about, rather shyly though, some of which had no apparent black dot next to the pectoral fin. Two large-sized dogtooth tuna suddenly zoomed in, creating instant panic among the fish schools. The orange-fin anemonefish differentiated itself from the Clarke's anemonefish (*A. clarkii*)



Giant tube barrel sponge (3m high) at Malupa Reef (above); Polyclad flatworm, *Acanthozoa sp*., at the Zero wreck (right)

Pyramid butterflyfish on coral bommie at Joelle's Reef (top left); Japanese Zero plane at Mt Wangore Cove (above and right); Venemous coral-limorpharia or elephant ear anemone, *Amplexidiscus fenestrafer* (left inset)

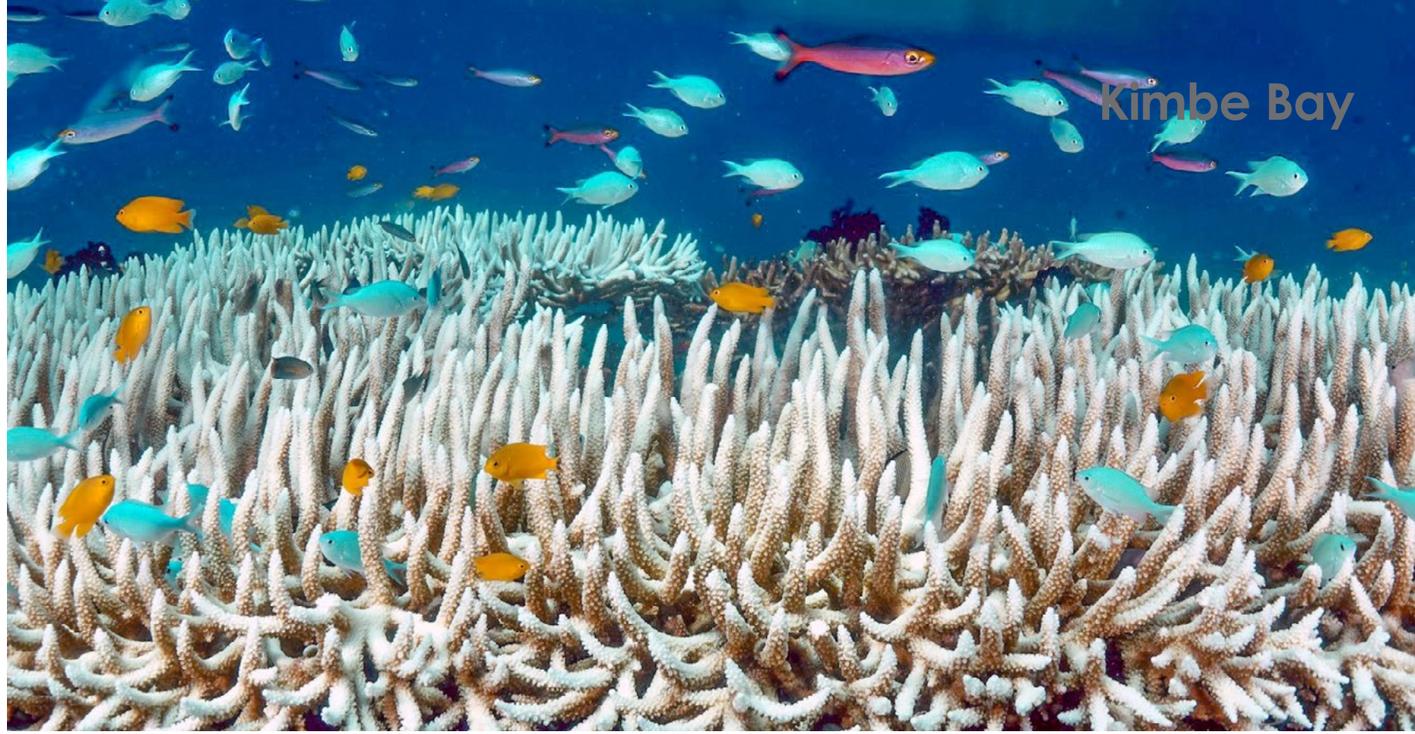


by its white tail. Circumnavigating the seamount was easily done during the course of the dive.

Japanese Zero plane. This wreck is located in a sheltered bay at the foot of Mt Wangore. On a soft volatile bed of brown silt in 15 to 17m of water, this iconic aircraft was only discovered in the year 2000 by local fishermen. Produced on 21 August 1942, this Japanese Zero fighter plane was part of Airgroup 204, which left Rabaul on 27 December 1943, while the US 1st Marine Division was disembarking at Cape Gloucester, on the southwestern tip of New Britain. Apparently due to a technical problem, pilot Tomi Haru Honda landed the plane in shallow waters near the Willaumez Peninsula.

Lacking any markings, the Zero was intact and now covered in grey encrusting sponges, which wrapped the fuselage like a shroud or spider web. Only the propeller had conspicuous red sponges and some bubble coral on it. Dive guide Brian acted as a model on the initial dive and divemaster Andrew posed on the wing on a subsequent dive. In his company, I explored a nearby reef, where he pointed out a magnificent starry polyclad flatworm (*Acanthozoa sp.)*.

Joelle's Reef. Just 45 minutes north of Walindi, this seamount had an elongated bean shape, with a curved tip to the southwest. Pinjalo snapper (*Pinjalo lewisi*), bigeye jacks and bluefin jacks were on the menu. Leaf coral mounds were conspicuous in places, as well as venomous patches of elephant ear anemone or coralli-



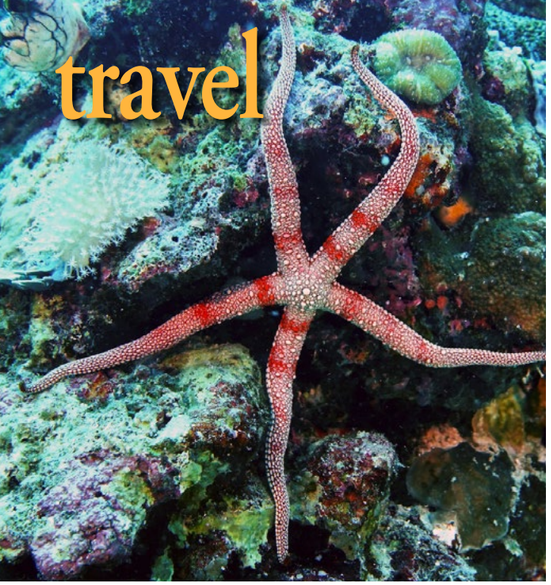
Kimbe Bay

Diver and mound of brain coral at Joelle's Reef (top left); Brilliant headshield slug, *Cheilinodura electra*, at JJ Reef (above left); Carlsonhoff's phyllidia nudibranch at JJ Reef (above right); Hefferman's sea star at Joy's Reef (left)

Damselfish in staghorn coral at Malupa Reef (top right); Pair of signal or two-spot goby at Joy's Reef (above); Bubble coral shrimp in bubble coral at Charmaine Reef (right); Red-lined sea cucumber at Joy's Reef (below)

morpharia (*Amplexidiscus fenestrafer*) in big attractive plates—not to be touched, by any means! The top of the reef, at 16m, sloped down to 25 or 30m, before a vertical drop-off. Barrel sponges and big gorgonian fans were found on the eastern side.

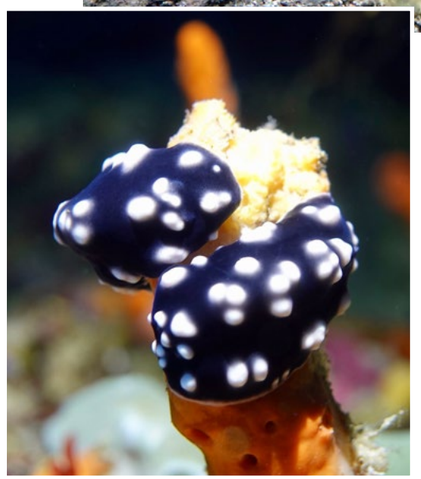
Joy's Reef. This site comprised a sandbar and coral rubble, emerging on the surface, which attracted arctic terns (*Sterna paradisaea*) and greater crested terns (*Sterna bergii*), which came to clean themselves in shallow water. Close to shore, and thus having poor visibility, this site was nevertheless a convenient macro dive, where one could spot the signal or twin-spot goby (*Signigobius biocellatus*) or the Pott's crinoid shrimp (*Palaemonella pottsi*). There were also some *Phyllidiella sp*. nudibranchs, red-lined sea cucumbers (*Thelenota rubraline-*



Kimbe Bay

TOP ROW LEFT TO RIGHT: Red banded sea star at Joy's Reef; Lumpy asteronotus nudibranch, *Asteronotus cespitosus*, at House Reef on night dive; Sawedge spooner crab at House Reef on night dive

BOTTOM ROW LEFT TO RIGHT Pulse coral and ascidian at Joy's Reef; *Phillidiella sp.* nudibranch pair, South Bay; Highfin coral grouper at Inglis Shoals; *Glossodoris hikuerensis* nudibranch at House Reef on night dive; Spinecheek anemonefish at Christine's Reef



Pair of squat shrimp at Christine's Reef

ata), Hefferman's starfish (*Celerina heffernani*) and red-banded sea star (*Gomophia gomophia*). There was a great variety of attractive coral species, including the anemone coral (*Goniopora djiboutiensis*) and broccoli-style bubble or torch coral (*Euphyllia glabrescens*).

Otto's Reef. Named after a German fellow of the old days and 45 minutes from Walindi towards the Wulai Islands, this isolated reef rose up from the deep in the middle of Kimbe Bay, far from any land. Jutting out towards the east, a reef point underwater attracted lots of fish action. For a change, I got to encounter three grey reef sharks up close. One of them was encircled by a school of rainbow runners (*Elagatis bipinnulatus*) in tow. It was a good photo opportunity, but unfortunately too deep.

Also noticeable here was the presence of mackerel scads (*Decapterus macarellus*) together with the rainbow runners, a favourite food of dolphins. A giant trevally or jack (*Caranx ignobilis*) zoomed in on me for a closer look, and a school of oceanic triggerfish hovered in the blue like fluttering butterflies.

Otto's Reef was good enough for two dives, as the wall curving around the point to the south was full of caves and overhangs. Slender unicornfish (*Naso lopezi*), barracuda, bigeye jacks and Napoleonfish or humphead wrasse were present.

Night dives. Night dives were done from the pier off the dive centre, or a site just a couple of minutes away by boat, on a nearby reef. As expected, these sites were a mixture of muck—very fine volcanic silt—and patches of coral. Here, one may encounter mantis shrimp in their burrows or on an outing, box crab, the sawedged spooner crab (*Etisus utilis*) and scorpionfish on the seafloor. Lots of Lampert's sea cucumber (*Synaptula lamperti*) were seen here, on sponges. Even the elusive mimic octopus (*Thaumoctopus mimicus*) was spotted.

Andrew pointed out a charming *Glossodoris hikuerensis* nudibranch on a brown sponge. However, my most incredible find was a giant nudibranch (20cm), a species I have never seen before: the lumpy asteronotus, a dorid nudibranch (*Asteronotus cespitosus*), which was mauve to light brown in colour, with warts and a ridge on its back, plus pink gills and rhinophores—an absolutely amazing creature!

Solfataras, volcanic steam vents with sulfur gases, inside Tavurvur volcano, Rabaul (above); Rabaul Page Park market (right)

Hot springs, with Tavurvur volcano in the back-ground, Rabaul (above); Young people on the road to Walindi Plantation Resort (left)

Post-pandemic plans

Papua New Guinea was closed for two years due to Covid-19, and only reopened its borders in early 2022, when Australia did. No Covid test is necessary any longer upon arrival, but the vaccination certificate is compulsory. Logically, tourism suffered from the closure, but Walindi is slowly operating again as bookings have increased a great deal this year.

General manager Cheyne Benjamin has new plans for improving the resort and bungalows, and a new swimming pool overlooking the beach was actively under construction during my stay. Facing the sunrise and the placid waters of the bay, it will look great.

Although retired from active duties, Cheyne's mother Cecilie turned out to be a good nurse and would help anyone with health problems, or with infected cuts—as she did for me—with a Papua New Guinea-made antibiotic cream that worked wonders on a bad-looking wound on my ankle. She was also a good source of information on the history of New Britain.

Rabaul

No trip to New Britain would be complete without a visit to Rabaul—a deep seaport that was once upon a time considered to be the "Pearl of the Pacific." This vision of prosperity sadly does not exist any longer, since the dramatic volcanic twin eruption of 1994. The old town was totally destroyed, burnt and buried in ashes. I had come to Rabaul in 1990 and again in 1991. On both occasions, I climbed the "volcano" on Matupit Island. Back then, you needed a canoe ride to cross the bay.

Thirty-two years later, I was keen to see the changes. A new town had emerged west of the old one, which was flattened and now, history. Isolated on the outskirts like a ghost of the past, Rabaul Hotel was still standing and operating, next to a big tree conspicuously noisy with a colony of nesting metallic starlings. One good point, however, was that it was a convenient stop on the way to the volcano.

No longer an island, Matupit is now accessed by a land bridge. "It is only a 20-minute walk," I was told. In fact, it turned out to be nearly a 1.5-hour trek to the summit of Tavurvur. A dirt road

Local in dugout canoe on Kimbe Bay (top); Brahminy kite trailing twig with leaves (above left); Yellowish imperial pigeon at Restorff Island (centre); Beach stone curlew on the beach at Restorff Island (right)

led through a desolated landscape of volcanic ash and black sand, punctuated by sparse vegetation, lone trees here and there, tufts of bamboo and pandanus trees with big spiny green leaves hanging down. A bamboo barrier marked the end of the way, with a small signboard that read "Site fee 5 Kinas."

The volcanic trail fringed the seashore, winding among hot springs and pools of steaming water. On continuation, there were pockets of lava flow, mostly covered by volcanic tuff (pebbles resulting from a volcanic eruption of lava mixed with water), until the start of the real steep climb.

Black in colour, Tavurvur volcano was a mix of basalt and tuff, with a slippery snaky trail up to the rim. From the top, the view of the 150m-wide crater was that of a cauldron, steaming profusely with solfataras on all sides, at the base of which sulphur deposits were conspicuous. Due to oxidation and heavily fractured in concentric rings, the basalt had turned an orange brown—a biblical window to hell, for sure!

Not as serious as the former one, the latest eruption of Tavurvur, involving earthquakes, occurred in 2014. The new capital of East New Britain has moved to Kokopo, east of the Gazelle Peninsula. The next eruption is not expected before 2034. The Pacific war may be over for almost 80 years and long forgotten, but the sword of Damocles is still hanging over Rabaul, no matter what. ■

*Special thanks go to Walindi Plantation Resort owned by the Benjamin family (**walindiresort.com**).*

*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**.*

Dive into Taiwan
— Northeast Coast Treasures

Text by Simon Pridmore
Photos by Kyo Liu

Reef scene at Secret Garden (above), seahorse (left) and sea apple (previous page) found along Taiwan's northeastern coast

Taiwan is a group of Pacific islands surrounded by warm tropical seas. It is easy to get to and get around, and it is also a first-world society with outgoing, friendly, laid-back people. Simon Pridmore gives us a glimpse into the beautiful dive sites and unique marine life that can be found here.

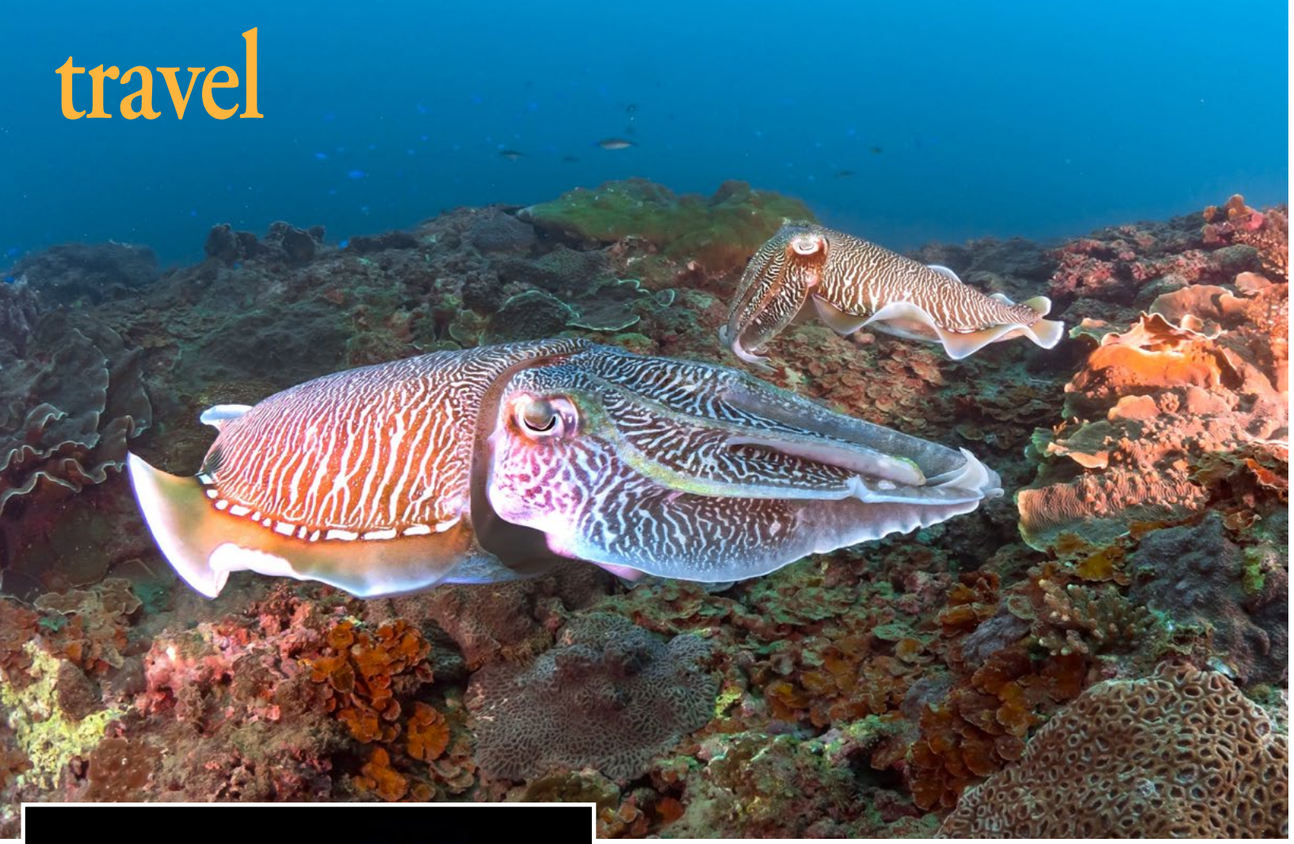
Taiwan offers some very good scuba diving and a network of dive centres and resorts, with first-class professional staff, equipment and services. They offer scuba experiences, basic training courses and fun diving for a young, enthusiastic first generation of Taiwanese divers.

Yet, when divers elsewhere in the world think about diving destinations, Taiwan is unlikely even to be a blip on their radar screen. Very few people outside Taiwan have ever thought to enquire about the diving here, and very few people inside Taiwan have ever thought to tell anyone about it—until a couple of years ago, when some far-sighted folks asked me and Taiwanese underwater photographer Kyo Liu to write a book.

The book is called *Dive into Taiwan*, and this is the first in a series of six articles, each covering one of Taiwan's diving regions, designed to give you a flavour of what to expect from a Taiwan dive trip. The book covers much more than diving. It talks about the people, countryside, cities, food and lifestyle to give readers a full immersive experience—diving into Taiwan in every way. But, in this series, I will just focus on the underwater attractions, with the help of Kyo's amazing photographs.

The Northeast Coast

Japanese marine life guides are the best in the world and feature a huge variety of unusual fish and other undersea creatures. Most of the



Broadclub cuttlefish at Secret Garden (above), diver with school of bannerfish (top right) and jellyfish (left) found on the northeastern coast of Taiwan

images in these books were taken in the waters around fabled Iriomote, one of the Ryukyu Islands in Japan bathed by the warm, life-giving Kuroshio ocean current.

The distance between Iriomote and the northeastern coast of Taiwan, which also benefits from the Kuroshio, is less than 200km (124 miles). So, it is hardly surprising that this is an equally happy hunting ground for macro photographers, nudibranch-fanciers, and fans of exotic underwater critters.

The area may not be as internationally famous as Iriomote, but veteran Taiwanese divers know all about it. Drive along the coastal highway on any day of the week in summertime and you will find cars parked here and there along the road. Behind each vehicle will be a hardy-looking diver, sporting beat-up old dive gear, but an expensive newly upgraded camera system.

In the same area, you may also come across groups of wetsuited individuals huddled near open-backed vans, surrounded by piles of equipment and looking very serious. This is because the northeastern coast is where the people of Taipei come to learn to scuba dive.

If you are staying in central Taipei, the dive sites are about an hour's drive out of town, strung out all along the North Coast Highway.

The diving season on the northeastern coast runs from May to October, when you can expect water temperatures from 27°C to 30°C (80°F to 86°F). In winter, water temperatures drop to between 17C and 22°C (63°F and 72°F), and big

Boat divers on Taiwan's northeastern coast

Mantas shrimp (above) and green sea turtle on reef (left) found along Taiwan's northeastern coast

waves during this period can make shore entries very challenging.

Protected sites such as Longdong Bay and Bitou Bay are diveable almost all year round though, and hardcore northeastern coast divers insist that, when the sea is a little cooler, the visibility is often better, and you can see the dramatic rock formations and impressive underwater seascapes in all their glory. During the summer season, visibility is usually 5m to 10m (16ft to 33ft). The risk of typhoons is highest in July and August, as is the case everywhere in Taiwan.

Wanghaixiang Bay Area

The fishiest and most colourful diving on the northeastern coast is in Wanghaixiang Bay. There are 11 dive sites here, including the wreck of a trawler, *Haijian*, in 28m (93ft) and some other metal structures called Steel Reef and Steel House. These were all originally sunk as fish aggregation devices, but the bay is now a designated no-take zone and fishing is not permitted. To help preserve the plentiful fragile soft corals that abound, local dive operations refrain from bringing brand new divers here. Topside, the bay is marked by the distinctive and much-visited Elephant Trunk Rock that sits at the end of a promontory on the southeastern side.

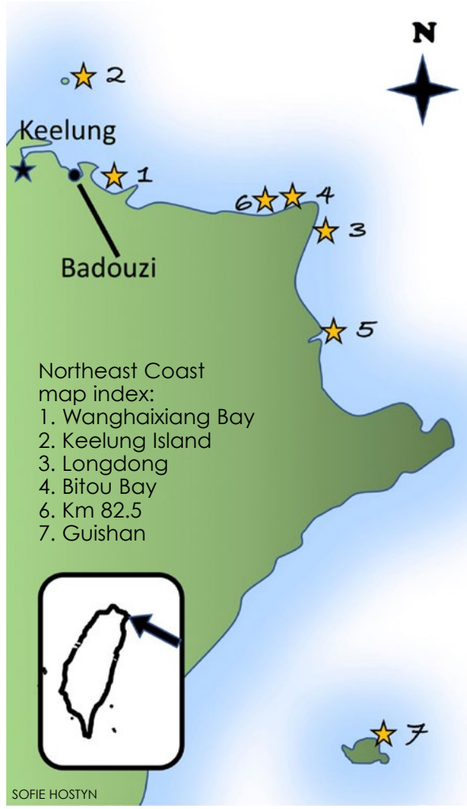
The most beautiful dive site in the bay is called Mimi Huayuan or Secret Garden. There are actually two dive sites here. Secret Garden is the name given to two large rocks absolutely covered in soft corals and sea fans, frequently swept by large schools of fish, that lie a couple of hundred metres or so northeast of the entry point. A second dive called Secret Garden 2 or Rose Garden (after a huge field of pink coral) begins at the same point but takes you in a loop in the other direction.

As soon as you dip your head below the surface, you immediately see the beneficial effects of the fishing ban. Not only are there schools of butterflyfish, porcupinefish, moorish idols and Australian stripey or convict fish (*microanthus strigatus*), there are large groupers, soapfish, rainbow wrasse, filefish and clouds of damsels everywhere. Moray eels hide among the rocks and scorpionfish hide in plain daylight, their camouflage rendering them almost impossible to see.

The profusion of soft filter-feeding corals and gorgonian fans is far greater here than anywhere else along this coastline. You may also find a rare sea apple or two in the deeper section of Secret Garden.

Schools of porcupinefish (*Diodon holocanthus*) tend to gather in the bay, which is unusual as they are normally solitary. The theory is that they congregate here to breed in calm waters. There are bigger fish to keep your eyes open for too, including big groupers and broadclub cuttlefish.

The shipwreck and other artificial reefs in Wanghaixiang Bay lie several hundred metres offshore, too far from the shoreline for a comfortable swim, but you can get out there by boat from the Badouzi fishing harbour on the other side of the peninsula. It is



Dive sites on Taiwan's northeastern coast

School of porcupinefish on reef (above); School of jack fish in the blue (top left); Abalone farm (lower left)

only a 10-minute ride from the dock to the site. Boats from Badouzi can also take you out to Keelung Island just offshore, where you will find big gorgonian fans, the occasional frogfish, plenty of schooling fish (such as trevallies, grunts and snappers), and lovely soft corals. The dive site they call Rainbow Reef is as colourful as it sounds.

Longdong Bay Area

As you drive east along the coast, the road curves towards the south and the scenery becomes ever more rugged and beautiful, the farther you go. The mountains that plunge almost directly into the sea here are green and mossy, as are the picturesque ruins of the old gold mining works on the land side of the road, which have been reclaimed by nature and are now completely overgrown. The coastal highway clings to a narrow ribbon of land separating mountain from sea, a thin band that the mountains and the sea are constantly trying to breach.

Longdong Bay is the primary destination for divers here. It has four sites and depths range from those shallower than 5m (15ft) to as deep as 24m (80ft).

If you stop someone with a camera system as they are heading for the waters at Longdong and ask them what they are looking for, they will probably reply, "Nudibranchs." And it is easy to understand why. The variety is astonishing. There are also plenty of other things for a sharp-eyed critter spotter to look for. You may find cockatoo waspfish, flying gurnard, dwarf scorpionfish, paddleflap rhinopias, lacy rhinopias, flamboyant cuttlefish, blue-ringed octopus, harlequin shrimp, bandtail scorpionfish, mantis shrimp and hairy frogfish, any one of which would be a highlight on a dive pretty much anywhere in the world. But do not always keep your eyes fixed on the seabed. The visibility may not be terrific—10m (33ft) on a good day—but it is good enough for you to get sightings of large schools of trevally, grunts and snappers from time to time.

If the waves are coming in from the northeast and stirring up Longdong Bay, divers will usually head up to Bitou Bay, which opens to the northwest and is very protected. Bitou is especially ideal for snorkelers and newer divers.

Both Longdong and Bitou are excellent night-diving spots, which is one advantage of staying out on the coast during your visit, instead of in Taipei. As is the case everywhere in the tropics, more critters come out to play after dark.

Ornate dermatobranchus nudibranch (above)

TAIPEI-BASED DIVE OPERATORS:
TDC Taipei
taiwan-diving.com
The Scuba Shop, Taipei
scuba.com.tw
Fun Divers Dive Center
fundiverstw.com
Dark Tide Tech Diving Expedition Base
darktide.com.tw

NORTHEAST COAST DIVE OPERATORS:
Pioneer Diver
pioneerdiverenglishnew.weebly.com/about-us.html
ScuBar
facebook.com/ScubarFulong
Email: **scubardiveshop@gmail.com**

KM82.5

In-between Wanhaixiang Bay and Longdong Bay is a site known as KM82.5. Like all highways in Taiwan, the North Coast Highway has green roadside markers every 100m, and the marker that tells you where this site is reads "82.5."

The site is quite fishy, although nowhere near as action-packed as Secret Garden, but what you are mainly looking for here, as in Longdong Bay, are smaller critters. Photographers especially love KM82.5, as fewer divers come here.

Guishan/Turtle Island

Guishan or Turtle Island lies 9km (5.5 miles) offshore from Yilan, a town 60km (37 miles) south of Longdong. It is not easy to get a dive boat out to the island, but I include it because it is such a unique dive site. Guishan is uninhabited, part of a maritime ecological park, and the number of visitors per day is limited to preserve the environment.

Guishan is actually the peak of Taiwan's only active volcano. Geothermal vents on the seabed all around it discharge trickles of hot sulphurous gas into the ocean. It is like diving inside a pot simmering on a stove, and the streams of bubbles serve to warm up the waters a little.

Dive operators

There are two strategies for diving the northeastern coast. You can stay in the centre of Taipei and dive with a city-based dive centre, which will spirit you out of town for a morning's diving and whisk you back again in the early afternoon.

This may mean that you spend a couple of hours on the road each day but, in the city, you will have a vast range of accommodation choices to fit any budget and, when you get back from your morning's diving, you will find enough dining and activity options to make your head spin.

If you want to combine a little fine diving with a little fine dining and culture, this is certainly the way to go. There are not many places in the world that offer such an appealing combination of underwater and topside things to do.

The alternative strategy is to stay out on the coast, so you can dive your socks off all day and every day. There are plenty of hotels at various budget levels in the towns of Keelung and Ruifang, where you will be close to Wanghaixiang Bay.

However, if your focus is on KM82.5, Longdong Bay and beyond, then it might be better to base yourself in Longdong or Fulong, where there are several small guesthouses, some run by the local dive centres. The rooms are rudimentary, but they are clean and comfortable. Your dining and topside activity options will be extremely limited, but if you are on a mission to photograph critters and nudibranchs to the exclusion of all else and do not care about the city sightseeing and feasting, then this would be the way to go. ■

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

Contributors' Picks

Sea Legs

from Around the World

Text and photos by John A. Ares, Sheryl Checkman, Larry Cohen, Anita George-Ares, Matthew Meier, Brandi Mueller, Michael Rothschild and Olga Torrey

We asked our contributors what their favorite underwater photos were of the legs, arms or tentacles of critters underwater. And they came back with a variety of subjects from curious crustaceans and cephalopods to jellyfish, sea stars, feather stars, frogfish and even people underwater. *X-Ray Mag* contributors share their favorite images from the tropical waters of Papua New Guinea, Philippines, Indonesia, Egypt, Bahamas, Saba and Mexico to the temperate waters of Vancouver in Canada and the US East Coast.

SHERYL CHECKMAN

Photo 1. Frogfish, Edge dive site, Alor, Indonesia (previous page). Gear: Olympus OMD EM5 Mark II camera, M. Zuiko 9-18mm f/4.0-5.6 lens at 9mm, Olympus PT-EP13 housing, Sea&Sea YS D-1 strobe. Exposure: ISO 200, f/4.5, 1/125s

Photo 2. Hermit crab, David's Drop-off dive site, Saba (right). Gear: Olympus OMD EM5 Mark II camera, M. Zuiko 60mm f/2.8 lens at 60mm, Olympus PT-EP13 housing, Sea&Sea YS D-1 strobes. Exposure: ISO 200, f/5.6, 1/100s

Photo 3. Arrow crab, Tent Reef dive site, Saba (left). Gear: Olympus OMD EM5 Mark II camera, M. Zuiko 60mm f/2.8 lens at 60mm, Olympus PT-EP13 housing, Sea&Sea YS D-1 strobes. Exposure: ISO 200, f/6.3, 1/125s

Photo 4. Green sea turtle, Man O'War dive site, Saba (right). Gear: Olympus OMD EM5 Mark II camera, M. Zuiko 8mm f/1.8 lens at 8mm, Olympus PT-EP13 housing, Sea&Sea YS D-1 strobes. Exposure: ISO 200, f/6.3, 1/125s

Brightly Colored Appendages

Text and photos
by Sheryl Checkman

While diving in Alor, Indonesia, at the Edge dive site, I came across this bright red-orange frogfish cleverly camouflaging itself against the equally-bright colored coral (Photo 1). What I noticed first, before I actually saw the whole fish, were the white tips along the edges of its leg-like fins, as if it had just had a French manicure!

On Saba, I was poking around in the nooks and crannies of David's Dropoff with my macro lens and found this scarlet reef hermit crab (also known as the red reef or red-legged hermit crab) peeking out from its shell (Photo 2). It is named for its bright red legs, which are contrasted by its yellow face and yellowish-green eyes that protrude from its face on yellow eyestalks. I am sure this crab was checking me out too!

On another dive on Saba, at Tent Reef, I found an arrow crab dancing in-between the rock formations of the reef wall (Photo 3). Its bright gold legs with neon-blue claws offered a striking contrast against the gray and red of the wall. I photographed this crab with my macro lens, and I remember having a hard time holding still enough to keep it in focus.

At the Man 'O War dive site, also on Saba, I captured a green sea turtle with my 8mm fisheye lens (Photo 4). In a hurry to switch ports for this dive, I inadvertently put the wrong port on my housing. I did not realize this until later, when I was viewing my photos and I could see the black circle of the lens port framing all my images. However, with some creative cropping, I was able to salvage the shot, focusing attention on the turtle's intricately patterned arm-like flipper. Follow on Instagram: **Instagram.com/sherylcheckman**

Photo 4. Hairy squat lobster. Gear: Canon Rebel T1i camera, Canon 100mm f/2.8 USM macro lens, Ikelite housing, twin Ikelite DS-161 strobes. Exposure: ISO 400, f/16, 1/60s

Sea Legs

Photo 1. Mosaic boxer crab (top far left). Gear: Canon EOS 10D camera, Sigma 50mm f/2.5 macro lens, Ikelite housing, twin Ikelite DS-125 strobes. Exposure: ISO 100, f/11, 1/125s

Photo 2. Hermit crab (left). Gear: Canon EOS 10D camera, Sigma 50mm f/2.5 macro lens, Ikelite housing, twin Ikelite DS-125 strobes. Exposure: ISO 100, f/22, 1/125s

Photo 3. Porcelain crab (below). Gear: Canon Rebel T1i camera, Canon 100mm f/2.8 USM macro lens, Ikelite housing, twin Ikelite DS-161 strobes. Exposure: ISO 400, f/16, 1/200s

Colorful Crustaceans

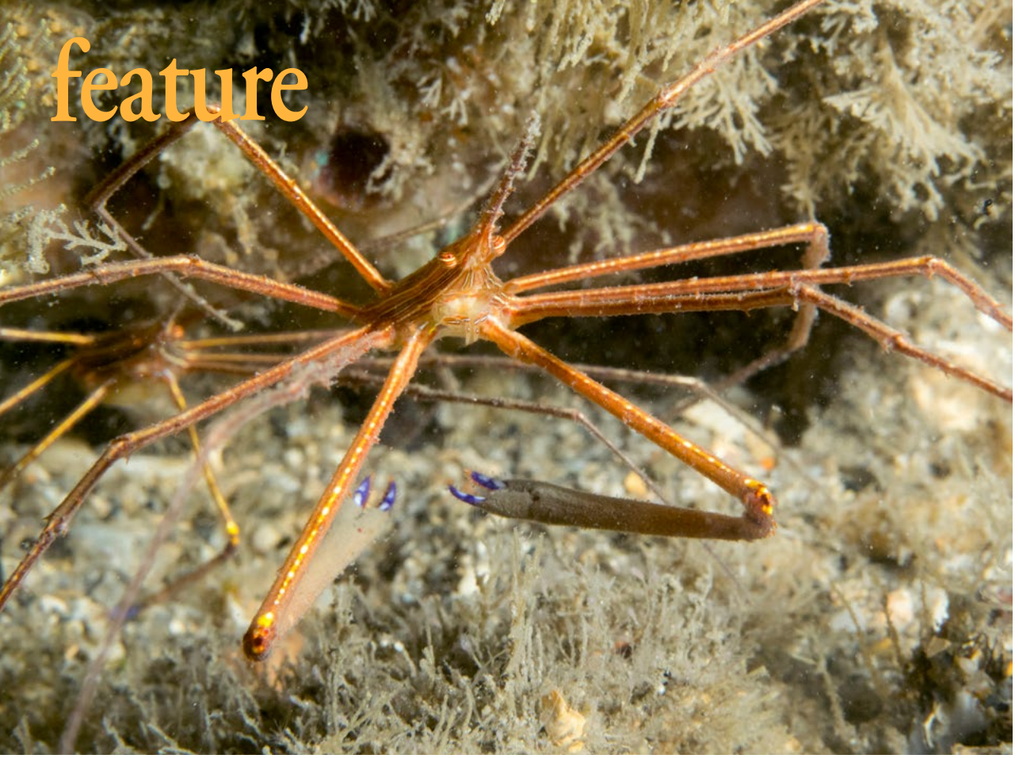
Text and photos by John A. Ares

Boxer crabs are amazing. (See Photo 1. Mosaic boxer crab.) These minuscule crabs hold small sea anemones in their claws for self-defense. The sea anemones benefit by being transported and exposed to more food sources than would be the case if they were stationary. Note that this was shot with a six-megapixel camera—an "old" Canon 10D—demonstrating megapixels are not the secret in the making of a quality photograph.

The hermit crab (*Aniculus aniculus*) in Photo 2 has wonderful, colorful legs. It does not decorate its shell with sea anemones as other species do. This species is active during the day and eats almost anything.

Porcelain crabs are one of those creatures that are hard to find at first. However, once you realize that they are associated with anemones, suddenly you will find them all over the place. They are frequently small, maybe 15mm wide. The individual in Photo 3 is filtering the water for plankton, using its feathery setae.

Underwater photographers go to the Indo-Pacific to see things that do not exist elsewhere in the world. Hairy squat lobsters are one of them. Maybe I have seen them twice in my life. To find them, you need to pay close attention to the local dive guides who know the underwater terrain, as this is "their backyard." Visit: **JohnAres.com**



Sea Legs

Photo 1. Renata Rojas getting ready for a shore dive, Dahab, Egypt (right). Gear: Olympus E-520 camera, Olympus 7-14mm lens, Olympus housing, Sea&Sea YS-01 strobes. Exposure: ISO 100, f/6.3, 1/200s; Photo 2. Squat shrimp photographed on Christine's Reef, Papua New Guinea (above center). Gear: Olympus OM-D E-M1 camera, Olympus 60mm macro lens, Aquatica housing, Sea&Sea YS-D1 strobes. Exposure: ISO 200, f/9, 1/200s

Legs for Locomotion

Text and photos by Larry Cohen

Divers, sailors and people that spend time on boats have an expression. They say people get their "sea legs" when they can handle rough seas and walk around the ship without getting sick. However, for an underwater photographer, "sea legs" can mean the actual legs of marine life or even a diver.

My dive buddy Renata Rojas was wearing dive gear with pink accents when we were getting ready for a shore dive in Dahab, Egypt. Her sea legs with pink fins made an intriguing subject for an over/under image (Photo 1).

The diving in Papua New Guinea off the liveaboard boat *Febrina* offers tremendous wide-angle and macro photo opportunities. For example, when diving Christine's Reef, I captured a squat shrimp using its sea legs to walk on a coral head (Photo 2). Using an f/9 aperture, I could keep the shrimp in focus and still throw the background out of focus.

Blue Heron Bridge in Florida, USA, offers excellent macro photography subjects without getting on a boat. However, you do have to dive at slack tide, or the current can be powerful. During this dive, there were so many tiny creatures to take photos of that I stayed longer than I should have. As the current started getting very strong, I spotted an arrow crab using its many legs to move along the sea bottom. The arrow crab did not seem to be fazed by the current, but I had difficulty staying still to capture the image (Photo 3).

Photo 3. Arrow crab photographed at the Blue Heron Bridge in Florida, USA (top left). Gear: Olympus OM-D E-M1 camera, Olympus 60mm macro lens, Aquatica housing, Sea&Sea YS-D1 strobes. Exposure: ISO 400, f/11, 1/100s; Photo 4. Channel clinging crab, Cozumel, Mexico (above). Gear: Olympus OM-D E-M1 camera, Olympus 9-18mm fisheye lens, Aquatica housing, Sea&Sea YS-D1 strobes. Exposure: ISO 200, f/10, 1/250s.

Cozumel is a Caribbean island ten miles off Mexico's Yucatán Peninsula, across the water from Playa Del Carmen. Divers flock to Cozumel for the lush coral garden walls and swim-throughs. In addition, the island is home to 500 species of fish. The colorful walls are also crawling with invertebrate life. It was hard to miss a colossal channel clinging crab on one dive (Photo 4). Please visit: **liquidimagesuw.com**

Sea Legs

Photo 1. Sea star shrimp on blue sea star, Dumaguete, Philippines (top left). Gear: Canon EOS Digital Rebel XTi camera, Canon EF50mm f/2.5 compact macro lens, Ikelite housing, two Ikelite DS 161 strobes. Exposure: ISO 200, f/11, 1/200s

Photo 2. Snail parasites on blue sea star, Puerto Galera, Philippines (above). Gear: Canon EOS Rebel SL1 camera, Canon EF-S 60mm f/2.8 macro USM lens, Ikelite housing, two Ikelite DS 161 strobes. Exposure: ISO 200, f/8, 1/160s

Life on a Sea Star

Text and photos by Anita George-Ares

Real estate on a reef is at a premium, even on sea stars. The sea star shrimp comes in a variety of colors and lives on many species of sea stars. In Photo 1, the shrimp rests on an ambulacral groove on the underside of the sea star. Ambulacral grooves contain the tube feet of the sea star. The different textures and shades of blue exhibited by the shrimp and sea star make an interesting composition.

Different textures and shades of blue are also in the image of snails near an ambulacral groove (Photo 2). The parasitic snails (*Thyca crystallina*) obtain nutrients from the sea star's hemal (blood vascular) system.

The red and white ovals on the sea star in Photo 3 are creeping comb jellies. Creeping comb jellies are unusual as they do not live in the water column where other species of comb jellies occur. The jellies make an interesting design on the sea star. At first, I thought that I had found a different species of sea star.

A zebra crab makes a home on a sea star that also hosts comb jellies (Photo 4). Long tentacles for capturing plankton extend from the comb jellies. Please visit: **facebook.com/profile.php?id=100016947967639**

Photo 4. Zebra crab on Luzon sea star, Puerto Galera, Philippines (above). Gear: Canon EOS Rebel SL1 camera, Canon EF-S 60mm f/2.8 macro USM lens, Ikelite housing, two Ikelite DS 161 strobes. Exposure: ISO 200, f/8, 1/160s

Photo 3. Comb jellies on Luzon sea star, Puerto Galera, Philippines (left). Gear: Canon EOS Rebel SL1 camera, Canon EF-S18-55 f/3.5-5.6 IS STM lens, Ikelite housing, two Ikelite DS 161 strobes. Exposure: ISO 200, f/8, 1/160s

Brown and white feather star on a pink sea fan, Triton Bay, West Papua, Indonesia (above). Gear: Nikon D3 camera, Nikon 60mm macro lens, Subal housing, two Sea&Sea YS-250 strobes. Exposure: ISO 200, f/8, 1/200s

Pink and yellow feather star engulfs a grey sponge, Anilao, Philippines (right). Gear: Nikon D3 camera, Nikon 105mm macro lens, Subal housing, two Sea&Sea YS-250 strobes. Exposure: ISO 200, f/11, 1/125s

Rhythmic Arms

Text and photos by Matthew Meier

The rhythmic movement of feather stars has fascinated me ever since I first laid eyes on them in Papua New Guinea almost 20 years ago. As a still photographer, I have tried to use the infinite shapes that motion generates to create artistic color combinations and abstract or geometric compositions of these amazing creatures—at times, capturing their entire form against an interesting background or otherwise coming in close to eliminate distractions from what caught my eye in the first place. When diving in the Indo-Pacific, especially with a macro lens on my camera, I always have one eye on the lookout for striking colors and uniquely patterned crinoids. Visit: **MatthewMeierphoto.com**

Purple feather star attached to a pink and white soft coral, Misool, Raja Ampat, Indonesia (top right). Gear: Nikon D3 camera, Nikon 105mm macro lens, Subal housing, two Sea&Sea YS-250 strobes. Exposure: ISO 200, f/9, 1/60s

Brown and tan feather star forms an intricate pattern, Misool, Raja Ampat, Indonesia (above left). Gear: Nikon D3 camera, Nikon 105mm macro lens, Subal housing, two Sea&Sea YS-250 strobes. Exposure: ISO 200, f/25, 1/125s

Striped crinoid shrimp on top of a balled-up dark blue and yellow feather star, Lembeh Strait, Indonesia (above right). Gear: Nikon D810 camera, Nikon 60mm macro lens, Subal housing, two Sea&Sea YS-250 strobes. Exposure: ISO 200, f/20, 1/125s

Leggy Beauties

Text and photos by Brandi Mueller

Decapods are an order of crustaceans that include crabs, lobsters and shrimp and are some of the ocean's critters that have legs, which are perhaps more properly referred to as thoracic appendages. They have eight pairs of these; five pairs are considered legs, and the front three pairs are modified to assist in eating.

I find the best time to see these leggy beauties is on night dives when they emerge from their hiding places out into the open to feed. Some are more common during the day, like the banded coral shrimp in the Bahamas (Photo 4).

But I usually find spider and decorator crabs prancing around the coral at night, like the ones from the Red Sea and the Bahamas in Photo 1 and Photo 2. Both species can have highly decorated legs, usually with some sort of other marine life growing on them. Also, in the Bahamas at night, the larger, channel clinging crabs wander out into the open for a midnight snack (Photo 3). Visit: **brandiunderwater.com**

Photo 1. Spider crab, Egypt (center). Gear: Nikon D850 camera, Ikelite housing, dual Ikelite DS230 strobes. Exposure: ISO 200, f/20, 1/200s

Photo 2. Decorator crab, Bahamas (top left). Gear: Nikon D850 camera, Ikelite housing, dual Ikelite DS 161 strobes. Exposure: ISO 250, f/13, 1/200s

Photo 3. Channel clinging crab, Bahamas (bottom left). Gear: Nikon D850 camera, Ikelite housing, dual Ikelite DS 161 strobes. Exposure: ISO 250, f/16, 1/200s

Photo 4. Banded coral shrimp, Bahamas (right). Gear: Nikon D850 camera, Ikelite housing, dual Ikelite DS 161 strobes. Exposure: ISO 250, f/11, 1/200s

Photo 5. Squat lobster, Egypt (top center). Gear: Nikon D850 camera, Ikelite housing, dual Ikelite DS230 strobes. Exposure: ISO 250, f/16, 1/200s

Photo 6. Sarasvati anemone shrimp in anemone (top right)

Photo 1. Hermit crab in the Shark River Inlet, Belmar, New Jersey, USA (above). Gear: Canon EOS 7D Mark II camera, Tamron 60mm macro lens, Nauticam housing, dual Inon Z-330 strobes. Exposure: ISO 500, f/7.1, 1/250s

Photo 2. Sea star under the Manasquan River railroad bridge, Point Pleasant, New Jersey, USA (top left). Gear: Canon EOS 7D Mark II camera, Tamron 60mm macro lens, Nauticam housing, dual Inon Z-330 strobes. Exposure: ISO 1600, f/16, 1/160s

Photo 3. Sea nettle under the Manasquan River Railroad Bridge, Point Pleasant, New Jersey, USA (left). Gear: Canon EOS 7D Mark II camera, Tamron 60mm macro lens, Nauticam housing, dual Inon Z-330 strobes. Exposure: ISO 100, f/20, 1/250s

Sea Legs

Evolution

Text and photos
by Michael Rothschild, MD

As life evolved over billions of years, so did the way that animals get around. The earliest microorganisms just floated, waiting for a meal to drift by. But locomotion—for pursuit or for escape—required better gear. Water creatures developed fins and tails, which work well in a liquid world. But when our ancestors colonized dry land, they needed legs to move and support their weight against gravity.

Legs underwater seem out of place, but they have their roles. Negatively buoyant critters crawl rather than swim. And in some cases, legs evolved back to earlier forms—a whale's flipper comes from its tetrapod ancestor's forelimb, converting a leg to a more useful underwater structure (like a diver putting on fins).

The first photo is a hermit crab, with shiny legs and eyes standing out from a drab mussel bed. The second is the tip of a sea star; I watched with fascination as this normally sessile creature took a stroll across the ocean floor, dancing on tubular feet. The third image is a sea nettle, an Atlantic jellyfish floating in the shallows. And the fourth is my dive buddy demonstrating his great buoyancy skills by floating fins up. Please visit: **dive.rothschilddesign.com**

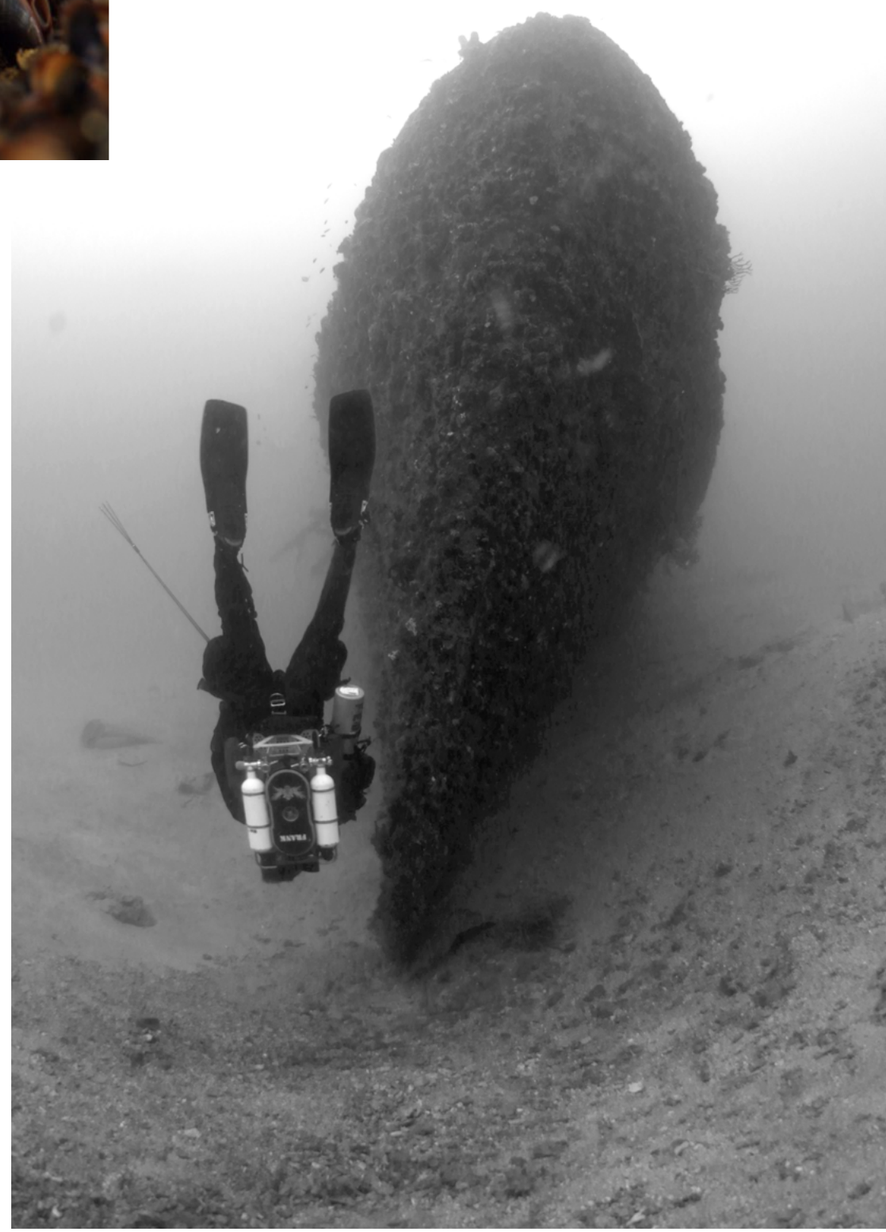


Photo 4. Diver on the Ancient Mariner Wreck, Florida, USA (above). Gear: Canon EOS 7D Mark II camera, Tokina 10-17mm fisheye lens (10 mm), Nauticam housing, dual Inon Z-240 strobes. Exposure: ISO 320, f/8, 1/50s

Photo 2. Hermit crab, Cozumel, Mexico (above). Gear: Olympus OM-D E-M5 camera, Olympus 12mm-50mm lens, Nauticam housing, dual Sea&Sea strobes. Exposure: ISO 250, f/10, 1/40s; Photo 3. Hermit crab, Browning Pass Wall, Vancouver Island, British Columbia, Canada (top right). Gear: Olympus OM-D E-M5 camera, Olympus 12mm-50mm lens, Nauticam housing, dual Sea&Sea strobes. Exposure: ISO 250, f/13, 1/250s

Photo 4. Coral shrimp, Papua New Guinea (above). Gear: Olympus OM-D E-M5 camera, Olympus 12mm-50mm lens, Nauticam housing, dual Sea&Sea strobes. Exposure: ISO 400, f/8, 1/50s

Sea Legs

Photo 1. Caribbean spiny lobster (*Panulirus argus*), Cozumel, Mexico (above). Gear: Olympus OM-D E-M5 camera, Olympus 12mm-50mm lens, Nauticam housing, dual Sea&Sea strobes. Exposure: ISO 250, f/10, 1/40s

Crawling Crustaceans

Text and photos by Olga Torrey

As an underwater photographer, I am fascinated with the variety of marine life in all the locations I visit. In addition, I have always been interested in how crustaceans move along the reef, so I found concentrating on their legs necessary.

When diving in Cozumel, Mexico, I was lucky enough to see a spiny lobster crawling along the reef during the day; usually, they feed at night. These crustaceans navigate by using their sense of smell and by detecting the Earth's magnetic field. The Caribbean spiny lobster is a decapod; it has ten legs and a spiny exoskeleton, which provides it some protection from potential predators. The motion of this creature's many legs attracted my attention when I photographed it (Photo 1).

On the same dive in Cozumel, I spotted a hermit crab. Many photographers would not consider this crab a worthy subject but seeing the crab's claws and legs move along the seabed, I knew it would make an interesting photo. Hermit crabs have ten legs, but only six legs are visible. These are walking legs. The hermit crab keeps its four other legs inside its shell, and these legs are much smaller than the walking legs. The front pair of legs have a larger pincer, which the crab uses for moving around and defending itself, as well as eating and drinking. Both front legs have thick layers of exoskeleton. (See Photo 2.)

Not all hermit crabs live in warm water. While diving Browning Pass Wall at Vancouver Island, British Columbia, Canada, I spotted another hermit crab. Because these animals take shells from other creatures, no two look alike. Hermit crabs need to find a more extensive shell body as they grow bigger. They will fight or kill another crab to take over a shell. (I have heard the same might be said of the human world, when looking for a rent-stabilized apartment in New York City!) This crab used its red legs to walk along the wall, carrying a stylish cover as its home. (See Photo 3.)

On the reefs of Papua New Guinea, there is so much life it is hard to decide whether to put a macro or wide-angle lens on one's camera. When diving on Christine's Reef off the liveaboard boat *Febrina*, I was glad that I had a macro lens on my camera when I spotted a coral shrimp using its legs to move along a crinoid. The pattern on this shrimp's body and legs matched very closely to the design on the crinoid, making it hard to see. (See Photo 4.) Visit: **fitimage.nyc**

Wolffish, *Anarhichas lupus*

Wolffish
— Ferocious-Looking Fishes

Text and photos by Lawson Wood

The wolffish is known by many names, including loup de mer, ocean catfish, sea catfish or Atlantic catfish, striped wolffish, seawolf or seacat. All wolffish species are in the order of Cottiformes (which includes sculpins and relatives) and are in the family *Anarhichadidae* (wolffish). Lawson Wood gives us an insight into this intriguing creature.

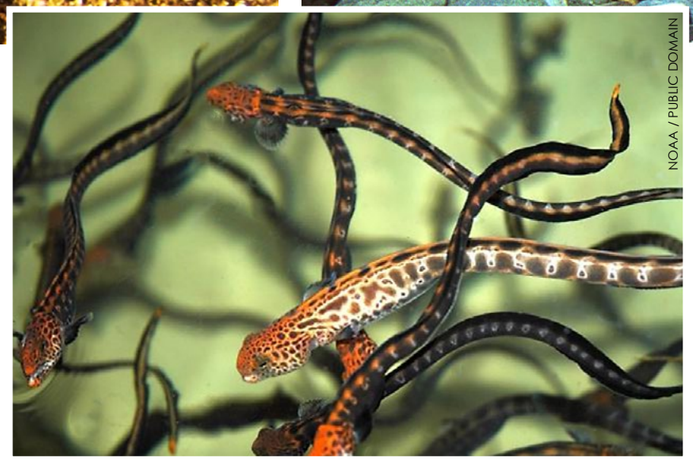
There are five species found worldwide, all in northern waters, ranging from Japan in the northern Pacific down to California, over into the Atlantic, down to eastern Canada and the United States, and over to Iceland; in Spitsbergen, Novaya Zemlya and down to Scandinavia; in the British Isles and Ireland; along the Atlantic coast of France and Portugal; and even into the Mediterranean. There is one known warm-water species of wolffish from the Indo/Pacific; this is the green wolf eel or carpet eel blenny (*Congrogadus subducens*).

The cold-water species include the following: Atlantic or striped wolffish, seawolf, catfish, devil fish, Scotch halibut, Scarborough woof, woof, and loup de mer (France).

Atlantic wolffish or loup de mer (*Anarhichas lupus*)
More local to UK coasts, this is the species most commonly associated with British waters and particularly the Berwickshire Marine Reserve and around the St Abb's Head National Nature Reserve in southeastern Scotland.

Bering or black-spotted wolffish (*Anarhichas orientalis*)
Commonly found from Hokkaido in Japan to the Sea of Okhotsk and onwards to Alaska. Although insufficiently documented, it is

Wolffish, *Anarhichas lupus* (right); Spotted wolffish, *Anarhichas minor*, Nova Scotia, Canada (top far right); St Abbs Head National Nature Reserve in Scotland, UK (below); Juvenile spotted wolffish (centre)



also known to occur across the northwestern Pacific, the Bering Sea and Arctic Ocean.

Wolf eel (*Anarrhichthys ocellatus*)
This large species is found in the northern Pacific, and I encountered this species at eastern Vancouver Island around Nanaimo. The males were a steely grey and the females a dull brown. Their lips were very pronounced around their elongated teeth. Usually over 2m long (6.5ft), the rear portion is quite tapered.

Northern wolffish (*Anarhichas denticulatus*)
Also known as the broadhead wolffish, bull-headed catfish, or catfish, this species is confined to the North Atlantic from Spitsbergen, and Scandinavia, south to the Faroe Islands and Shetlands, Greenland and southwest to Sable Island off Nova Scotia and the Grand Banks. It is very occasionally found in the North Sea, but surprisingly it is also found in deep waters in the Bay of Biscay. The head of this species is small compared to the rest of its body, which is quite rotund. It only grows to 144cm (4.7ft) long and weighs around 20 kilos.

Spotted wolffish or leopardfish (*Anarhichas minor*)
This species is located off northern Russia and the Scandinavian coast, all the way to the Scotian Shelf off Nova Scotia. There have apparently been a couple of sightings recorded off southeastern Scotland and northwestern Ireland. I am not sure about these sightings as they appear quite far south, but like all animals and fish, they then turn up when and where you least expect them. This wolffish species is commercially raised by fish farms in the United States and Canada, which appears to be fairly successful as a percentage are being reintroduced into the wild. The body length is around 1.5m (5ft), and the head is in proportion to the rest of the body.

The wolffish is perhaps the most iconic of all the marine fish to be found within the Berwickshire Marine Reserve, located in the southeast of Scotland. I was instrumental in founding the first marine reserve in Scotland at Eyemouth, and around ten years later, co-founded the St Abbs and Eyemouth Voluntary Marine Reserve (now renamed the Berwickshire Marine Reserve). This marine reserve is now part of the Berwickshire and North Northumberland Special Area of Conservation—one of the largest marine conservation areas in Europe.

Characteristics

The wolffish's Latin name, *Anarhichas lupus*, describes this fish as *lupus* ("like a wolf") due to its very obvious and protruding teeth. The etymology, or route name *Anarhichas*, is from the Greek, *Anarhichaomai*, which means "to climb up," suggestive of the species' behaviour, as the fishes use their large pectoral fins to propel themselves over the seabed, and in and out of rocky crevices. They do swim, but in an undulating way like true eels!

These fish are well-named, quite obviously because of their protruding canine-like front teeth, which give them a ferocious appearance. But these fish are not aggressive at all; rather, they will shy away from divers' lights and

Wolffish, *Anarhichas lupus* (right and below)

Skull of Atlantic wolffish *Anarhichas lupus*. Note the complex and impressive teeth (left); Wolf eel pair, *Anarrhichthys ocellatus*), Vancouver Island (right)

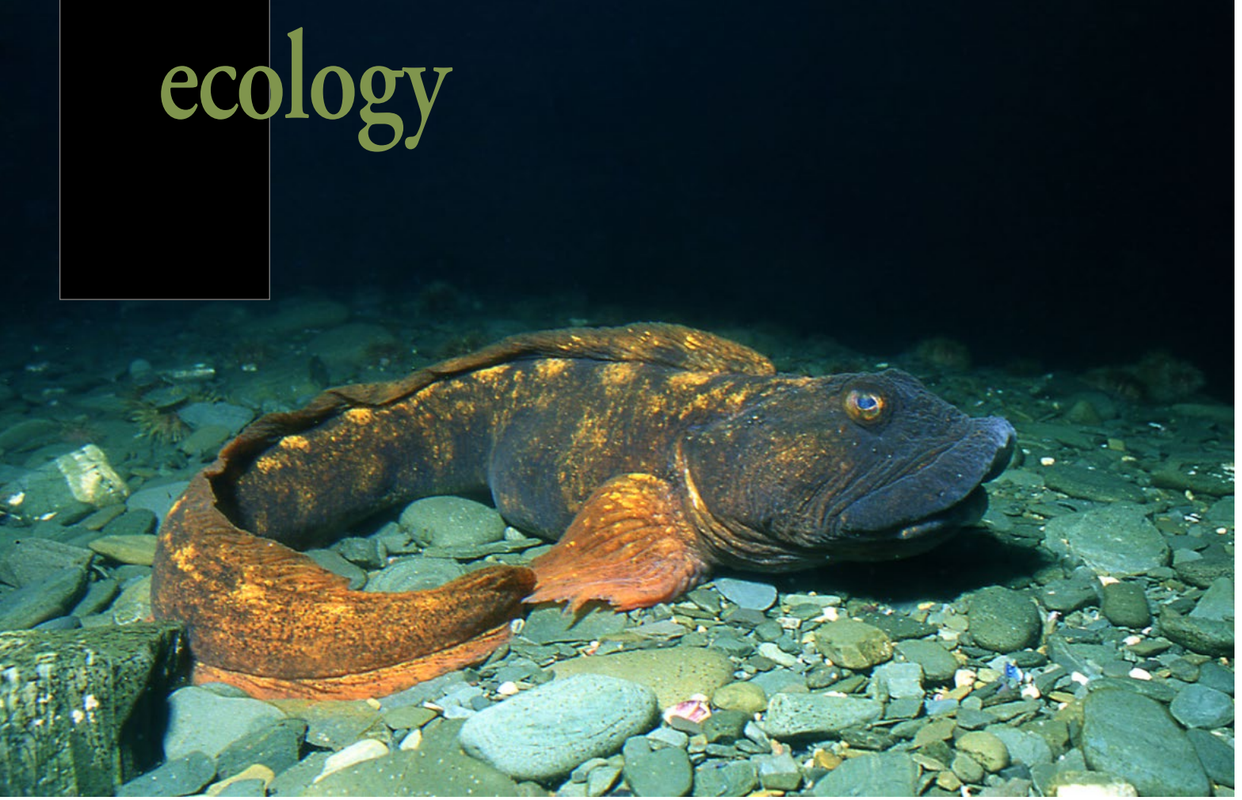
hide deeper inside their lairs. Behind these visible primary canine teeth are a cluster of five or six smaller canines, as well as three sets of crushing molars on the roofs of their mouths, which they use to crush and pulverise their food. Their jaws are able to extend when attacking larger prey such as sea urchins, lobsters and crabs.

They are an Arctic species (and have a type of antifreeze in their bodies that keeps their blood flowing fluidly to withstand the sea temperatures below 0°C), preferring colder waters, and are more generally found from northern Norway down through Iceland; the Faroe Islands; Shetland and Orkney Islands, northern Scotland and all the way to the Farne Islands and perhaps farther south. There has been a verbal sighting off Tyneside and the Yorkshire Coast (but on a wreck well offshore a few years ago); but the farther south you go down the eastern coast of Britain, the rarer this species becomes as it ventures into warmer waters. However, there are always exceptions to every rule, and they have been fished off the coast of France, the Bay of Biscay, Portugal, and even the Balearic Islands in the Mediterranean.

Super-sized

This fish is actually a super-sized blenny, with a large round head, an elongated tapered body and a very long dorsal fin from just behind its head to its tail or anal fin. It has no pelvic fins but does have large pectoral fins situated just behind the gill covers, making this fish a blenny rather than some kind of eel. It uses these super-sized pectoral fins to allow it to "hop" over the seabed when searching for food.

It does have another cold-water close relative, which I photographed on Vancouver Island. With a face only its mother could love, this species is known locally as a wolf eel (*Anarrhichthys ocellatus*) and is usually found in waters of less than 18m (60ft). I found my pair of wolf eels in only 6m (20ft), but they can be found as deep as 330m (~1,000ft).



Eel pout, Newfoundland (left); Wolffish in its den (above)

I am not sure whether the cold-water habitat has anything to do with the super-sizing of species, but when I visited Newfoundland, there is a species of eelpout that is equally as large as the wolffish, but not nearly as ferocious-looking, as it has large fleshy lips, not unlike the European eelpout or viviparous blenny (*Zoarces viviparus*). The term *viviparous* means "to bear live young." The species found in Newfoundland is known as the large eelpout or Arctic eelpout (*Lycodes lavalaei*).

Behaviour

Often referred to as catfish or woof by fishmongers, wolffish are commercially caught, but usually as bycatch by bottom-trawling inshore fishing boats. Active feeders by night, they do rest during the day in rocky crevices or under boulders. At one particular site off the Black Carr Rocks just north of St Abbs Harbour, there is a rocky ledge in around 18m (60ft) of water where usually five or six wolffish can be found dotting the length of the ledge. The most that I have found there was eight, with another three nearby. Most scuba divers find wolffish along this stretch of coastline.

Encounters

I was first introduced to the wolffish back in the early 1970s when I first found one off Eyemouth (Scotland) in 12m (40ft) of water. Its right pectoral fin had been damaged and almost split in two, making the fish very distinctive. This was a *huge* wolffish with the head about the size of a football and easily over 2m (6.5ft) in length.

I had noticed some broken sea urchin shells and the remains of a few crabs near the entrance to its lair, when a large spider crab ambled past me as I was taking photographs of George (as we divers called him). George suddenly shot out and grabbed the spider crab in its mouth. When I went in closer to take the photograph, the wolffish was clearly intimidated by me and opened its mouth wide in an aggressive posture. The spider crab then climbed back out and ambled on its way!

This particular wolffish gained such notoriety that many divers and photographers (including shooters from the BBC) took the pilgrimage to Eyemouth for a face-to-face encounter with George! When feeding, wolffish are able to extend their jaws (similar to the wrasse species) and are easily able to engulf a large sea urchin whole.

Status

The Atlantic or striped wolffish is designated as being of "Special Concern" by SARA (Species At Risk Act) due its slow-growing, late maturation and living a benthic lifestyle where both adults look after the eggs. They should be returned to the sea, if possible, when caught as a bycatch and preferably in the area where they were fished, as they play an important role in the ecosystem of the ocean.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) is an independent advisory panel to the Minister of Environment and Climate Change Canada and also refers to wolffish as threatened or endangered. The reason for their designation is that numbers have decreased over the last three generations, principally due to the seabed being altered by bottom dredging, ocean dumping and pollution, perhaps caused by environmental change and bycatch fatalities. Thankfully, the populations found in the Berwickshire Marine Reserve in southeastern Scotland appear to be fairly stable—for now.

Reproduction

At around the age of six years, when wolffish mature, they spawn during the winter months, laying over 1,000 large (6mm), yellowish eggs in small clumps attached to the rocky seabed, or in small crevices. The eggs are fertilised internally, and the parents take turns protecting the eggs and keeping them aerated (very similar to lumpsuckers). They also remove any diseased or dead eggs.

The eggs hatch after eight weeks or so, and the newborn hatchlings hide on the seabed amidst small stones, feeding on the last reserves

FACT FILE

LOCATION:
Admiralty Chart 115
Admiralty Chart 175 Fife Ness to St Abbs Head

DIVE CENTRE/AIR FILLS:
There is no longer a dive shop in Eyemouth, but air can be obtained at the following locations. (Please call in advance if you require air as staff at both businesses may not be available immediately, due to being out with their day dive boats).

OPERATORS:
Dive St Abbs, Boat & Accommodation Rock House, St Abbs (divestabbs.com)

Pathfinder, Boat and Accommodation, Priory View, Eyemouth Road, Coldingham (stabbsdiving.com)

Dive Stay at Eyemouth owns the Glenerne Guest House, the Home Arms Guest House and the Ship Hotel in Eyemouth. (divestay.co.uk)

Aquamarine Charters at Eyemouth is run by Derek Anderson. It has a couple of boats and visits the Black Carrs regularly. (aquamarine-charters.co.uk)

Marine Quest, Air, Boats and Accommodation, Harbour Road, Eyemouth (marinequest.co.uk)

Wolffish in Scotland

Skeleton of wolffish, showing its impressive teeth (above); Wolffish with prey (right)

of their egg yolks. They do have a larval stage and will float amongst that planktonic soup for a couple of weeks before settling onto a nice rocky seabed. Juveniles are olive-brown in colour with their pectoral fins being a shade of olive green. Adult females are usually more brown in colour, with the males a steely, purplish grey, with darker vertical bands down the length of the body.

Teeth

As they are a benthic (bottom-dwelling) species, they feed primarily on various crabs, sea urchins, starfish, mussels, whelks, cockles, clams, hermit crabs and other crusty critters. Like sharks, when the wolffish's front teeth get worn down or broken off, they are replaced by a new tooth, which moves forwards from behind. Both the lower and upper jaws are armed with four to six conical teeth, which protrude forwards.

Behind the upper teeth are three rows of crushing teeth, in the centre of these are the pairs of molars on both the upper and lower jaws. The fish has a large tongue and even small, serrated teeth situated in the throat. The fish are known in Iceland and Norway as *steinbítur* or *steinbit*, the literal translation of which is "stone biter."

When you look at the very young hatchlings and the size of their teeth as well as their long slim bodies, and then examine the skull of a mature wolffish, you can see that they could have easily been the inspiration for the creators of the movie *Alien*, so ferocious-looking are these fish in all stages of their lives. It is their aggressive posture and fearsome look that clearly identifies this massive fish, but they are really shy and retiring, and should not be coaxed out into the open by hand feeding!

Where to see them in the UK

Now, more popular than ever, St Abbs on the southeastern coast of Scotland and within the Berwickshire Marine Reserve has become the epicentre for wolffish encounters. The Black Carrs, just north of St Abbs village, are only accessible by dive boat from either St Abbs or Eyemouth. Air and nitrox is available from the Home Arms Hotel and Marine Quest on Eyemouth Harbour.

Tidal considerations

There can be currents around the Black Carrs, and dive boats will endeavour

to get you in the water at slack water and let you know which way the tide is running. It is recommended that you stay underwater until you are away from any shallower rocks before deploying your SMB and terminating your dive, as there may be other dive boats in the vicinity. ■

Lawson Wood (Oceaneye Films) was raised in the Scottish east-coast fishing town of Eyemouth and spent his youth exploring the rock pools and shallow seas before learning to scuba dive at the tender age of 11. Over 44 years later, he has been fortunate to make his passion his career and has authored and co-authored over 45 books, mainly on our underwater world. Wood is a founding member of the Marine Conservation Society, founder of the first Marine Reserve at St Abbs in Scotland, and made photographic history by becoming the first person to be a Fellow of the Royal Photographic Society and Fellow of the British Institute of Professional Photographers solely for underwater photography.

Equipment

Edited by
Peter Symes
& G. Symes

Apple Watch Ultra

The popular range of Apple Watches now includes a model called Ultra, which features a new depth gauge. "It also delivers the data and functionality required by scuba and freedivers for descents down to 40 meters," Apple writes. As immensely feature-rich as these sports watches have become, a 40m depth limit appears to be a bit tight. That said, as most recreational divers would not or should not venture any deeper, it may not be much of an issue. The diving app, Oceanic+, which includes all the core features divers need, has been developed in collaboration with Huish Outdoors. **apple.com**

Ocean Reef Vesper Integrated Headlight

Ocean Reef's new lightweight, compact, powerful, easy-to-use Vesper is a fully integrated secondary diving light. Compatible with all Ocean Reef IDMs from the Space and Neptune lines, its reduced size and patent-pending placement inside the mask offer increased negative buoyancy of the system as well as comfort. Smaller and lighter than the VL, the Vesper does not require adhesive or screws and can be installed by the user with no training. It features an infrared sensor, SOS mode, charging via USB, and multipurpose case for protection of the unit during storage and transport. In addition, it illuminates the user's face, allowing for identification without blinding the diver. **diving.oceanreefgroup.com**

Scubapro Go BCD

Designed to travel, the Scubapro Go BCD is front adjustable, lightweight, soft and foldable as a padded air-net ergonomic backpack, featuring integrated front weight pockets, two large quick-draining cargo pockets, two octo pockets, and Scubapro's user-friendly Quick Cinch tank buckle system, which adjusts easily and fits any tank size. It has a wraparound bladder made of durable Nylon 210 denier fabric with a polyurethane layer and RF soldering for maximum wear resistance. It also has rotating quick-release shoulder buckles to maximize comfort and fit; an additional upper band to help secure a tank, maximizing stability at depth; quick-release integrated weight pouches with low profile buckles; and five aluminum D-rings. It weighs 2.54kg (5.6 lbs), with a lift capacity of 10.2kg (22.5 lbs). Travel bag included. **scubapro.johnsonoutdoors.com**

TUSA Zensee Mask

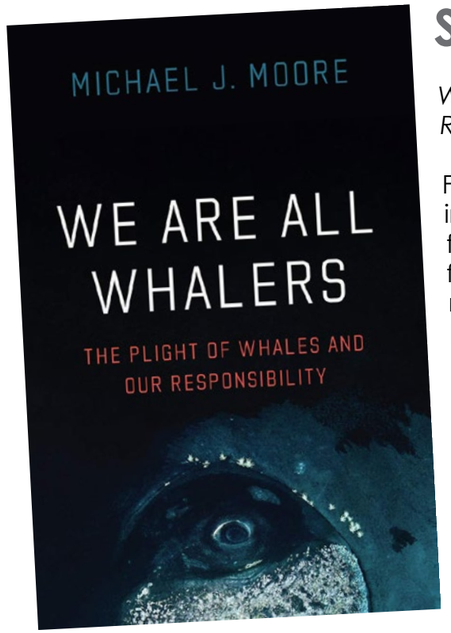
The Zensee Mask is the first frameless dive mask by TUSA, featuring a panoramic view, innovative technology, and lightweight design, as well as 3D Synq, a unique fitting ring built into the mask skirt to provide an ideal fit for all face shapes. There is also a low-profile buckle and mask strap for easy adjustments, a low friction skirt surface for comfort and fit, a 3D mask strap that contours to the shape of the head, a round edge skirt for better seal and comfort, and an extra-wide field of view. **tusa.com**

Mobby's T4 Shell Prime Drysuit

Touted as the best of Mobby's Shell Prime series of drysuits, the T4 incorporates the Japanese manufacturer's innovative, light-effort, self-donning zipper design and is made of a three-layer material with flexible, elastic and durable rip-stop nylon bonded to both sides of a butyl rubber layer, which has excellent waterproofness, durability and flexibility, according to the manufacturer. Safe and secure diving is enhanced by ACT, Mobby's original dynamic anatomical cutting technology, which applies anatomical knowledge to patterning, enabling stress-free mobility and stylish functional design. Options include leg pockets, replaceable neck and wrist seals, p-valve, p-zipper and wrist valve. Available in 36 sizes including XXS to XXXL+ for men and XXS to XXL for women, with helpful 3D LOOK AI to help one find the best size, using two smartphone photos. **mobbys-online.com**

books &media

Edited by
Catherine GS Lim



Saving Whales

We Are All Whalers: The Plight of Whales and Our Responsibility, by Michael J. Moore

From whale necropsies on beaches and tracking injured whales to deliver sedatives, to poorly enforced conservation laws and efforts to balance fisheries profit with protecting endangered species, marine scientist and veterinarian Michael J. Moore brings readers up to speed on their current plight. Although whales remain very much at risk from human activity, he highlights how technologies for rope-less fishing and the acoustic tracking of whale migrations can make a drastic difference, looking ahead with hope as our growing understanding of whales leads to a stronger push for change.

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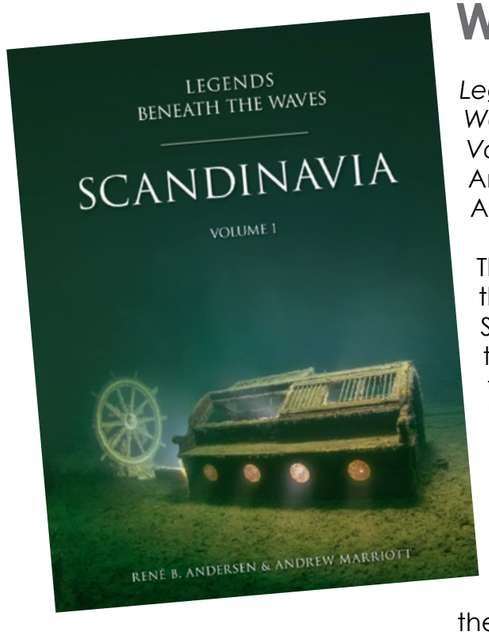

Wrecks

Legends Beneath the Waves: Scandinavia Vol.1, by René B. Andersen and Andrew Marriott

This book chronicles the shipwrecks in Scandinavian waters, hailing from the two World Wars, all the way to the Viking Age. Although cold and dark, these waters hold the combination of saltwater in the North and Norwegian seas and the almost freshwaters of the Baltic Sea—this is why you can find deteriorated shipwrecks alongside some of the most well-preserved wrecks around.

Publisher: Independently published
Date: 17 May 2022
Hardcover: 265 pages
ISBN-13: 979-8825595559

Sperm Whales

Sperm Whales: The Gentle Goliaths of the Ocean, by Gaelin Rosenwaks

This book tells the story of sperm whale families in the waters off Dominica, as witnessed through the lens of photographer, filmmaker and marine biologist Gaelin Rosenwaks. It was there that she saw with her own eyes their matriarchal family units comprising females that stay together for generations. The intimate and stirring story of these giants of the sea is told with a collection of her never-before-seen photographs.

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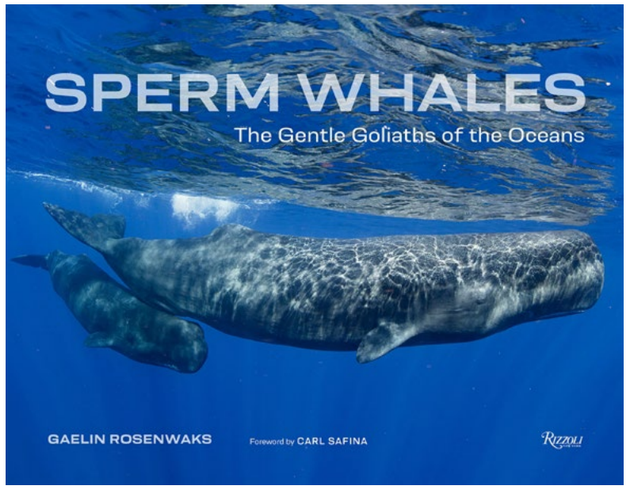

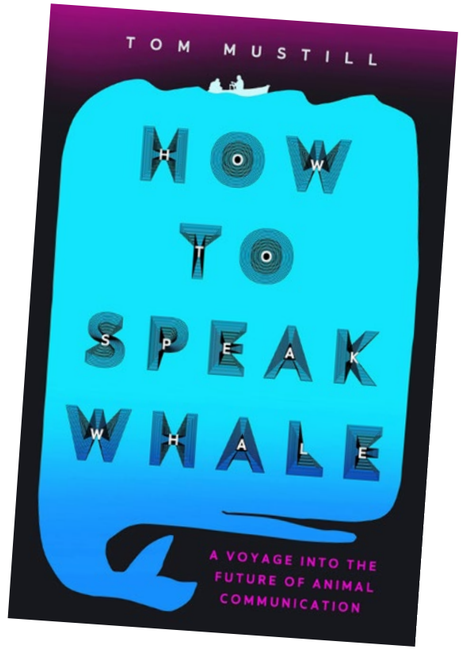

Whale Speak

How to Speak Whale: A Voyage into the Future of Animal Communication, by Tom Mustill

After a humpback whale breached onto his kayak, naturalist Tom Mustill started researching human-whale interactions worldwide. This led him to entrepreneurs who sought to use artificial intelligence to decode animal communication. Eventually, his investigations uncovered a revolution in biology, where the technologies developed to explore our own languages are turned to nature, in a bid to decode animal communications. And whales—with their mammalian brains, virtuoso voices and highly social lives—present a realistic opportunity for this to happen.

Publisher: Grand Central Publishing
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Should I Do a Nitrox Course?

— The Benefits of Diving with Nitrox

RYAN LACKEY / FLICKR / CC BY 2.0

Text by Simon Pridmore

There is still a lot of confusion around nitrox these days. Simon Pridmore talks about what it does and does not do, the benefits of diving with nitrox, and why a nitrox course is a good idea.

The other day, I came across a question on a divers' chat room: "My boyfriend is doing a nitrox course. Should I do the course with him? I do not need it as I always have at least 1500 psi left in my tank at the end of a dive when he is down to 500psi."

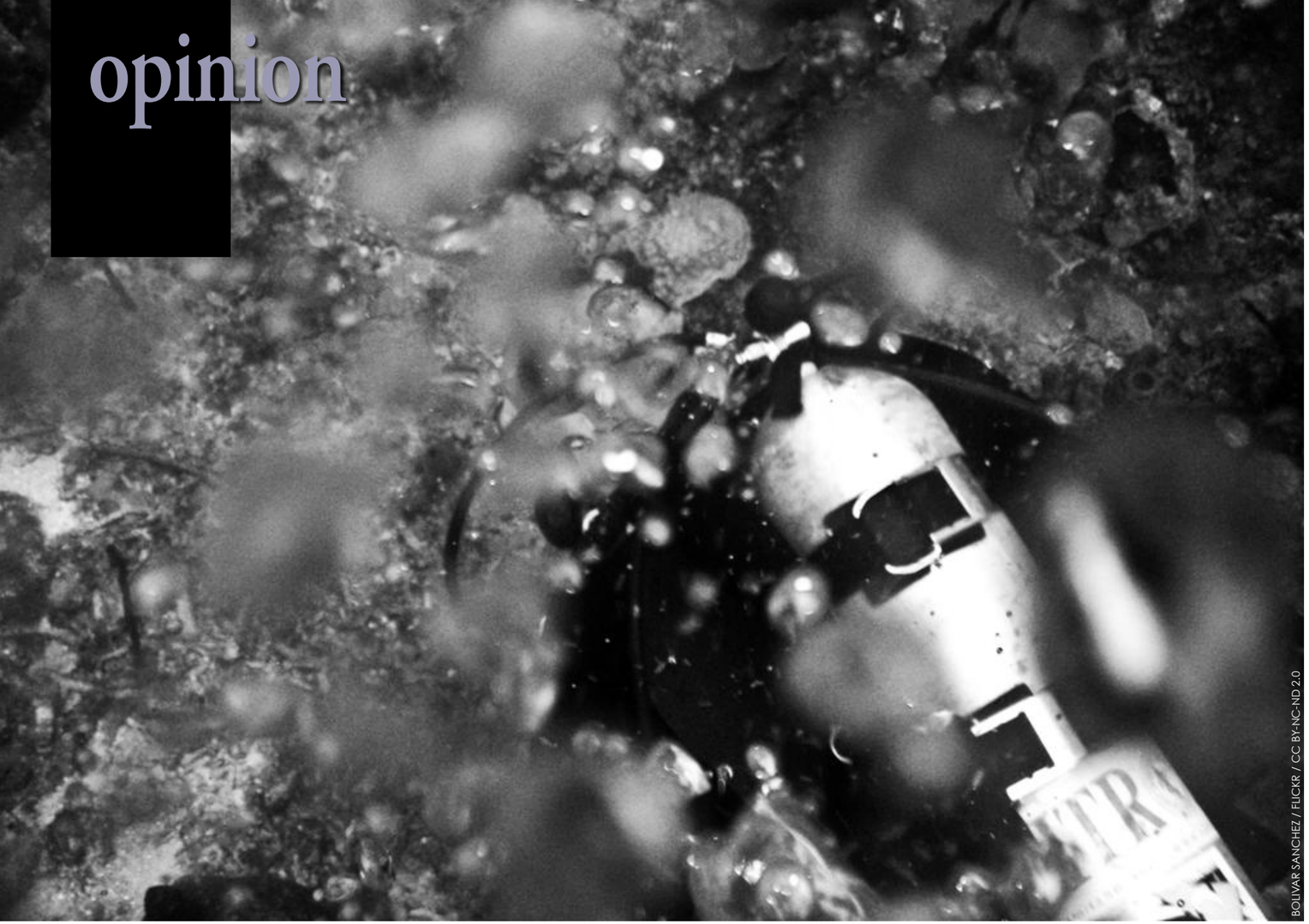
There is so much to unravel in this question. It shows how, even now, after nitrox has been widely available to sport divers for almost 30 years, there is still a lot of confusion about what it is and what it does.

What nitrox does and what it does not do

By far, the greatest benefit of diving with nitrox rather than air is the fact that with nitrox, you are breathing less nitrogen than if you were breathing air.

Assuming that the nitrox you are breathing is nitrox 32, as is almost always the case in recreational diving circles these days, then 68% of each breath you take is nitrogen rather than 79% when you are breathing air. This means that the nitrogen level in your body builds up more slowly during a nitrox dive than during an air dive. Therefore, if you are using nitrox *and* if your computer is set to nitrox, it will take longer for you to arrive at your no-decompression limit than if you were breathing air.

If you are typically doing dives on air where your dive time is dictated by your no-decompression limit rather than your air supply—that is, you are coming up from your dive with plenty of air left because your computer is showing that you are about to go into deco—then switching to nitrox will give you longer dives. However, if you are typically ending your dives when you run low on air and still have



BOLIVAR SANCHEZ / FLICKR / CC BY-NC-ND 2.0

plenty of no-decompression time remaining, then switching to nitrox will make no difference at all to how long your dive lasts.

Switching to nitrox has absolutely no effect on how quickly you use up your breathing gas. There are plenty of techniques that *will* help you reduce your consumption rate, but that is a separate discussion. My book *Scuba Confidential* has a whole chapter on it.

Why a nitrox course is a good thing to do

So, should you do a nitrox course? Yes, you should, and this is why.

As you gain more diving experience, you will reach a point where two things start happening. First, you no longer use up your breathing gas as fast as you did in the beginning; and second, you start doing deeper and more challenging dives. This is when you will want to use nitrox to give you more dive time.

As you get more experienced and begin to travel farther afield to dive, you will probably start doing extended trips with three, four, even five dives a day. Using nitrox with schedules like these will extend your dive time, which is especially true on later dives in the day when your no-decompression time on air may become quite short.

If your dive partner is using nitrox, then, no matter what your consumption rate is, it is good for both of you to be on nitrox, so that your computer profiles match as closely as possible. If you are both breathing the same gas, you will have a good idea of your partner's remaining no-decompression time, simply by looking at your own computer. If one of you is using nitrox and the other is using air, then, especially if you are doing multiple dives in a day, the remaining no-decompression time figures on your respective computers will be very different.

Here is a good example of what can easily happen when you have a team of divers, some of whom are using air and others nitrox. It happened when I was diving in Lembeh Strait a few years ago. There were six divers in our group. Two of the diving pairs were using nitrox 32; the third pair was diving on air. It was the second dive of the day, and we were diving a site where the seabed was at a constant depth of 20m (66 ft) or so.

Of course, this being Lembeh Strait, we found lots of cool critters, and everybody got carried away taking pictures. The air divers forgot to check their gauges, probably assuming subconsciously that they still had plenty of no-decompression time left because nobody else in the group had started ascending. Perhaps they had their computer alarms switched off too, or maybe they ignored them. As for the nitrox divers, they forgot that they had air divers in the group and assumed that if they had plenty of no-decompression time left, then everybody did.

It was only when the group returned to the anchor line that the air divers glanced at their gauges and noticed to their horror that they had accumulated a huge decompression burden. Fortunately, as the

ANDREW SNAPS / FLICKR / CC BY-NC-ND 2.0

team had stayed together, the nitrox divers were able to stay with the air divers and help them out with gas sharing during their extended stops and everyone was fine. But it was a good reminder for all of us. From then on, we always made a point of double-checking between buddy teams during our dives.

What else nitrox can do

Using nitrox can also help you add an extra margin of safety to your diving. If you are older or out of shape (or both), or if you are any age or shape and just want to dive conservatively, especially if you are on a trip where you will be doing multiple dives over multiple days in a remote area far from a recompression chamber, then a great technique is to use nitrox and have your computer set to air.

You will not benefit from the extra no-decompression time that diving with nitrox can offer, but, on every dive, you will be building in a margin of safety as far as decompression sickness is concerned, as your computer thinks you are breathing 79% nitrogen with each breath, when in fact you are breathing only 68%. This is a completely safe procedure to follow as long as you never exceed the maximum operating depth (MOD) of the nitrox.

This maximum depth for nitrox 32 depends on what maximum PO_2 you choose and set in your computer, as follows:

Max PO_2 = 1.4 / MOD = 33m (110ft)
Max PO_2 = 1.5 / MOD = 36m (120ft)
Max PO_2 = 1.6 / MOD = 39m (130ft)

Myth or reality?

A couple of final points. In the early days of sport nitrox diving, it was thought that diving with nitrox would make a diver less susceptible to narcosis. However, research subsequently showed that this is not the case, even though nitrox has a lower nitrogen content. This is because oxygen under pressure produces narcosis too. So, you must be equally vigilant on deeper dives, whether you are breathing air or nitrox.

However, another claim made for nitrox—that you are less tired after a nitrox diving day than after an air diving day—is a matter of debate. Scientific experiments have failed to find any objective proof that this is the case, but I remember when I ran liveaboard trips in the past and everyone was using air, some divers found it hard to keep their eyes open during dinner and by 8 p.m. we were all in bed. Nowadays, when everyone is using nitrox, the chatting and storytelling goes on long after the crew has cleared the dishes.

I notice the difference. See if you do too. ■

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

NEW 4 in 1!

Simon Pridmore has released a new single-volume e-book, bringing together four books in his bestselling *Scuba* series:

- ***Scuba Fundamental – Start Diving the Right Way***
- ***Scuba Confidential – An Insider's Guide to Becoming a Better Diver***
- ***Scuba Exceptional – Become the Best Diver You Can Be, and***
- ***Scuba Professional – Insights into Sport Diver Training & Operations***

As Simon puts it, this is "a remastering and repackaging of the original albums rather than a greatest hits." Nothing is missing. *Scuba Compendium* gives e-book readers the advantage of being able to access all the knowledge contained in the four books in one place, making this a unique and easily searchable work of reference for divers at every level.

Simon has always promoted the idea of safer diving through the acquisition of knowledge, which is why he has chosen to release this highly accessible version. If you have read his work before, you will know that he provides divers with extremely useful advice and information, much of it unavailable elsewhere; his points often illustrated by real life experiences and cautionary tales. He examines familiar issues from new angles, looks at the wider picture and borrows techniques and procedures from other areas of human activity.

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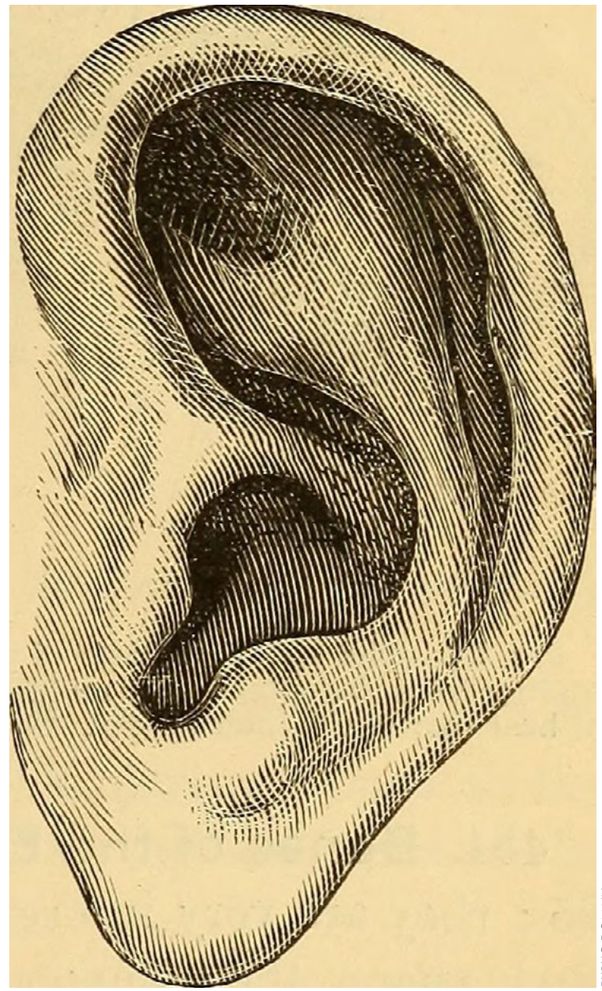
ASIN: B09DBGHJSC

simonpridmore.com



The Outer Ear, from *Anatomy, Physiology and Hygiene*, by Charles Henry May (1890)

PUBLIC DOMAIN

Ear Problems in Diving

Part I: The Outer Ear

Text by Michael Rothschild, MD

Many people suffer from ear problems during and after diving. Technical rebreather diver and underwater photographer Dr. Michael Rothschild is an ear, nose and throat specialist in New York City. In this series, he walks us through some of the common causes of dive-related ear problems, and how to treat and prevent them.

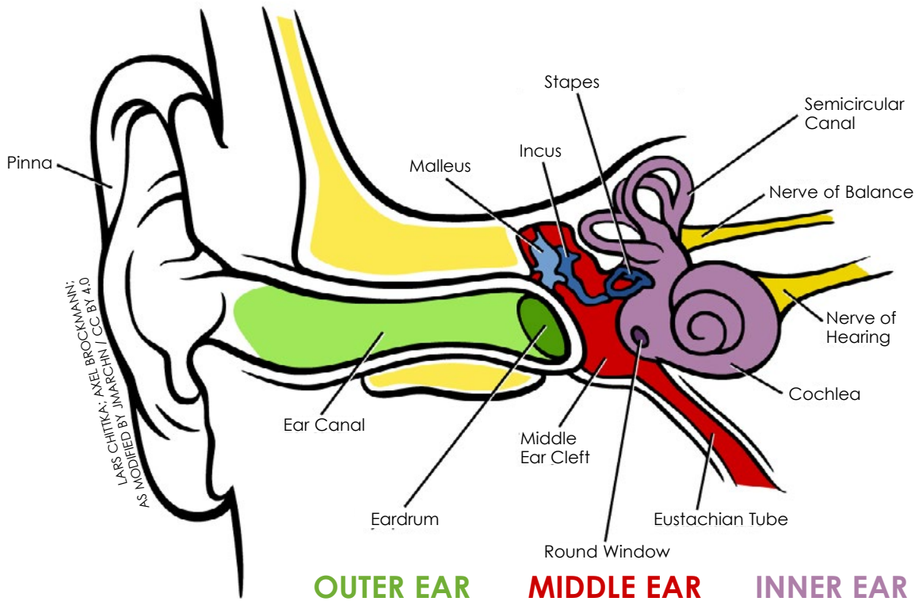
Introduction

I am an avid scuba diver and an ear, nose and throat specialist, which means that I end up answering a *lot* of questions about this topic! The majority of medical problems encountered by divers involve the ears. While they are rarely as serious as decompression sickness or other life-threatening conditions, they are incredibly common and can ruin a dive trip.

The ear is uniquely positioned to be vulnerable to both external and internal injury in this sport. Furthermore, there is a great deal of confusion about the nature of these problems—the relevant anatomy, the causes of symptoms and the best treatment.

To make things worse, even people who have obtained medical care may have no better understanding of the source of their pain, dizziness or hearing loss. This is because even for many brilliant and experienced general physicians (GPs), the ear can be difficult to examine. And while pediatricians generally have a lot of ear experience, they rarely treat scuba divers. I realize that this might sound arrogant on my part—believe me, I am humble about my own skills and deferential to GPs who must be able to manage a wide range of life-threatening conditions. However, the fact remains that many doctors who are not otolaryngologists (ENTs) do not have the specialized equipment or experience necessary to clean the ear thoroughly, to examine the eardrum under high magnification, and to test hearing in a comprehensive manner.

One of the greatest sources of confusion is the fact that the outer ear, middle ear and inner ear—which are completely different systems that have very little to do with each other—often can give rise to similar symptoms such as ear pain, vertigo or hearing problems. In this series of articles, I will review each of these anatomical areas, and describe how diving can affect them. In this first part, I will discuss problems of the outer ear.



Problems of the outer ear

The outer ear refers to the part of the ear that sticks out of the head (the pinna) and the hole that leads to a tube (the ear canal) that ends at the eardrum. It is basically a pocket of skin, and it is where earwax (cerumen) is created and accumulates. Cerumen is a normal substance that protects the ear canal—it is generally just a thin layer coating the walls, but some people accumulate large amounts of it. It consists of dead skin, mixed with various oily secretions from glands in the outer ear.

When water gets into the ear from swimming or diving, it gets into the ear canal. Unless there is a hole in the eardrum, the water from swimming or diving does not enter the middle ear.

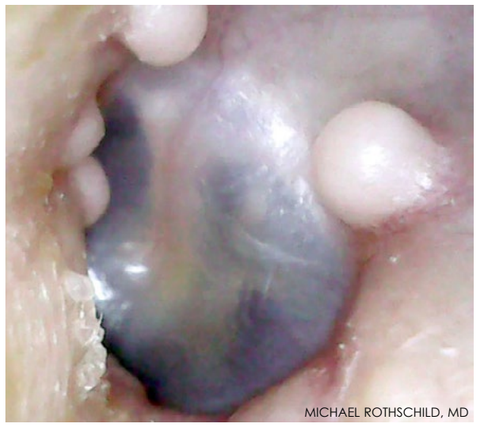
Swimmer's ear. Water from swimming or diving can get stuck in the external ear canal, especially if there is a lot of earwax. Furthermore, wet earwax takes a long time to dry out. Just like in cases of diaper rash or athlete's foot, when an area of the body stays damp and dirty, it can lead to chronic inflammation and swelling. This can cause skin breakdown and infection (usually with the pseudomonas bacteria that normally lives in this area). This inflammatory condition of the outer ear is called "swimmer's ear" or otitis externa, and it can be extremely painful.

Surfer's ear. Some people develop bony growths, known as osteomas, in

Ear Problems

SKYLER SION / PEXELS

their ear canals. These are thought to be more common in cases of long-term exposure to cold water, hence the name "surfer's ear." They can trap earwax and water if they get big enough. The growths occasionally require surgical removal. Below is a photograph of my own ear canal, showing this condition. Just like you do not need to play tennis to get tennis elbow, you can see from this picture that you do not need to surf to get surfer's ear!



MICHAEL ROTHSCHILD, MD

Surfer's ear

Treatment of swimmer's ear

Treatment of swimmer's ear often requires carefully cleaning the wet debris from the ear canal to allow the ear to dry. This is best done by an ENT doctor using a microscope and small ear tools, under direct vision. This will also allow for a high magnification inspection of the eardrum, to rule out a perforation or other middle ear problems. Once the ear is clean, medicated ear drops are used, generally those containing an antibiotic to kill the bacteria, and a steroid to help with the swelling and pain.

It is important to keep the ear dry during healing, although this may be difficult on a long-anticipated dive trip! Earplugs can help keep water out with swimming or showering, but they can cause problems if used while diving. Even the ventilated type can lead to pressure-related injury (barotrauma) of the outer ear. Spending a day out of the water is a better approach to this problem.

Prevention of swimmer's ear

Disimpaction. Thorough disimpaction of large accumulations of cerumen (under direct vision, ideally with a microscope) will help avoid water trapping and prevent swimmer's ear. But overly aggressive and frequent ear cleaning, especially with wax-dissolving drops, can actually make the situation worse by removing the protective layer of cerumen.

Hydrogen peroxide can help remove debris from the ear canal if medical care is unavailable and if there is no significant outer ear infection or suspicion of perforation. Lie on your side, with your ear canal facing up, and fill it with this solution. Use a fresh bottle; it tends to go "flat" if it has been sitting around open for any length of time. You should hear the roar of bubbles as it reacts with the contents of the ear canal. Let it sit for two to three minutes, opening and closing your mouth occasionally, or tugging on your ear to help it get all the way into the ear canal. Again, do not overdo this; one treatment should be enough in simple cases of cerumen impaction.

Drying the ear. Drying the ear after swimming can help prevent swimmer's ear as well. A good way to do this is with a dedicated device (such as the Mack's Ear Dryer), which blows a gentle stream of warm air into the ear canal. While a hair dryer can be used, an ear dryer is safer and directs the correct temperature air directly into the canal. Interchangeable tips can let family members share the device without sharing infections.

Ear sprays. There are some commercial sprays that will help prevent the swelling and breakdown of the ear canal skin by coating it lightly. There are several brands available, such as "EarShield" or "EarPro." These are helpful on a dive trip with prolonged water exposure, but they should not be overused, or used if there is already an outer ear infection.

Alcohol and vinegar solutions. Another approach to prevention of swimmer's ear is the use of five to ten drops of a solution of rubbing alcohol and white vinegar after diving. Add three tablespoons of vinegar to a pint of alcohol to make this mixture. Some people recommend a 50-50 combination, but ideally there should be very little water in the solution, and vinegar is mostly water. The alcohol dries the ear, while the vinegar makes the ear canal more acidic, which makes it harder for the pseudomonas bacteria to grow. You need very little vinegar for this purpose. And a few drops of glycerine in the mix can help prevent over-drying.

One easy way to make this is to add a small amount of white vinegar to commercially available solutions like "Swim-Ear." This is 95% isopropyl alcohol and 5% glycerine. A half of a teaspoon of vinegar added to the one-ounce bottle is enough.

Avoid overuse of this solution, as it can overdry the ear, breaking down the protective layer of earwax and causing irritation—no more than once or twice a day. If medical care is not available and there is no concern about an eardrum perforation, this solution may be used to treat swimmer's ear, but antibiotic and steroid drops are a better option. Cotton tipped applicators should never be used—they tend to pack the wax into the ear canal and can cause permanent injury if they touch the eardrum.

Conclusion

Most ear pain after diving goes away by itself in a short time. However, without an examination, a diver may not be able to tell whether the problem is in the outer or middle ear, and treatment depends on accurate diagnosis. Thorough evaluation of persistent ear problems should be done by a doctor with the tools and experience necessary to distinguish outer, middle and inner ear disease. ■

Check this space again to learn more. Next time, Dr. Rothschild discusses problems of the middle ear and how to treat them. For more information, please visit: ***dive.rothschilddesign.com***.

Text by
Catherine
GS Lim

Male dolphins form lifelong bonds

Male bottleneck dolphins have been observed working together to boost their chances of finding mates.

Researchers have discovered that male bottleneck dolphins form long-term social groups to help one another find mates and fight off competitors. It was the first time such behaviour was observed in the animal world.

Their conclusions were based on data collected of 202 Indo-Pacific bottlenose dolphins between 2001 and 2006 in Shark Bay, Australia, using visual and auditory data. In the lab, the researchers then focused on studying the interactions of 121 individuals for the next decade.

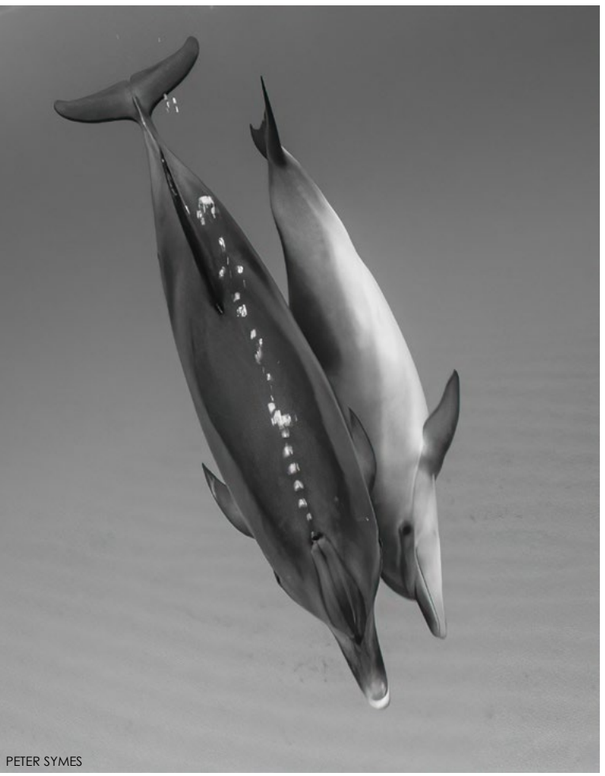
Their findings was published in the *Proceedings of the National Academy of Sciences* journal.

They discovered that the male dolphins formed alliances among two or three members, and the groups might grow up to 14 members. Such alliances, which lasted for decades or their entire lives, were formed when the dolphins were still young.

"These dolphins have long-term stable alliances, and they have intergroup alliances. Alliances of alliances of alliances, really," said lead author Dr Richard Connor, a behavioural ecologist at the University of Massachusetts Dartmouth.

Within the groups, the members helped one another find mates, even to the extent of "stealing" females from other dolphins and even defending against "theft attempts."

Stephanie King, professor in animal behaviour at Bristol University, elaborated: "What happens as a male, you might be in a trio, herding a female. And if someone comes to take that female, the other males in your team and your second-order alliance come in and help you."


PETER SYMES

Dolphin BFFs?

Helpful alliances

If there was a possible threat, two second-order alliances would combine to form a larger alliance. The researchers observed that every male was directly connected to 22 to 50 other dolphins.

King added that it was their cooperative relationships, rather than alliance size, that determined their breeding success.

The researchers said this is the only non-human example of these kinds of strategic multilevel alliances to have been observed. They suggested that the dolphins' large brains enabled them to keep track of the different relationships.

"I would say that dolphins and humans have converged in the evolution of between-group alliances—an incredibly complex social system," said Connor. ■

SOURCE: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (PNAS)

shark news

Edited by
Peter Symes

MARK BUSSE / FLICKR / CC BY-NC-ND 2-0

Whale sharks also eat veggies

In addition to gulping down enormous mouthfuls of krill (tiny shrimplike crustaceans), whale sharks also swallow huge helpings of seaweed.

Australian marine scientists have discovered that the massive whale shark also eats plants, making it officially the largest omnivore on Earth.

As the evolution of a very large body size requires a ubiquitous and abundant source of food, the consumption of plants could present an energetic challenge for these animals unless some components can be digested.

While previous studies have found seaweed in whale shark stomachs, a new study by a research team, led by University of Tokyo biologist Alex Wyatt, suggests they might in fact ingest such algae as a dietary staple.

Careful investigation of blood and tissue samples from over a dozen whale sharks suggests that they actually have a pretty omnivorous diet that includes plants and algae.

The team found that whale shark tissues were rich in specific fatty acids and other compounds found in relatively high proportions in Sargassum—a type of brown seaweed that breaks off of the reef and floats at the water's surface at Ningaloo.

The findings were somewhat surprising as their tissue does not have the fatty acid or stable isotope signature of a krill-feeding animal. Though samples of collected whale poo showed that whale sharks were indeed eating krill, their tissues indicated that they did not metabolise much of it.

Instead, the fatty acid profiles in their tissues, faeces and potential prey items suggest that the floating macroalgae, Sargassum, and its associated epibionts are a significant source of food. An epibiont is an organism that lives on the surface of another living organism, and is, by definition, harmless to its host. ■

SOURCES: ECOLOGICAL MONOGRAPHS, ECOLOGY

Greenland shark shows up in the Caribbean

A Greenland shark, or a hybrid between the Greenland shark and Pacific sleeper shark, was captured over the insular slope at Glover's Reef, a coral atoll in Belize.

Devanshi Kasana, a Ph.D. candidate in the Florida International University (FIU) Predator Ecology and Conservation lab, was working with local Belizean fishers to tag tiger sharks when the surprise discovery was made.

While the exact species could not be confirmed, it is most likely a Greenland shark (*Somniosus microcephalus*) or a hybrid between the Greenland shark and the Pacific sleeper shark (*Somniosus pacificus*). This is the first record of a sleeper shark in the western Caribbean region and further supports the hypothesis that these sharks, best known as being from the polar and subpolar latitudes, occur at depth in tropical regions.

"At first, I was sure it was something else, like a six-gill shark that is well known from deep waters off coral reefs," Kasana said. "I knew it was something unusual and so did the fishers, who hadn't seen anything quite like it in all their combined years of fishing."

Enigma

Greenland sharks remain somewhat of an enigma to science. Because little is known about them, that means nothing can be definitively ruled out about the species. Greenland sharks could possibly be trolling the depths of the ocean all across the world.

The waters where Kasana and the fishermen found the shark certainly get deep. Glover's Reef Atoll—part of the Glover's Reef Marine Reserve World Heritage Site, a marine protected area—sits on top of a limestone platform, forming a lagoon surrounded by a coral reef. Along the edges of the atoll, there's a steep slope that drops from 1,600ft to 9,500ft deep, which means there is cold water needed for a Greenland shark to thrive. ■

SOURCE: MARINE BIOLOGY, FLORIDA INTERNATIONAL UNIVERSITY

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Do What You Teach

& Teach What You Do

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Text by Mark Powell

Very often, you will come across examples in scuba education where what is taught does not match up with what divers do in real life. Mark Powell provides insights for new divers and tips for dive instructors.

Sometimes, an instructor will acknowledge that what they are teaching is not what they actually do themselves. How many times have you heard an instructor say, "I have to cover this, but it is not how it really works" or "The manual says this, but in the real world, we would do something different."

It is even worse when the instructor insists that a procedure is absolutely essential, but when they go diving for themselves, they skip it or do something completely different. This is a very dangerous trend in teaching.

If you are teaching one thing but doing another, then it undermines the confidence that the student has in other aspects of your teaching. If you tell a student they should never do something, but then they see you doing it, it calls into question all the other things you have said they should never do.

If you do not "do what you teach" or "teach what you do," then one or the other is incorrect. If what you are teaching is correct, but what you are doing is incorrect, then change what you do. However, if what you are doing is correct, but what you are teaching is incorrect, then change what you are teaching.

Buddy checks

A good example of this is the way we teach buddy checks. All agencies teach that divers should do a buddy check before each dive. There is plenty of research from aviation, medicine and many other areas which show that having a "checklist" approach is one of the most effective ways to spot potential issues before they occur. Yet, most divers drop the idea of a buddy check as soon as

DAVE HERHOLZ / FLICKR / CC BY-SA 2.0

they finish their training.

One of the reasons for this is that most instructors do not perform a buddy check when they are diving, and even if they do a buddy check, it is very different to the one they teach. They do not "teach what they do" or "do what they teach."

This leads to the situation where a buddy check is seen as something that is only done in training or is only done by inexperienced divers. This completely defeats the objective of teaching a buddy check.

Everyone should do a buddy check before each dive. As you become more experienced, you may get complacent and forget a basic step, so buddy checks are still essential for the most experienced diver.

The problem is that we do not teach "realistic" buddy checks. We do not teach what we do. Some agencies insist on a rigid buddy check in order to help the student remember the process. Unfortunately, this leads to a rigid, formulaic approach that is not realistic.

Real-world examples

I remember one instance where I was teaching a Course Director course, and an aspiring course director, enrolled in the course, started to demonstrate a buddy check. This aspiring course director was an experienced diver and instructor as well as a very experienced technical instructor. I had seen him do plenty of effective, realistic buddy checks in the past. However, as soon as he started demonstrating the buddy check, he turned into a robot, going through a very rigid and unrealistic process that I had never seen him do in real life.

Afterwards, I asked him why he had demonstrated it that way and he said, "I thought that was how we were supposed to teach it." He recognised all the disadvantages of teaching it that way, understood that it was not effective, and agreed that it caused divers to drop the practice as soon as they finished their course, but thought he had to do it that way anyway.

The other disadvantage of this approach is that it focuses on the procedure rather than on the intended result. The intended result of a buddy check is, of course, to spot any potential problems. Divers and their buddies are so focused on following the procedure that they often do not spot obvious problems.

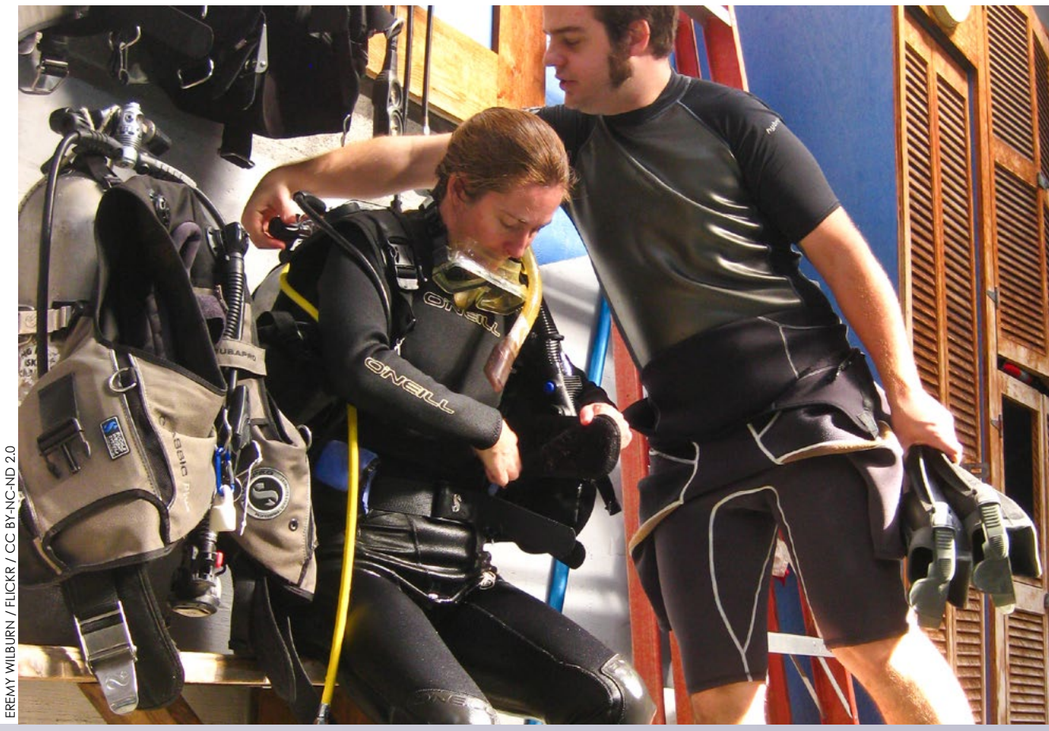
Real-world examples of this, which I have seen, include a diver saying, "My drysuit inflator is here and is working," when the hose is not even attached. I have seen divers point to their BCD belt buckle while saying, "This is my weight belt." I have also seen divers doing what appeared to be a perfect buddy check without them or their buddies realising that their air was not turned on. Finally, I have seen divers complete a buddy check, turn around and jump into the water without either them or their buddy noticing that their drysuits were open, or in one case, that they were not wearing any fins. They completed the procedure but completely failed to achieve the objective.

A different approach

One technique I use when teaching is to think of a buddy check as a game. Assume your buddy has made a mistake with his or her equipment, and your challenge is to find it. It can become quite competitive, with divers being extremely careful to check their own equipment before the buddy check to make absolutely sure that there is nothing for their buddies to pick up on, while the buddies look at every bit of kit with eagle eyes in the hope of finding some mistake that has been overlooked.

This has the advantage of building the right mindset in both divers. You end up with divers who are very careful about putting together their own kit and doing a buddy check on themselves, but you also develop divers who are constantly looking at other divers' kit and will often identify problems in divers other than their buddies.

I also show students how I would do a buddy check in the real world, and how I would deal with the real-life challenges. For example, what if you are buddied with a diver that trained with a different agency and uses a different acronym? I am lucky



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DAVE HARRISON / FLICKR / CC BY-NC-ND 2.0

to have trained with a number of different agencies and dived with divers from even more, so I have come across ABCDE, BAR, BWRAF, SEABAG and many other approaches to doing a buddy check.

It would be great if we all had the same way of doing a buddy check, but this is not the case. I am happy to follow the process or abbreviation that other divers prefer, if that makes it easier for them, as most of the approaches cover the main points. I also add in my own final sanity check of considering what has not been checked, and finally giving the diver a thorough look from head to foot, to spot anything that just does not look right.

But what if you are on a boat and cannot stand right in front of your buddy to do the buddy check? Many divers are taught to pick up the components of their buddy's kit and physically test it. This is fine when you are in close contact, but what if you are on the other side of the boat? In addition, some divers do not like other divers touching their equipment and are not comfortable with this approach. I do not mind who is checking the equipment as long as I am confident that it has been checked.

By adopting this approach, I have found that divers are much more likely to perform a buddy check and are happy doing it with divers from different agencies. It also means that if I am diving with any of my students, they see me doing what I taught them.

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Solo diving

Another good example of "do what you teach" and "teach what you do"—or rather, a good example of breaking this approach—is solo diving. For years, instructors have taught that solo diving is bad and should not be done under any circumstances. Then, on their days off, they have gone solo diving; divemasters on dive boats have dived down on their own to tie in a line or release a line; instructors are told that it would be unsafe to dive alone, but they can take in a student on their first dive, and that is perfectly safe.

If instructors, divemasters and experienced divers are doing this on a regular basis in private, why do those same divers insist it is unsafe in public? Despite teaching one thing, they are clearly doing another. This is hypocritical and does not meet the "do-what-you-teach" and "teach-what-you-do" approach.

If instructors genuinely believe that it is acceptable for them to solo dive, then they must stop telling their students that it is unacceptable. Rather, they should be teaching that solo diving has a number of risks, but these risks can be mitigated by an experienced diver with the right experience, training and equipment.

On the other hand, there may well be instructors that do believe that solo diving is not safe and teach that divers should always dive in the buddy system. In this case, those instructors need to specify that diving in the buddy system is more than just diving with a random buddy. A buddy should be able to assist you in an emergency, have a similar dive plan, and have similar equipment configuration.

Teaching tables and using them

How many instructors teach tables during their open water course? How many use tables themselves? If they are teaching tables but not using them, this is not a good example of "doing what you teach" and "teaching what you do." So, why do many instructors still insist on teaching tables even if they do not use them themselves?

Many diver-training courses can trace their origins back to the '60s, '70s and '80s when dive computers were not available to the average

DANIEL KWOK / FLICKR / CC BY-NC-ND 2.0

recreational diver, and dive tables were the only options. As a result, courses included how to plan your dive using tables.

Even during the late '80s and '90s, when dive computers started to trickle into the recreational diver market, the computers were not that reliable, and so dive tables were still the preferred option. However, since the mid '90s, personal dive computers have become much more reliable and have become almost universal. Despite this, diver training is still focused on teaching dive tables.

This causes a number of issues. First, using the tables are a moderately complicated process, and it can confuse some students, especially if the instructors themselves do not use the tables and give a weak explanation. Secondly, most divers do not regularly use their tables, and so quickly forget how to use them.

The biggest issue though, is that with dive computers becoming more affordable, reliable and popular, it has become normal for divers to buy a dive computer as one of the first bits of dive equipment they buy. So, they would be taught to use tables but then immediately switch to using a computer. This means that we have a situation where the instructor says divers must use tables, but they only have a brief introduction to the tables and do not use them frequently, so the students quickly forget how to use them. At the same time, they have bought a nice dive computer, but they do not know how to use it, and so misuse the computer.

If the instructor does not use dive tables to plan their dives, why should they insist that the students plan their dives using tables? If they use computers to plan and execute their dives, then they should be teaching their students how to safely plan and execute their dives using a computer.

Deco tables and dive computers

Some instructors insist that divers should understand decompression tables before they can use a dive computer, so that they understand the principles behind how the computer works. This has two problems: The first is that dive students do not understand it—most divers do not leave their training with a good understanding of how tables work; and the second is that even if dive students understand how to use the tables, it does not mean that they understand the underlying concepts or can apply them to dive computers.

It would be better to save the time that is taken in teaching how to use the tables, and instead, use that time to teach the basics of decompression theory, and most importantly, how to plan and execute a dive using a dive computer.

If you are an instructor, I would encourage you to think about what you are teaching and ask yourself, "Is this what I actually do?" If there is a mismatch, ask yourself, "Is what I am teaching wrong, or is what I am doing wrong?" Then, do something about it.

If what you are teaching is wrong, then change what you are teaching. If what you are doing is wrong, then change what you are doing. As instructors, we are role models and have a huge impact on the divers we teach.

Teaching students to do the wrong thing, or doing the wrong thing ourselves, and by implication, teaching them that they can ignore the safety rules, can have huge consequences on dive safety. As role models, we need to be setting the example, and encourage the right behaviour at all times, rather than sabotaging it. ■

Mark Powell is the author of Deco for Divers: A Diver's Guide to Decompresson Theory and Physiology *and* Technical Diving: An Introduction. *For more information on any aspect of technical or recreational diving, please contact him at:* ***dive-tech.co.uk***

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COURTESY OF GEORGE WOOKEY

Historical photo from the 1950s, showing Royal Navy diver George Wookey preparing to descend

Deep Diving: 100 Fathoms Down!

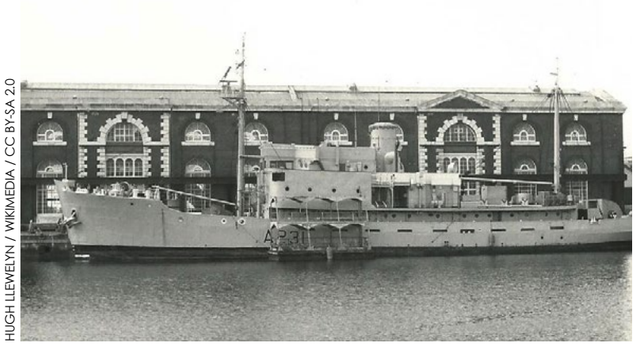
— *Interview with Royal Navy Diver George Wookey*

Text by David Strike

Up until the '60s, the major advances in diving technology were driven by big-budget military programmes. Extending the depth limits to which divers might safely go—and still be capable of performing meaningful work when they got there—had a practical purpose. David Strike has the story, as told by George Wookey.

Submarine rescue and recovery was the incentive behind the series of deep-diving trials conducted by the British Admiralty during the '30s, '40s and '50s. Setting out to extend the deep-diving limits, the Royal Navy programme established a world depth record in 1948, of 540ft. Wearing a Siebe-Gorman six-bolt helmet incorporating the Davis Injector system, flexible dress, and using the fast-dwindling supplies of American Lend-Lease helium, Petty Officer Wilfred Bollard set a depth record that was to last eight years. Not until 1956 would the baton pass to another.

In October of that year, Senior Commissioned Boatswain George Wookey descended to a depth of 600ft, setting a record for a helmeted diver wearing flexible dress that has never been equalled. Joining the Royal Navy as a boy, about a year before the beginning of World War II, Wookey transferred to the submarine service, before qualifying as a diver in August 1944. Commissioned in 1948, Wookey was appointed to the Diving School on HMS *Defiance*, training "X"-Craft crews in submarine escape and boom defence net penetration, before being sent in 1949 to HMS *Reclaim*—the Royal Navy's deep-diving experimental ship for deep-diving training.



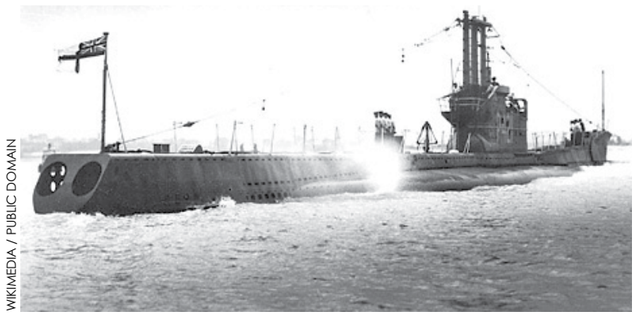
HUGH LLEWELYN / WIKIMEDIA / CC BY-SA 2.0

The Royal Navy's deep-diving experimental ship for deep-diving training, HMS *Reclaim,* at Portsmouth

It was a vessel that he returned to again in 1951, to assist in the search for the sunken submarine, HMS *Affray*, in which 75 men lost their lives entombed inside the hull. Perhaps as a natural consequence of a peacetime submarine disaster, there was an emphasis on trialling new methods of submarine rescue and recovery. In June 1956, Wookey found himself once more aboard HMS *Reclaim* for trials of the Royal Navy's new experimental one-man observation chamber.

Although the preliminary work took place at various sites off the western coast of Scotland, the deeper trials were held in the fjords of Norway where the one-man observation chamber made 37 dives to depths between 400 and 1,060ft.

"At the same time that the chamber dives were taking place," recalled Wookey, "a number of flexible-suited dives using various mixtures of oxy-helium were made to moderate depths. The existing decompression tables, however, proved inadequate with a high proportion of the dives resulting in the bends.



WIKIMEDIA / PUBLIC DOMAIN

Historical photo of HMS *Affray*, lost at sea in 1951

"Clearly more investigation was necessary. A team of physiologists from the RN Physiological laboratory re-assessed the former data, and by August 1956, a new set of tables for depths ranging from 300ft to 600ft were supplied."

At Fort William, in western Scotland, preliminary dives using the new tables proceeded normally and without incident. HMS *Reclaim* set sail for Norway, arriving at Osterfjord on 10 October 1956. Despite bad weather and the loss of one of *Reclaim's* four anchors while mooring in deep water, diving operations began. The first dive—to a scheduled depth of 450ft—resulted in Chief Diver Bob Linscott and his SDC attendant contracting bends.

"Overnight, Surgeon Commander Bill Crocker and physiologist Ray Hempleman worked yet again on the decompression tables, adjusting and extending them as necessary," said Wookey. "On the morning of 12th October, the weather had moderated, and the decision was

Deep Diving

Historical photos taken in the 1950s show Royal Navy diver George Wookey, identified with yellow circle in a group photo (right), and being dressed for a deep dive (bottom left).

COURTESY OF GEORGE WOOKEY

made to continue with the trials. The ship was re-moored in 620ft—albeit with three anchors—while diver Joe Helps dressed slowly and methodically in the tense atmosphere of the diving flat below decks.

"A heavy steel workbench was lowered to 450ft and hung suspended by the shot rope down which the diver would descend. To simulate working on the hull of a submarine, Helps was to take down a wire hawser and attach it to the workbench with two shackles. The allowed time at this depth was ten minutes," said Wookey. "Five hours later, after his dive to 450ft, both Helps and his SDC attendant were none the worse for their dive.

"The date was still Friday, the 12th of October. Our deadline was Sunday, the 14th of October, on which day the ship was scheduled to depart for our home base in Portsmouth. It was important, since we had now achieved success at 450ft, that we attempt to reach 600ft—the main object of this series of experimental dives," said Wookey. "The fact that this dive would have to be undertaken at night was of little consequence since there would be no material light—day or night—below about 200ft.

"The decision taken, the workbench was lowered to 600ft, and two submarine lamps freely suspended from the bow of the ship to 260ft and 600ft, some 50ft away from the workbench. A final analysis of the gas mixture in the main storage cylinders, and by 19:15 hrs that same evening, all was ready," said Wookey. "Normal deep-diving routines for diving deeper than 300ft was for the diver to make a normal descent on compressed air to 120ft, then wait briefly at that depth while the composition of the breathing gas was changed to 9% oxygen, 91% helium. The diver would then continue with the descent to, in this case, 600ft.

COURTESY OF GEORGE WOOKEY

The descent

With the preliminaries over and the routine tests completed, Wookey entered the water and waited, half-floating, one foot on the bottom rung of the ladder and his helmet a couple of feet below the broken surface.

"I watched the SDC—with my attendant, diver 'Geordie' Clucas, inside—slowly leave the surface, bubbles gushing briefly from the opened lower hatch as the rising air pressure within kept out the invading water," said Wookey. "Then suddenly the SDC vanished below me, the drone of the winch and the purchase wire, not two feet away, speeding it into the water to 220ft, where Clucas would await my return from 600ft.

"The order, 'On to the shot rope and carry on down,' boomed over my intercom. Sliding down to 120ft took less than one minute and the order to 'Stop! Remove mouthpiece and start counting' came as no surprise, for this is where my normal air supply, i.e. nitrogen/oxygen, would be substituted by the appropriate mixture of helium and oxygen," said Wookey. "Helium is, of course, lighter than the nitrogen it replaces—approximately seven times lighter—and the vocal effects are quite startling making speech difficult to interpret by those unaccustomed to it.

"Regain mouthpiece and carry on down," came the next order, said Wookey. "Already, it was much colder as the helium permeated my system.

"Within seconds, my heavily booted feet were clanging on the side of the SDC where Clucas waited in his solitary confinement. He waved through the open lower hatch as I sped past, the light from within dazzling me briefly and then rapidly diminishing as I left it far above me," said Wookey. "The water turned from a bright, crystal-clear green to a deepening opaque, then finally, and quickly, complete blackness.

"Gradually, I found my descent slowing and my legs tending to float upwards as I slid down the shot rope, and I realised that my new-found buoyancy was due to the increasing length of umbilical hose being paid out by my attendants on the surface," said Wookey. "I knocked hard on my relief valve inside the helmet, releasing as much gas as I could. Soon I could distinguish a faint, intermittent glow that increased steadily as I pulled myself down, hand over hand, to the workbench at 600ft.

THE EQUIPMENT

The Siebe-Gorman Injector type equipment worn by George Wookey on his record-breaking descent differed from the standard (i.e. the Davis six-bolt) diving dress, and was specially designed to reduce the carbon-dioxide content of the gas breathed by the diver to the minimum.

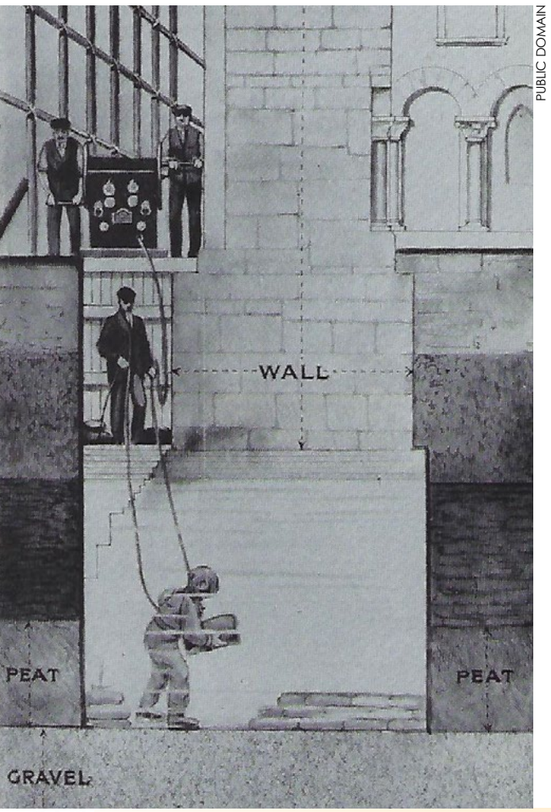
The Deep Diving helmet is slightly larger than the ordinary, has connections for two "air" pipes, neither of which is fitted with a non-return valve, and incorporates a special outlet valve to vent air quickly from the system. Breathing gas enters the helmet through one connection and is guided over the front glass by a rubber air-chute. A mouthpiece fitted with a non-return valve enables the diver to inhale air from the helmet and to exhale through the mouthpiece.

Expired gas exits through the second pipe and passes into a weighted canister containing a CO_2 absorbent cartridge mounted on the diver's back in lieu of the usual backweight. The "scrubbed" gas then re-enters the helmet. A bypass valve attached to the canister and mounted on the wearer's right-hand side allows the diver to manually control the gas flow and determine whether gas enters the helmet directly or through the injector system. ■

From 1906 to 1911, former Royal Navy diver William Walker (chief diver of Siebe, Gorman & Co.), worked in complete darkness for six hours a day, moving and placing an estimated 25,800 bags of concrete, 114,900 concrete blocks and 900,000 bricks, to save one of Europe's largest Gothic cathedrals, Winchester Cathedral, from collapse (right and bottom left).

PUBLIC DOMAIN

"At last, I had made it. 'On the bottom,' I reported. A remote voice jerked my mind back to the job in hand, 'Your gauge depth is 600ft. Carry on with your work.' The screwed shackles secured by the previous diver had been screwed up tightly and seized with rigging wire. My exposed hands were fast becoming numb. Cold crept steadily through me, and I had a passing thought, 'One of these days, they'll invent heated suits!' [ed. — Water temperatures in Norway in October 1956 was approximately 1°C]



PUBLIC DOMAIN

"After what seemed a lifetime, the job was done and I reported, 'Job completed,'" said Wookey. "The order, 'Stand by to come up', reached me. I tried to clamber onto the top of the workbench, but for some reason, I was being restrained—the slack telephone breast rope secured to my helmet had caught under the suspended bench, and as those on the surface pulled, I was being dragged under the bench.

"After a frightening few minutes of struggle to clear myself, and not being able to make myself understood over the intercom, I was, at last, free and hung there briefly, exhausted, before the long ascent to my first decompression stop at 260ft," said Wookey. "This was to take 12 minutes, and allowed plenty of time for reflection… Thankful that I had been able to pull myself clear of the bench; elated that we had been able to prove that a diver could do useful work, possibly vital to a damaged submarine, under difficult conditions at 600ft; and finally, that I had achieved a personal ambition of many years standing.

"The increasing cold brought me back to reality," said Wookey. "I had never been so cold in my life, and my exposed hands were really hurting. My fingers seemed swollen to the size of sausages.

"By 10ft stages, I reached 220ft, where I remained hanging on to the steel ladder suspended from the opened lower hatch of the SDC," said Wookey. "After ten minutes, the SDC was raised to 210ft where Clucas waited to assist me into the SDC.

"'Let me be the first to congratulate you, George!' Clucas said as he removed my helmet—releasing air line and telephone breast rope from the helmet so that they might be pulled to the surface, then shutting the lower hatch and enclosing us both within the confined space of the SDC," said Wookey. "At 200ft, the gas mixture reverted to oxygen/nitrogen. The SDC was then hoisted inboard with Clucas and me remaining inside to complete our tediously long decompression in ten-foot stages to 30ft.

"The last decompression stop at 10ft seemed interminable, but was in fact only 30 minutes," said Wookey. "I had become numb to the discomfort after about six hours since leaving the surface, and I was so cold!

"Slowly, the pressure dropped to atmospheric, and I stretched upwards to hammer the clips off the upper hatch of the SDC when, to my dismay, I felt the distinctive pain creeping along my arms and across my back," said Wookey. "I felt transfixed and scared, having had several bends in the past, the last serious one having landed me in the hospital. I knew what a bend in the back could mean.

"Clucas scrambled over and past me and through the upper hatch. 'Better haul him out quickly!' I heard him say," said Wookey. "Four hands grabbed me by my upraised arms and yanked me bodily out of the SDC, and I followed headlong into the main RCC after Clucas. The door slammed shut, compressed air screamed into the RCC, and within seconds, the quickly mounting pressure slowly began to relieve the now intense pain in my arms and back.

Wookey said, "Five hours later, at 07:35 on the 13th of October, I crawled tiredly out of the main recompression chamber and into a hot tub in the sick bay."

Wookey had proven that it was possible for a flexible-suited diver operating from the surface to do useful work perhaps vital to a sunken submarine, and in depths that just a few years previously was thought to be impossible. His efforts were honoured with an MBE.

During 1957, the Royal Navy abandoned this form of deep diving as being too hazardous to the individual diver and concentrated efforts instead on developing the principle of diving from a manned underwater capsule from which a diver could emerge at the operating depth on the end of a short umbilical, whilst closely attended and observed from within the capsule.

"Such," said Wookey philosophically, "is progress!" ■

The Diver Who Saved a Cathedral

With one of Europe's largest Gothic cathedrals in danger of collapse when its 11th-century foundations began to sink into the peat bed on which they rested, the authorities in charge of Winchester Cathedral in Hampshire, England, began an ambitious reconstruction programme to underpin the walls and foundations.

Faced with the problem of heavy water seepage that quickly flooded the 7m-deep pits dug beneath the Cathedral's walls, the engineer in charge of the undertaking called on the services of Siebe, Gorman & Co., who assigned their chief diver, William Walker, to the project.

From 1906 until the job's completion in 1911, the former Royal Navy diver worked in complete darkness for six hours a day, moving and placing an estimated 25,800 bags of concrete, 114,900 concrete blocks and 900,000 bricks.

In 1964, in recognition of his singular efforts in successfully saving the Cathedral, a statuette of Walker in his diving dress was unveiled and now stands behind the Cathedral's high altar almost opposite that of Joan of Arc. ■

Image 2. *Diver Spacescape*, composite by John A. Ares

Compositing

Creativity in Underwater Photography

Text and photos by John A. Ares

We take photographs for different reasons: to identify the sea life we find, for the sheer pleasure of making images, or perhaps as a method of personal expression. It is the latter, personal expression, that leads us to the creation of art. John A. Ares discusses the creative use of compositing in postproduction.

Image 1. *Santorini Doorway*, by John A. Ares

I believe that creativity is an aspect of photography that can be taught or, at the very least, inspire. Search Google for the word "art" and you get 15 trillion results.

"The aim of art is not to portray but to evoke." This quote is by Paul Karabinis, from the forword of Jerry Uelsmann's book, *Other Realities*, published by Bulfinch. Uelsmann was one of the greatest photographers in "post-visualization," or the assembling of photo montages or composites. I use these terms interchangeably.

Uelsmann did all his work in the darkroom. Most of us in the digital age take advantage of the tools available via the computer. Compositing requires competence in using certain Photoshop tools, including:

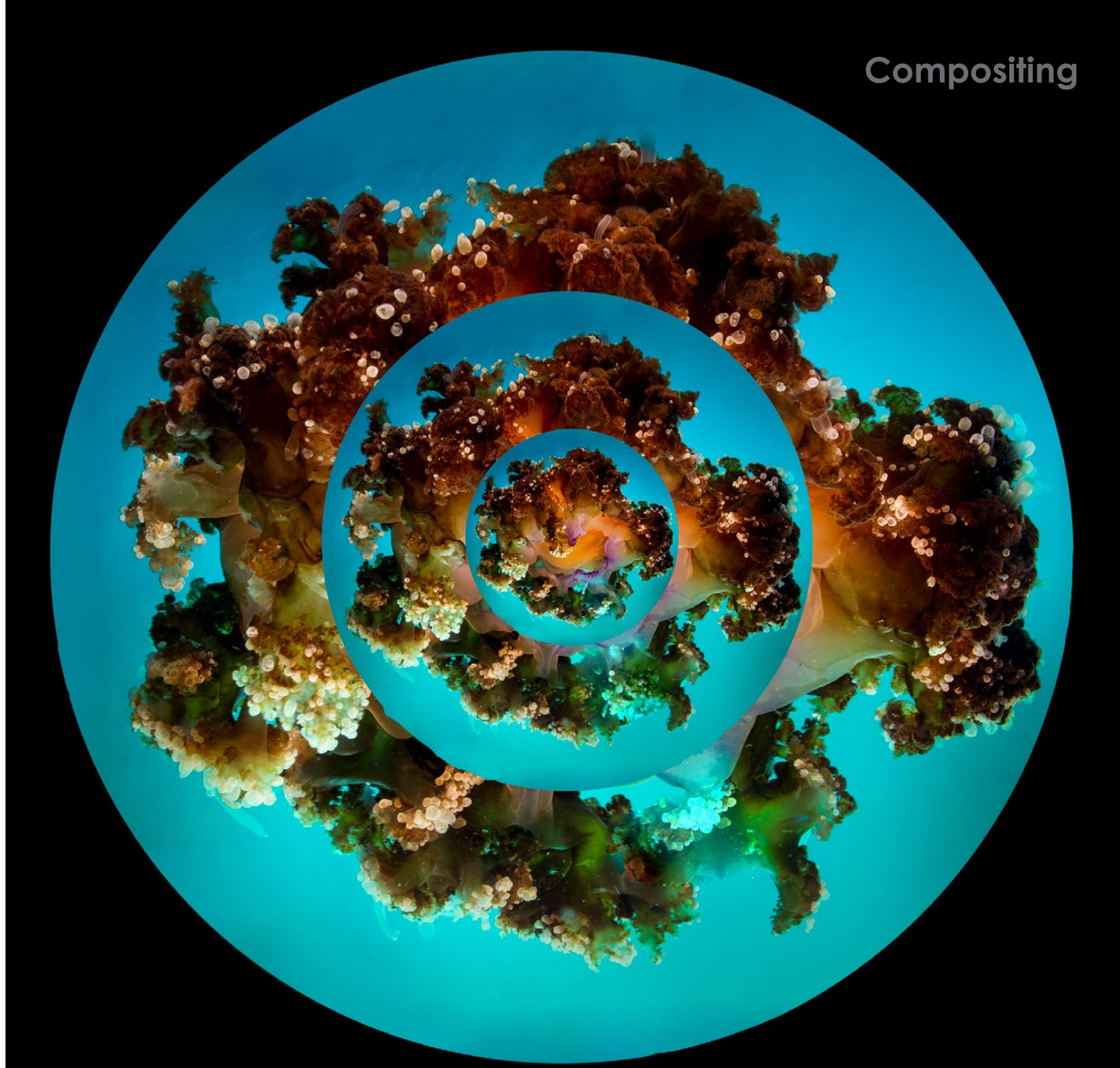


Image 3.
Concentric Jellyfish,
composite image
by John A. Ares

- Masking
- Proficiency in working with layers
- Eraser tool
- Cutting shapes like circles
- Rotating selections
- Resizing selections

For more on selections, please see my article, "Selective Color: Creative Effects in Postproduction of Underwater Images," in issue 110 at: **xray-mag.com/content/selective-color-underwater-photo**.

Compositing is a creative technique that involves combining images in different ways. One simple method is to visualize a montage that uses only a couple of images. Consider the surreal view out the door into an underwater seascape in Image 1 (previous page).

Image 1. Santorini Doorway

Selecting photos for a composite is not always intuitive. For example, I saw the doorway photo from Santorini, Greece, in my archive and thought, what would it look like if you were looking out into an underwater scene instead of seeing a sky? I then looked for a suitable "seascape" to complement the doorway image.

In selecting images, it helps if you have a good size photo archive. Uelsmann does not shoot for creating a composite; rather, he shoots using a process called "gathering assets." He shoots photos that contain interesting elements that may find their way into a future composite.

Image 2. Diver Spacescape

Another example of a composite is the image of a diver coming out of the deep. (See Image 2 on the previous page.) To me, the diver in North Sulawesi, Indonesia, looked as if he was in space. The backdrop of the reef on the right side of the image was insignificant, and I thought it needed a "starfield" instead. I had created the starfield for use in another photo and thought it would be appropriate here. (Search Google for "creating a starfield in Photoshop.")

For the top layer, I inserted a photo I took of a lunar eclipse, to further enhance the feeling of space. I rotated the moon so that it appeared as if the light was coming from the surface.

It was also important to highlight the fish on the border between the two images. The spadefish were getting dark at the border and required a little brightening.

Image 3. Concentric Jellyfish

Another approach to compositing

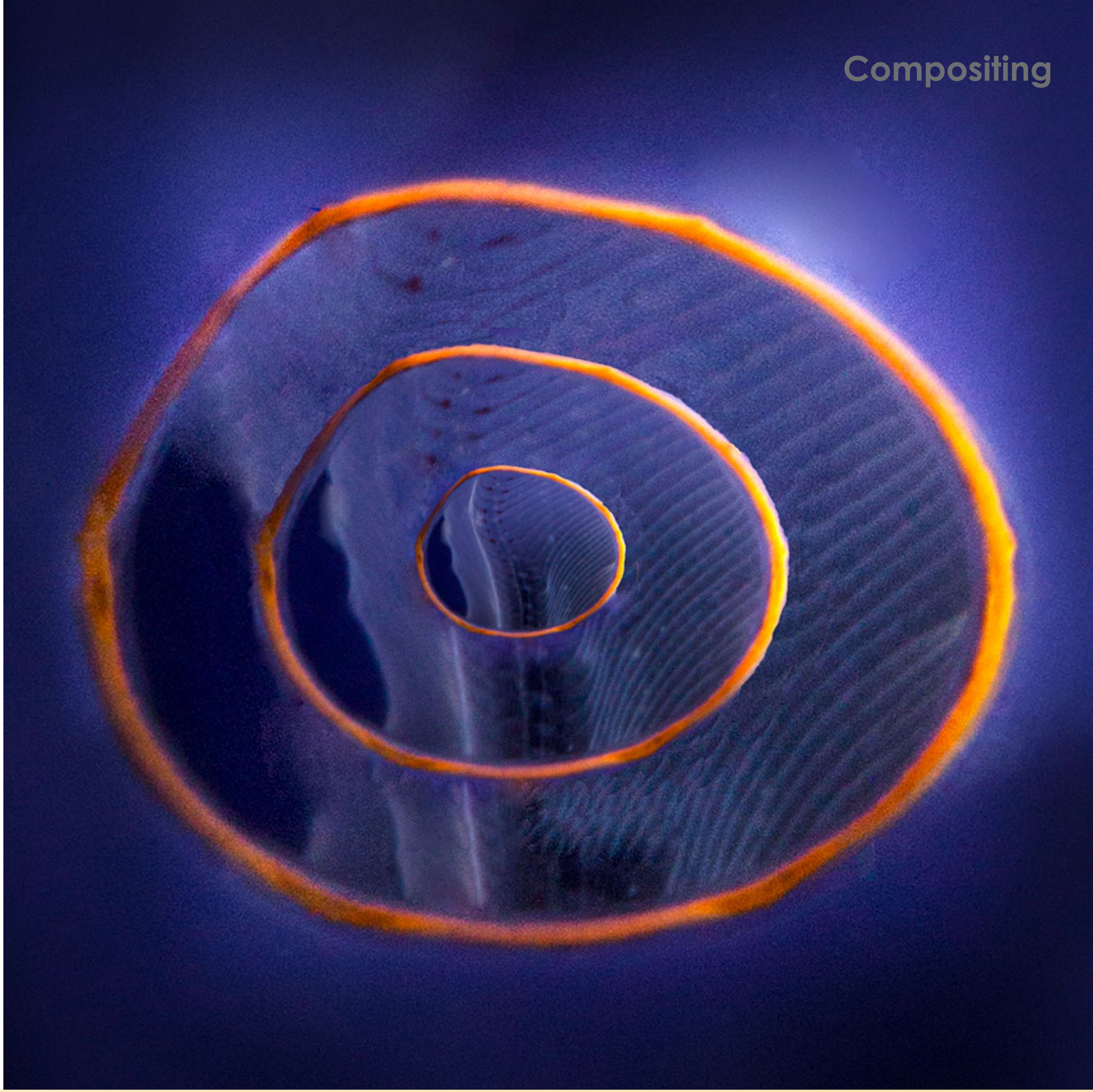


Image 4. *Tunicate*, composite image by John A. Ares

involves repeating a single image. Because of the symmetry, the jellyfish images could be nested inside each additional image. Three concentric images seemed to be a manageable goal. The primary image was placed on a black background and cut into a circle. Two additional copies of the image were then resized accordingly and placed so the images would blend.

Image 4. Tunicate

A variation of compositing involves copying parts of an image and rearranging them multiple times on the photo.

For the tunicate image, I thought the glow of the gold ring was intriguing and needed some amplification. I copied, trimmed and resized the gold ring twice to show the ring three times in total.

Final thoughts

There are many creative ways to use one's own underwater photographs. Letting your imagination run free, finding intriguing associations, and thinking outside the box can lead to interesting artistic composites, in which the whole is indeed greater than the sum of its parts. ■

A former senior management consultant for Fortune 100 companies, studio commercial photographer and trained biologist and marine food toxicologist, John A. Ares is an assignment and stock photographer and image consultant based on Staten Island in New York City, specializing in portraits, nature, travel, underwater, food/restaurant and fine art photography. An avid diver, he has been a PADI instructor and instructor trainer, teaching underwater photography courses and traveling to many exotic dive destinations around the world. A member of the New York Underwater Photographic Society (NYUPS) and American Society of Media Photographers (ASMP), he has served as an associate editor and photographer for Seafood America magazine and his work has won competitions of American Photographer magazine. He also conducts training seminars and has been a presenter at Beneath The Sea and NYUPS. For more information, visit: **JohnAres.com**

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photo news

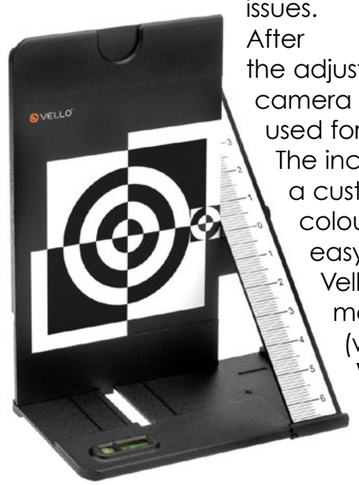
Edited by
Rico Besserdich

Nauticam Housing for ARRI ALEXA 35

Nauticam has released its new video camera housing for the ARRI ALEXA 35 cinema camera. The new housing features a tray system for assembling the camera, which slides into place. Furthermore, it provides large knobs to control focus, iris and zoom, plus the option to operate the lens via motors. The housing is compatible with a variety of battery packs. For monitoring, the Atomos Ninja V or SmallHD 503 Ultrabright can be mounted on Nauticam's housing and be connected via SDI bulkheads. Nauticam's own Vacuum Check and Leak Detection System is included. The housing ships with a 250mm optically coated glass dome port and a 100mm housing extension, which allows the use of three motors for the control of zoom lenses or longer prime lenses. **Nauticam.com**

Vello LENS-2020 Lens Calibration Tool

The Vello LENS-2020 Lens Calibration Tool allows one to test a camera's autofocus accuracy and then calibrate the focus system to correct any possible front- or back-focusing issues. After the adjustment is saved within the camera as a lens profile, it can be used for future shooting sessions. The included grey card helps to set a custom white balance for true colours. The tool is foldable for easy storage and portability. The Vello calibration tool can be mounted on standard tripods (with a ¼-inch connector). **Vellogear.com**



Hasselblad X2D 100C

Hasselblad's new medium format mirrorless camera—the X2D 100C—features a 100-megapixel 43.8 x 32.9mm backside illuminated sensor, a hybrid phase and contrast-based autofocus with 294 phase-detection AF points, five-axis in-body image stabilization, and 15 stops of dynamic range. The Hasselblad X2D 100C is equipped with a 0.5-inch 5.76M-dot OLED electronic viewfinder (EVF) with a magnification of 1.00x and a refresh rate of up to 60fps. The rear touchscreen is 3.6 inches large, providing a 2.35M-dot resolution. Another 1.08-inch colour display on top of the camera displays the current settings. For media storage, the camera has a built-in 1TB SSD (solid state disk), plus a CFexpress Type B slot for additional memory storage devices. The battery, which is quick charging via USB, provides enough energy for up to 420 photos. Important note: This is a stills-only camera, with no video capabilities provided. **Hasselblad.com**

Sea&Sea Sony Alpha Universal Housing

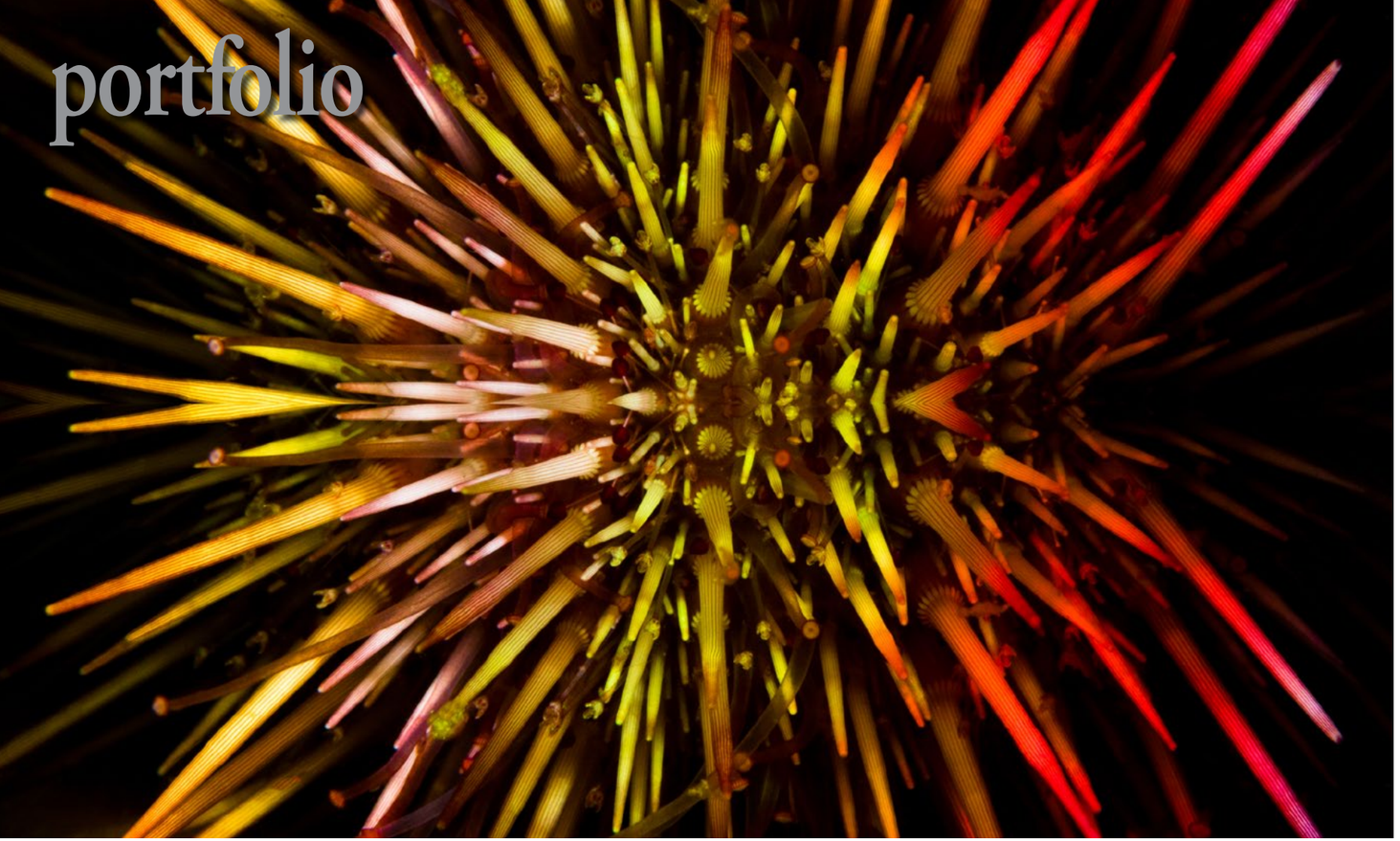
Sea&Sea has announced a new universal housing that will be compatible with Sony's full-frame Alpha camera series. According to the manufacturer, the MDX-aU supports the Sony a7 Mark IV, a7R Mark IV, a7S Mark III, a9 Mark II and a1. The housing can be adapted to the above-mentioned camera models by using minimal part replacements, which can be done by the user. The housing features a large acrylic back panel, a new improved fiber-optic cable cover, and Sea&Sea's own Leak Alarm Unit, which comes standard. The MDX-aU supports fiber-optic connectivity with compatible Sea&Sea YS strobes in TTL or manual modes, plus classic strobe triggering via sync cord. **seaandsea.jp**

AOI Housing for OM System OM-1

AOI has released a new housing for the premium Micro Four Thirds OM System OM-1 system. The new UH-OM1 housing shares similar features to AOI's other OM-D housings, such as a compact polycarbonate design, an integrated optical trigger, and AOI's Vacuum Analyser and Wet Detection System. The in-built trigger also works in Super FP mode (high-speed flash sync). The housing weighs 1,079g and is depth-rated to 45m. **aoi-uw.com**

Kate Jonker

P O R T F O L I O



Doubly Prickly, by Kate Jonker. Sea urchin, shot using a rainbow-coloured filter and processed as a reflection in Photoshop

Kate Jonker is an award-winning underwater photographer and coach, internationally published writer and public speaker, dive boat captain and dive guide based in South Africa. Pushing the boundaries of underwater photography, she creates sublime art photos like paintings, featuring the unique and diverse marine life found not just in the local waters around Cape Town, but also exotic locations around the world, from Southeast Asia to the Red Sea, among others. *X-Ray Mag* interviewed the artist to find out more about her creative process, unique photographic style and perspectives.

Interview by G. Symes
Art photos by Kate Jonker

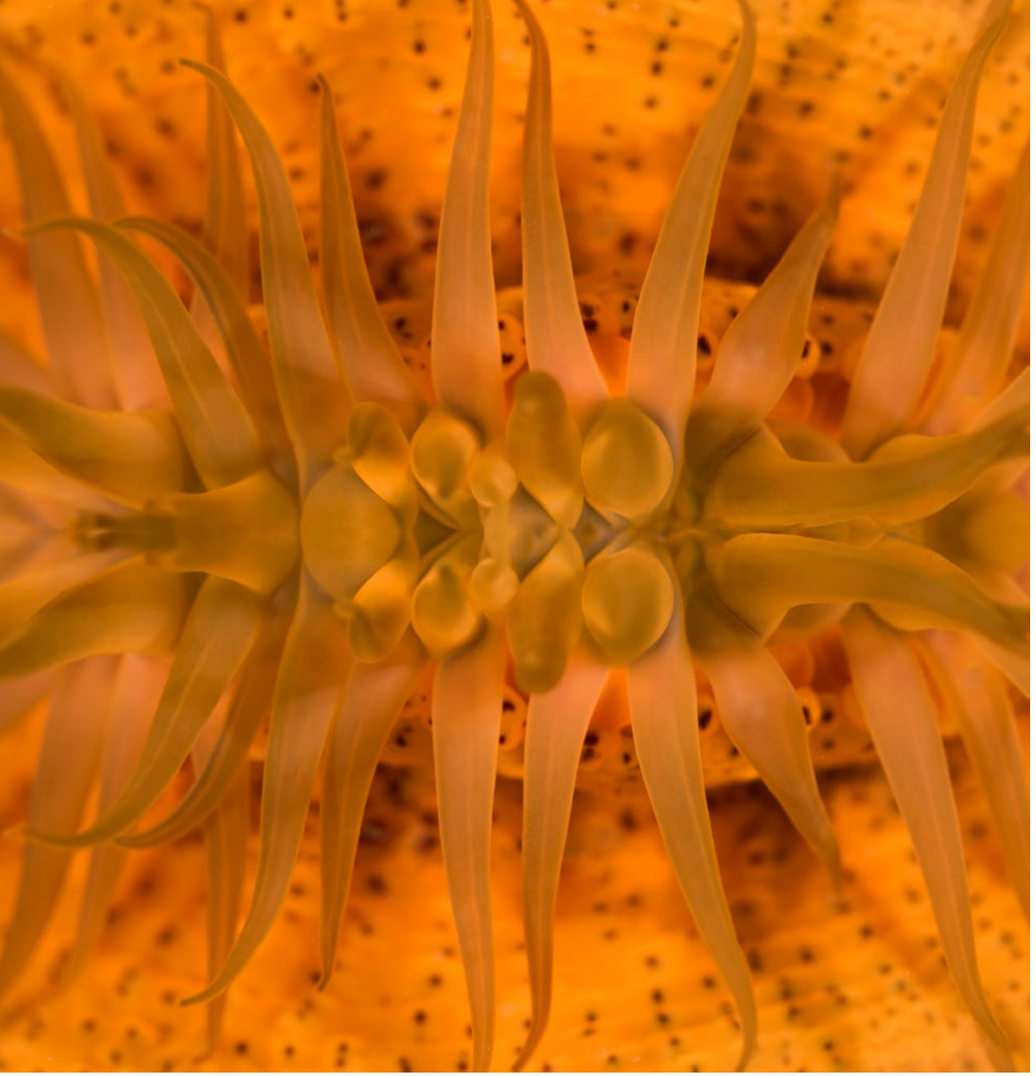
X-RAY MAG: Tell us about yourself and how you became an underwater photographer.

KJ: I grew up on the beach in South Africa and spent as much time as I could snorkelling. I was fascinated by the life beneath the waves. I was given my first camera when I was nine and developed a love for photographing the details and textures in nature. Although I learnt to scuba dive 22 years ago, my love of the ocean and photography only came together 10 years later when my husband and I opened a scuba diving business in our hometown of Gordon's Bay just outside Cape Town. I wanted to capture the beauty of our marine life to encourage others to learn to dive and to come diving with us.

X-RAY MAG: With your art photo series, you have moved past mainstream underwater photography and into the realm of fine art. From where did you get your inspiration for the art series? Was it something you sought out? Did it arise out of creative experimentation, or was it something that happened to you in the course of life—encounters with other people or things you studied or read?

KJ: My grandfather was an artist. He was always painting. I must have inherited his genes as creativity was

Fireworks (above), by Kate Jonker. Feather duster fan worm, lit with two torches, one with a pink filter and one with an orange filter; *Ice Hot* (previous page), by Kate Jonker. Gasflame nudibranch, shot using a high key photography technique



Reflections of Anemone, by Kate Jonker. Sea anemone, processed as a reflection in Photoshop

part of life growing up. I loved the work of Impressionist artists such as Claude Monet and Post-Impressionist artists such as Vincent van Gogh and the surrealist work of Salvador Dali.

Quite early on in my underwater photography journey, I started to experiment with different techniques such as snooting and shallow depth of field as I found "just taking photos" boring. However, a chance encounter with underwater photographer Patrick Ong on a trip to Anilao in the Philippines in 2017 was the catalyst for my creativity. Patrick introduced me to reverse ring macro photography and the use of coloured lights.

I love how reverse ring macro photography creates painterly, distorted images with incredibly shallow depths of field, and how the use of torches and strobes with coloured filters adds another dimension. It is a challenge, and the results are never boring!

X-RAY MAG: What is the message or experience you want viewers of your art photos to have or understand?

KJ: I want viewers to see the beauty of our underwater world expressed in a unique way, to attract their attention and capture their imagination.

X-RAY MAG: How do people respond to your art photos?

KJ: Admittedly, my art is not everyone's "cup of tea." However, the most memorable interaction was when famous underwater photographer Dr Alex Mustard MBE commented on one of my photos, saying, "This is a really nice use of coloured light. Ninety-nine percent of them are horrible, and this one works really well."

X-RAY MAG: What is your creative process? What special equipment and postproduction tools do you use?

KJ: Before setting up my camera, I decide what type of images I am going to make, usually the night before I go diving. This will determine which lens I am going to use and the type of lighting I will need. For example, I have an old Meyer-Optik lens from the 1960s that creates an interesting bubble bokeh. As it is a manual lens, I need to decide on the aperture and working distance before I put the camera in the housing. Or, if I want to photograph sharper, more detailed

Softness, by Kate Jonker. Tubular hydroid, photographed using a very slow shutter speed and wide-open aperture to create a dreamy effect. Lit with two torches, one with a yellow filter and one with a pink filter

Long Way Down, by Kate Jonker. Minuscule soft coral nudibranch, photographed using a Canon 7d MkII camera and reversed 50mm lens

Centre Stage, by Kate Jonker. Salmon gasflame nudibranch, lit with a snooted strobe, and a background lit with a flash with a pink filter

Ghostly Apparition, by Kate Jonker. Speckled klipfish, lit with two torches, one with a blue filter and the other with a yellow filter

images using a snoot and colour filters, I will set up my camera with either a 60mm or 105mm macro lens.

It is a lot of planning beforehand. My mindset will then be completely focused on the type of image I want to create throughout my dives. Whilst I am diving, I look for suitable subjects for the type of image I am after.

I do not create the image in post-production at all, I just use Lightroom for postproduction and will adjust exposure, highlights, shadows, whites and blacks, and add texture and clarity if necessary, or a little vibrancy if the colour is looking a bit flat. I will use the spot removal tool to remove any backscatter. That is about it.

X-RAY MAG: In your relationship with reefs and the sea, where have you had your favourite experiences?

KJ: My favourite ocean experiences have taken place in my hometown of Gordon's Bay. One summer, I made friends with a little yellow speckled klipfish who lived in a broken clump of bryozoans at the Stone Dog dive site. The first thing I used to do when I jumped in the water there was to swim over and see if he was home. At first, he was quite shy, but after a number of visits, he would pop out of his tiny home and pose beautifully for me whilst I took his photo. He really was extremely cute.

X-RAY MAG: Can art be defined? What is your definition or concept of what constitutes art?

Sunflower of the Sea, by Kate Jonker. Tubular hydroid, lit with a snoot, and a background lit by a flash with a pink filter

KJ: I do not believe art can be defined. What is art to me, might not be art for you. Art is such a personal choice. For me, art is the visual creation of an image in my mind. I will think about the style of photograph I want to create long before I capture it with my camera, and when the opportunity arises, I will try my best to create that image.

X-RAY MAG: Can images be both documentary and artistic at the same time, or do we always have to make a choice?

KJ: Images can certainly be both documentary and artistic at the same time. It boils down to how much of the actual subject remains recognisable. Art is a blurring of lines between the actual image (the documentary) and the art (the imagination).

X-RAY MAG: Can underwater photography evolve further, do you think?

KJ: Underwater photography will continue to evolve as new technology continues to be developed. New equipment such as advanced snoots, creative underwater lighting, filters and lenses will also continue to be developed as new fads or trends come and go in underwater photography.

X-RAY MAG: What is the most interesting photography (or photographer's work) you have seen lately?

KJ: I absolutely love the underwater photography technique that is loosely termed "Japanese Art."

X-RAY MAG: What is this technique? What about it is so appealing to you?

"Reach" for the Stars, by Kate Jonker. Brittle stars, buried in the sand, reaching up to catch tiny particles of food as they float by, photographed using an old manual lens from the 1960s, adapted for the artist's Nikon D850 camera

Kate Jonker

Spectre, by Kate Jonker. Longsnout pipefish, photographed using a Canon 7d MkII camera and 60mm macro lens attached to a reversed 50mm lens. Natural lighting, with the mouth of the pipefish lit with a snooted strobe

Chewy Candy, by Kate Jonker. Candy nudibranch mid-munch, photographed using a very wide-open aperture for a shallow depth of field and dreamy feel

Best Buddies, by Kate Jonker. Cape dorid nudibranch and amphipod, photographed using a retro lens from the 1960s, and a very shallow depth of field

KJ: "Japanese Art" is a style of photography I stumbled across by chance in 2018. I chatted with some of the photographers who excel in this style to find out more and was told: "Japanese Art is a part of Japanese culture. If one uses the rule of thirds, the subject is either placed on the bottom right or bottom left intersect of the frame. The subjects should be less than 1:1 ratio in the frame, and as a very shallow depth of field is used, the subject is very softly in focus. The result also creates a coloured background with soft, creamy colours shot in high key. The image features a large amount of light tones and fewer midtones or shadows. This is created through in-camera techniques and not postproduction."

X-RAY MAG: I am particularly intrigued with the series of your art images that remind me of lovely delicate pastels on white cotton papers. How did you develop this series and what was your inspiration for creating them?

KJ: The inspiration for these photos was indeed the beautiful style of photography from Japanese underwater photographers known as "Japanese Art." To create these images, I used a very shallow depth of field using wide open apertures, paired with a diopter. This creates these lovely soft pastel colours and a very shallow depth of field.

X-RAY MAG: A camera is just a mechanical tool. Art is an interpretation. How would you teach and train somebody to have an eye for

Grazing, by Kate Jonker. Crowned nudibranch, photographed using a retro lens from the 1970s, adapted for the artist's Nikon D850 camera

creating interesting imagery? Is natural talent a prerequisite or can the right tutor and putting in the required effort take one all the way—to become a good, or even successful, artist?

KJ: Admittedly, some people are naturally more creative than others. However, the mere act of making a photograph is already creativity in itself. When we press that shutter, we are pressing it at the moment we feel is right. It is a personal choice. However, I do believe that more creative individuals will be able to produce work that is unique, whereas the less creative individuals are more likely to copy the style or image that they have seen, and make it their own.

X-RAY MAG: If you could use only three short sentences, what advice would you give to aspiring photographers—underwater or otherwise?

KJ: You do not need the most expensive camera to make beautiful images. Learn to use your camera inside and out to achieve the results you want. Do not be afraid to experiment.

X-RAY MAG: What are your upcoming projects, photo courses or events?

KJ: I have been teaching "in-person" underwater photography workshops for the past five years and am currently working on putting them online under my "Underwater Photo Coach" brand so that I can help even more people make beautiful underwater images.

X-RAY MAG: How can viewers order prints of your work for their homes, offices or resorts? Do you have signed limited edition prints on archival papers?

KJ: Anyone wishing to order my prints can contact me directly. I can then arrange their chosen image to be printed on a selection of mediums by a top printer and delivered to their address. I limit the number of prints per image to a maximum of five and sign the print if requested.

X-RAY MAG: Lastly, is there anything else you would like to tell our readers about yourself and your artwork?

KJ: I would like to end on a note of encouragement for all underwater photographers. Photography is an opportunity to be creative. Do not worry about what anyone else will say. Art is so subjective. Do what feels right to you, create images that you like and enjoy making them. Not everyone likes a Dali. Not everyone likes the work of Vincent van Gogh. Create art for your own enjoyment, and if your work captures the imagination and brings happiness to others, that is an extra bonus! ■

For more information and to order prints, please visit the artist's website at: ***katejonker.com***.

Just a Baby, by Kate Jonker. Tiny inkspot nudibranch, photographed using a strong diopter and a very shallow depth of field