



GLOBAL EDITION  
November 2022  
Number 115

US Wrecks  
**Northeast**

Deep Wrecks  
**Malta**

Training  
**Cave  
Diving**

Taiwan  
**Penghu**

Ecology  
**Moray  
Eels**

UW Photo  
**Leak-Free  
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COVER PHOTO BY STEVE JONES

MEDITERRANEAN  
**Cyprus**



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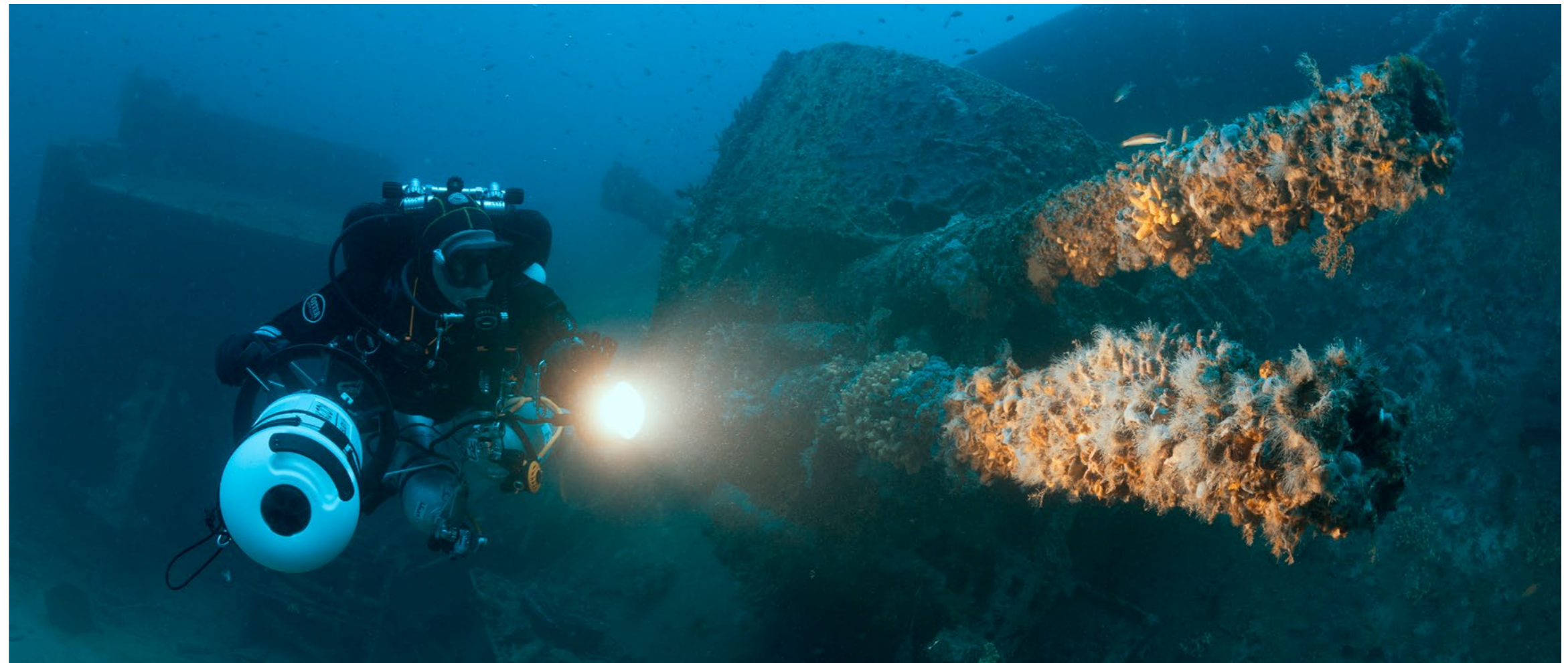
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COVER PHOTO: *Wreck of HMS Southwold, Malta*  
Photo by Steve Jones ([millionfish.com](http://millionfish.com))

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Diver on HMS Southwold, Malta. Photo by Steve Jones



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# Neglecting Basics

Being able to hover, move smoothly and efficiently through the water, and streamline your equipment is not just a matter of style and elegance but one of safety and protecting the environment.

As I swim low and glide gently over a reef, careful not to touch, I look up and catch a glimpse of a group of divers. All but the one, who is obviously the dive guide, are moving along rather awkwardly. Most propel themselves forward in various postures between upright and prone, but none are anywhere near being horizontal. As a result, their kicks are directed at a downward angle, resulting in a bobbing, up-and-down motion through the water. Several look like they are bicycling, and hoses are dangling all over the place. It is a right mess to behold and not an unusual sight at some dive destinations.

I get it that diving is a new set of motor skills to acquire and hone when you are first taught to dive and that some fumbling about, in the beginning, is only to be expected. Proper posture, finning technique and hovering take time to fine-tune and become second nature.

Practice makes perfect, so why isn't it happening?

It just does not appear to be an integral part of entry-level dive course curriculums but is up to the discretion of the instructor to make that extra effort to teach and properly train new divers, so that they get well settled into good habits and techniques from the onset. It is a shame really, but I assume it is a question of time and money for dive operators as they are businesses.

The slack does not seem to be picked up at any later time, however, so many divers keep on flailing about as they get stuck in bad habits or just do not know any better.

It can go pretty far up the chain too. I recall from my own PADI IDC how about half of the instructor candidates in my group, which were minimum Dive Masters for starters, struggled to hover in the pool. To this day, I cannot get my head around how some divers can progress to that level of certification and still not easily hover. It is not that difficult!

Later, I conducted an Advanced Open Water course, and I started by revisiting the issue of correct weighting. Among seven students, a whopping 29kg of extraneous lead was removed and left on the jetty before we went on

the first dive. Who knows for how long these folks would have continued to dive significantly overweighted if we had not revisited this simple basic exercise.

Being able to hover, move smoothly and efficiently through the water and streamline your equipment is not just a matter of style and elegance. It is also a matter of safety, because when you are relaxed underwater, you are not out of breath and have more mental and physical capacity to deal with any problems that may arise. You use less air, and you get less tired. The dive is also simply much more pleasant when you let the water support the whole of your body weight without any need for finning—what I sometimes refer to as “resting on an inverted waterbed.”

So why not make it easier for yourself?

In any case, since poor buoyancy control is a major cause of damage to both natural and artificial reefs and other habitats, that is the least you can do to protect the environment.

— Peter Symes  
Publisher & Editor-in-Chief

# NEWS

from the deep

Edited  
by Peter Symes

## National Marine Sanctuary system celebrates 50th anniversary

**The National Marine Sanctuary Act was passed in 1972. Since then, the system has added 15 National Marine Sanctuaries and two National Marine Monuments.**

Fifty years ago, the United States Congress, prompted by the Santa Barbara oil spill off the coast of California, three years earlier, passed the Marine Pro-

tection, Research and Sanctuaries Act, which allowed for the creation of marine sanctuaries. Since October 1972, the National Marine Sanctuary System has grown into a nationwide network of 15 national marine sanctuaries and two marine national monuments that conserve more than 620,000 square miles of ocean and great lakes waters.

This landmark legislation protects all marine mammals in US waters. The

law protects these areas from human activities such as pollution, habitat destruction, over-harvesting and coastal development.

### New sites

The National Marine Sanctuary system is considering adding two new sites: Hudson Canyon, off the coast of New York and New Jersey; and Chumash Heritage, an area right below the Monterey Bay National Marine Sanctuary. Hudson Canyon is the largest submarine canyon along the US Atlantic coast and is one of the largest in the world.

The proposed Chumash Heritage National Marine Sanctuary is a grassroots effort led by the Northern Chumash Tribal Council in partnership with several lo-

cal, state, and national organizations. It would stretch from the southern end of the Big Sur coast to the Channel Islands off Santa Barbara. It is the first tribal-nominated sanctuary and if finalized, it would extend protection from Point Arena in Mendocino

Black sea bass (*Centropristis striata*) hovering over the reef. Georgia, Gray's Reef National Marine Sanctuary.



### FACT FILE

#### National Marine Sanctuary System

The Office of National Marine Sanctuaries serves as the trustee for a network of underwater parks encompassing more than 620,000 square miles of marine and Great Lakes waters from Washington state to the Florida Keys, and from Lake Huron to American Samoa. The network includes a system of 15 national marine sanctuaries and Papahānaumokuākea and Rose Atoll marine national monuments. ■

County to Point Conception in Santa Barbara County.

Both have the backing of the Biden administration. ■ SOURCE: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)



Edited by  
Catherine  
GS Lim



TANE SINCLAIR-TAYLOR / SIMON FRASER UNIVERSITY / FLICKR / CC BY 2.0

Fish life on the Great Barrier Reef in Australia

## Temperature and habitat changes have impacted Australia's reef fishes

**The reef fish communities in Australia have been affected by environmental changes.**

For more than a decade, some researchers in Australia have been monitoring coral reefs in the vicinity to see how rising ocean temperatures affect both the tropical and temperate reef fish communities.

The findings of their study was published in the journal *Current Biology*.

According to lead author Rick Stuart-Smith, a marine ecologist at the University of Tasmania,

the team had focused on reef fishes as reefs provided many benefits to people and the fishes there helped maintain the natural ecological function of the reefs.

The impact of habitat and temperature changes varies according to the location of the reef. Specifically, tropical reef fishes appeared to be more affected by habitat change while those at temperate and subtropical reefs were more affected by temperature changes.

The research also revealed that losing coral and kelp cover can lead to fish populations with more generalist species, instead of

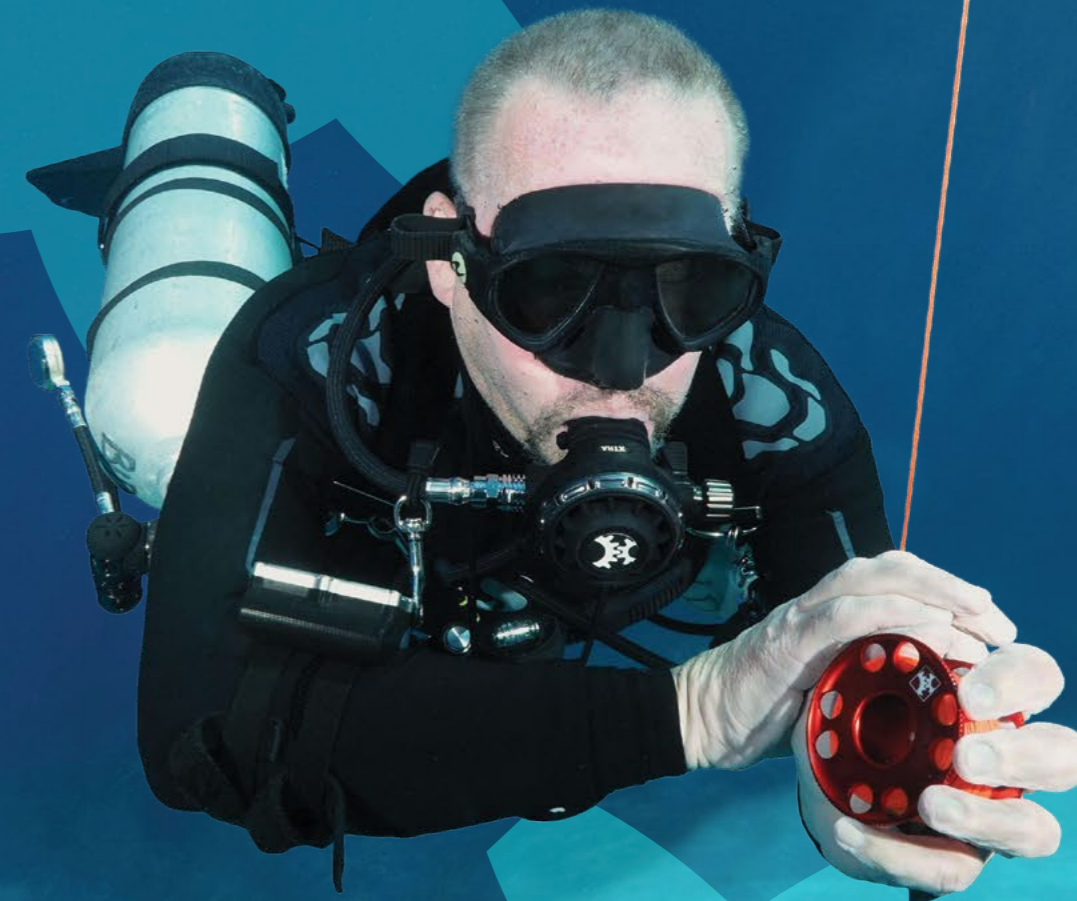
niche species that have adapted to specific habitats. Evidence of this can be found in the north-eastern Australian regions.

Besides hoping that more widespread, standardised and coordinated local research be conducted to better evaluate global trends, the team also called for more climate-related reef research.

According to them, the changes they had observed around the Australian continent over such a short time period indicated that much larger changes were likely to occur as oceanic warming continued. ■

SOURCE: CURRENT BIOLOGY

# TO THE EXTREME...



# AND BACK.



[DiveGearExpress.com](http://DiveGearExpress.com)



# Diving Talks 2022 – report

Text and photos by Peter Symes

**The second Diving Talks conference, held in Troia, Portugal, on 7-9 October 2022, featured a stellar line of presenters, and was another pleasant gathering of like-minded diving enthusiasts and ocean lovers.**

One evening, I told Arlindo Ser-rao, the organiser of the Diving Talks, that number two, following up on a prior success, was often challenging. I was referring to the fact that most movie

sequels, with *The Terminator* and *The Godfather* being notable exceptions, often fail to get the same sort of traction as the first one; and that book authors and musicians frequently have less success with their second opus.

I am not sure if I struck a nerve because I could not help noticing that our little chat got referenced a couple of times in some presentations and talks later on. So, it is probably better that I start off by clarifying, right off the bat, that was nothing less good or interesting about the second Diving Talks as compared to the inaugural one held in 2021. On the contrary, the concept was refined



and adjusted, its strong points further enhanced, and the less important aspects were weeded out. It has evolved.

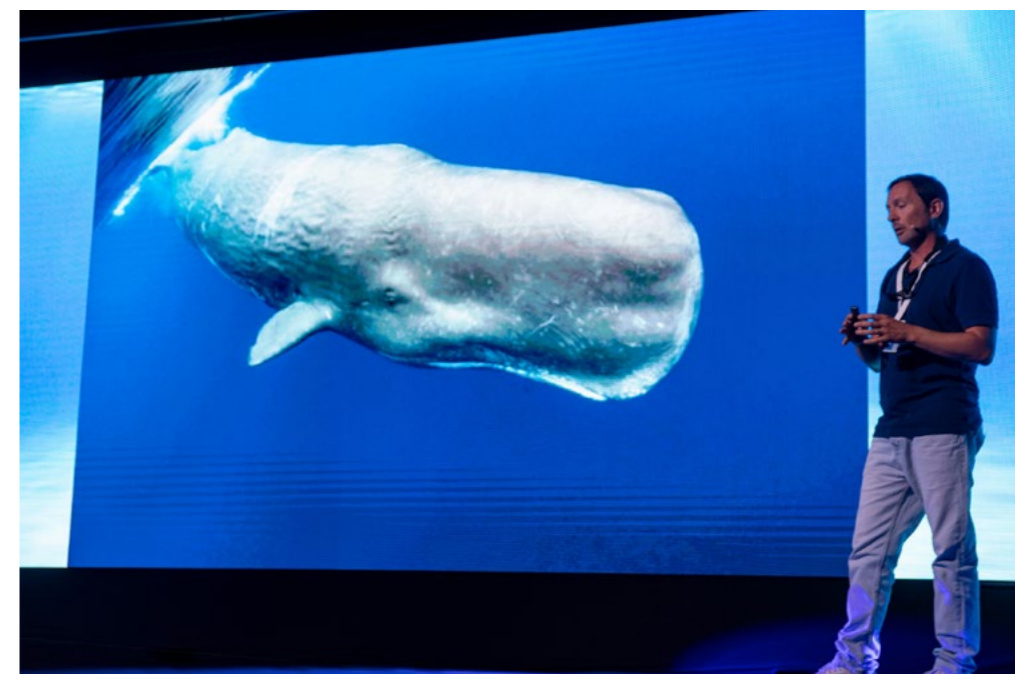
## Talks

Its defining characteristic lies in its name. It was indeed about talks and plenty of Q&A time had been added to the various presentations which enabled and spurred stimulating discussions between the presenters and the audience.

This concept is working well, and I found it refreshing because it erased much of the usual barrier between the presenters and the audience. The atmosphere became more inclusive and intimate which eased the talks and spurred



Bill Stone presenting via video link at Diving Talks in Troia, Portugal (right); Portuguese photographer and biologist Nuno Vasco Rodrigues (centre); Simon Mitchell on in-water recompression (bottom right); The Editory By The Sea Hotel (below)



continued conversations during the coffee breaks or over lunches and dinners.

The presenters were quite a diverse mix spanning from photographers, and cave divers with some amazing footage to special forces, hyperbaric researchers, explorers, engineers, freedivers and wreck hunters. All of whom were interesting and accomplished personalities.



The session topics and quality of presentations were largely from the top shelf, with some presenters being more at ease or natural than others. One or two got a wee bit too academic or long-winded but the vast majority were fluid, professional and captivating.

## Relaxed

Attending any dive show or

conference is taxing to some degree because one is so focused on listening in to presentations and taking part in talks all day long, and evenings too. But by this yardstick, Diving Talks is, by a comfortable margin, the most relaxed and enjoyable event among the many I have attended over the years—precisely because there was room and time for



Ellen Cuylaerts giving a presentation

# news

Presenter Gareth Lock (right); Delicious dishes and coffee break cookies (below)



stimulating conversations with other dive industry professionals with whom I had the opportunity to connect with on a much deeper and more personal level than usual.

At most other events, I also tend to have quite a long laundry list of meetings and negotiations, networking, or plainly scouting for news. But this event was not rushed, and the social component was pronounced.

## Meeting role models

If I must single out one main



Kirk Krack giving his presentation (above centre); Presenter, photographer and X-Ray Mag regular contributor Brandi Mueller (above right)



quality of this event, it is that you had the opportunity to hang out and really talk with some of your role models and other talented and accomplished people.

## Venue

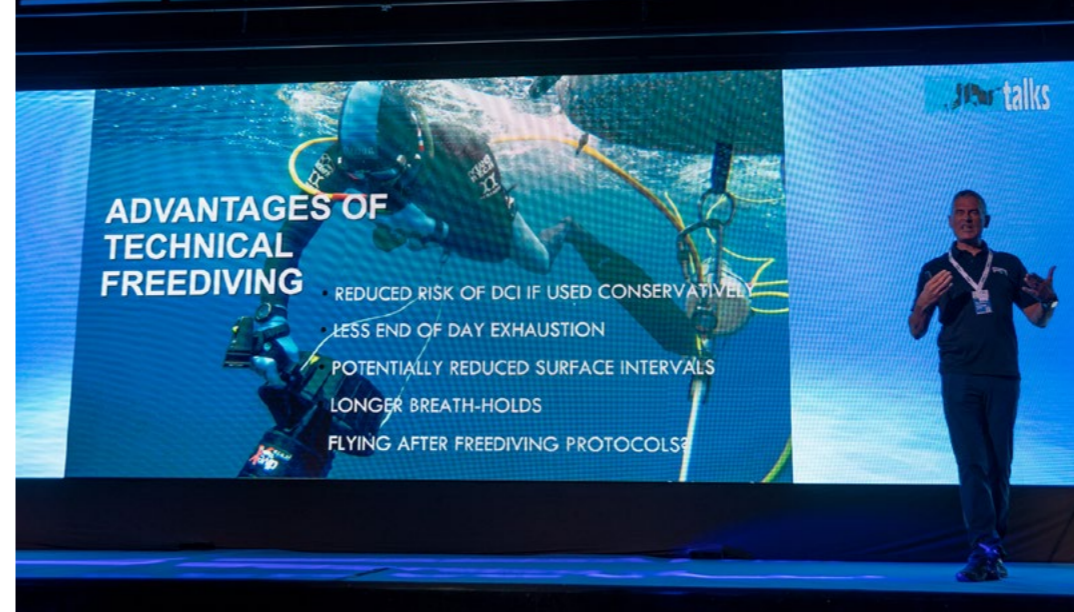
The venue was also quite nice, and it was always good to

have the conference facilities and hotel in the same places, preferably under the same roof. Having attendees and presenters staying at the same place also makes it easy and even natural to have a nice chat over breakfast, lunch or dinner. Or even make new acquaintances this way. As I surely did so as I travelled home, I had plenty of contacts, business, and new ideas to follow up on. In the mix, I also learnt something new, which is quite refreshing if you are a dive industry veteran.

Troia is a resort complex some 50km south of Lisbon but thanks to an excellent transfer service provided by the organisers, who had a team greeting just outside customs in Lisbon airport, the last bit of way to the resort was completely worry-free. The young crew were pleasant and professional too and keen to engage in a nice conversation. They made one feel quite welcome in a genuine and heartfelt manner.

## Timing

Having the event in early Octo-



ber, I find, was also quite good timing. It didn't clash with other events and the weather was quite pleasant. Compared to my home in Scandinavia, it was summerish but not hot. It sure was nice to be outside or have the window open at night.

After the event ended, we

were asked our opinions about the event. It was not just nice to be sincerely asked about our opinion and feedback, but I also know it will be taken to heart and further improvements or new ideas will be fielded next year. The feedback and critique I had to offer were largely posi-

tive and the few niggles I experienced aren't worth mentioning. Overall, it was quite smooth.

Many thanks to the organisers and the sponsors for making it a pleasant and infotainment-packed event. I have already reserved the dates for next year. ■



Diving Talks venue at Troia resort complex, some 50km south of Lisbon



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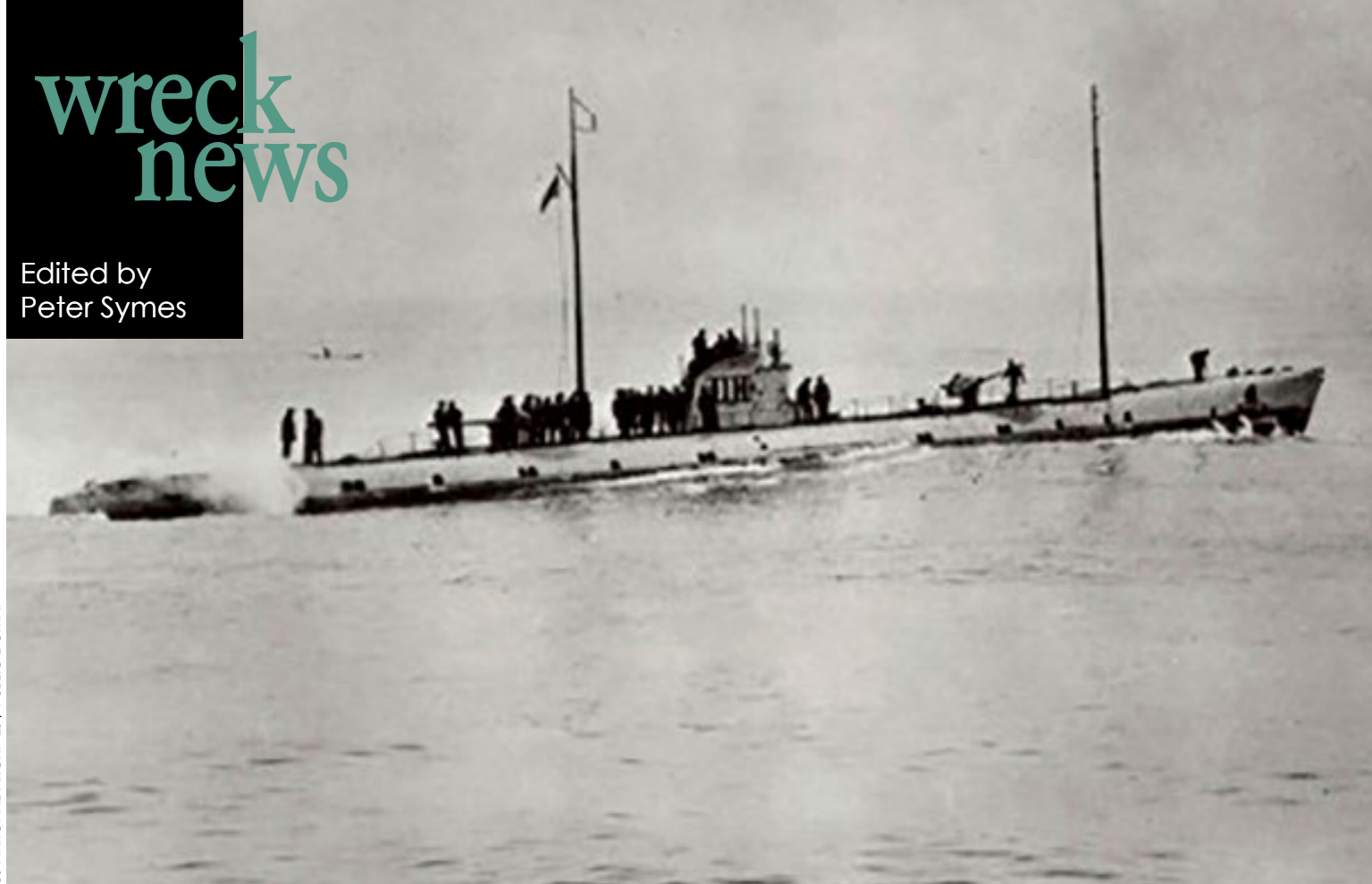
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US NATIONAL ARCHIVES / PUBLIC DOMAIN

Photograph of the former German submarine U-111 while undergoing tests by the US Navy in 1919

## WWI German sub located off the US Coast

**The SM U-111 was one of five German U-boats from World War I that were sunk in US waters and it is the last to be rediscovered.**

According to an exclusive report by *National Geographic* ([nationalgeographic.com](http://nationalgeographic.com)), a team of shipwreck hunters has discovered an extraordinary sunken vessel off the East Coast of the United States: the wreck of a World War I German U-boat sunk by US warplanes a century ago for target practice.

Commissioned by the German Imperial Navy in 1917, the 235-foot *U-111* patrolled the waters of the North Atlantic, sinking

three Allied merchant ships before the Kaiser's surrender in November 1918.

After Germany agreed to the armistice in 1918, all seaworthy U-boats were sent to the British North Sea port of Harwich, where most were cut up for scrap. However, a handful of the early submarines were sent to the United States to be studied and reverse-engineered; and the *U-111* arrived at Portland, Maine on 18 April 1919.

### Sunk on purpose

By early September 1919, the *U-111* had completed a head-to-head comparison test against the American submarine USS *S-3* (*SS-107*). In 1922,

the US Navy deliberately sank the vessel, but its exact location was not disclosed.

The *U-111* was sunk on 31 August 1922 when its hatches were opened, and the USS *Falcon* set off a depth charge by the sub. When the U-boat sank, the US Navy thought the seawater at the location was much deeper, and that the vessel would sink to the seafloor at a depth of about 500m (1,600ft). In fact, the wreck rests approximately 120m (400ft) below the ocean surface near the Winter Quarters Shoal lightship along the Virginia coast. ■

SOURCE: NATIONAL GEOGRAPHIC

## The Ship That Tried to Warn the Titanic Has Been Found

**SS *Mesaba*, one of the vessels that sent iceberg warnings to RMS *Titanic*, before the ocean-liner sank, has been identified lying in the Irish Sea.**

British merchant steamship SS *Mesaba* sent a warning radio message to the *Titanic* on 15 April 1912 while crossing the Atlantic. The message was received by the *Titanic*—which was advertised as unsinkable—but did not reach the main control centre of the vessel.

Later that night, the supposed-ly unsinkable *Titanic* hit an ice-

berg and sank on her maiden voyage, taking 1,500 lives and becoming the world's most infamous shipwreck.

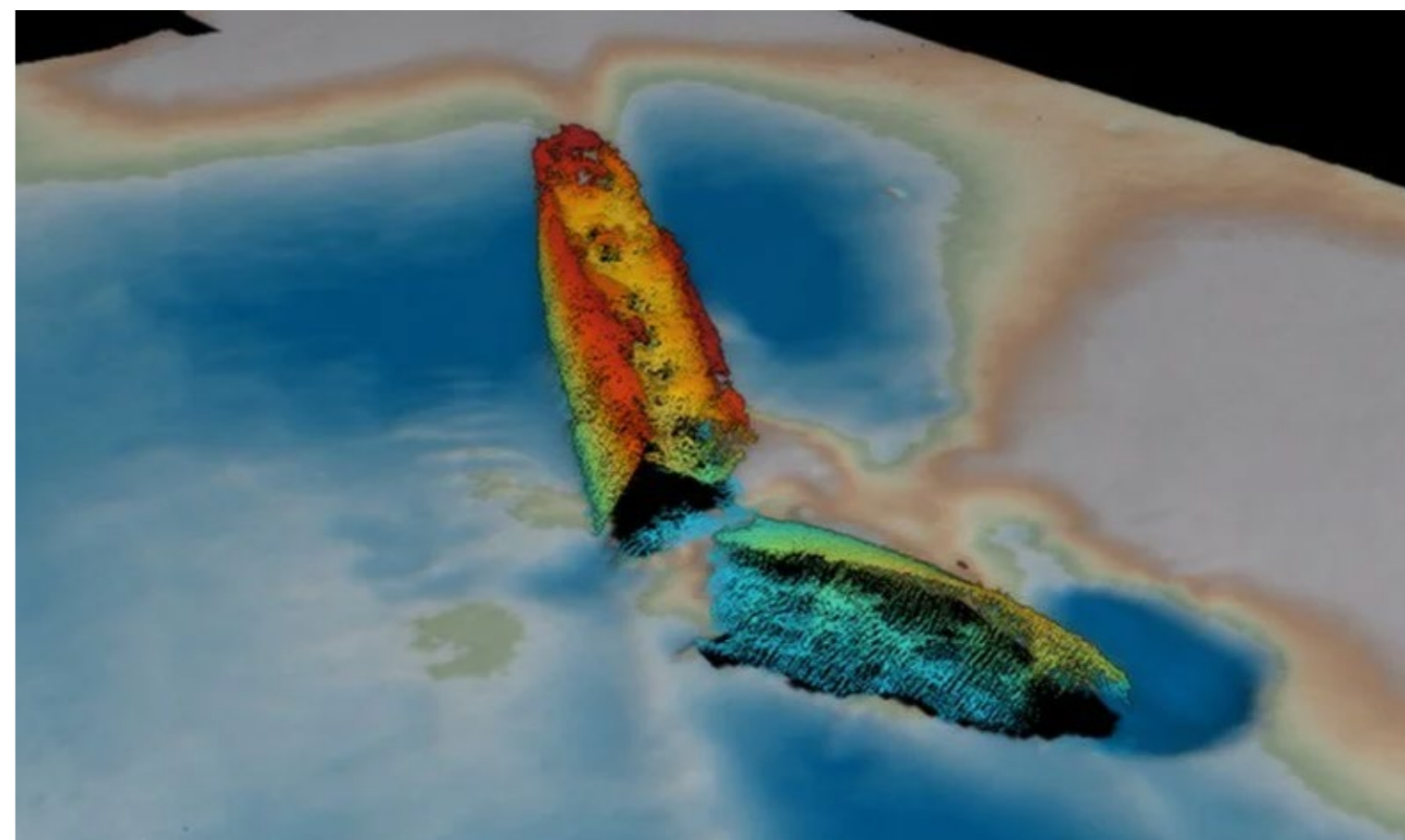
The *Mesaba* continued as a merchant ship over the next six years before being torpedoed whilst in convoy in 1918. Twenty people, including the ship's commander, died.

Its exact location was unknown for more than a century, but with the help of a state-of-art multibeam sonar, researchers at Bangor University have finally been able to positively identify the wreck and have revealed its position for the first time.

### 273 shipwrecks

The *Mesaba* was one among 273 shipwrecks lying in 7,500 square miles of Irish Sea, which were scanned and cross-referenced against the UK Hydrographic Office's database of wrecks and other sources.

It was thought that 101 wrecks were unidentified, but the number of newly identified wrecks was far higher, as many, including the *Mesaba*, had been wrongly identified in the past. ■ SOURCES: EUREKALERT



Multibeam sonar image of SS *Mesaba* lying on the sea bed in the Irish Sea.

BANGOR UNIVERSITY / PROVIDED BY EUREKALERT



## Diving wears on artificial reefs

Due to the unique experience that artificial reefs such as shipwrecks are able to offer, they can be victims of their fame and suffer uncontrolled diving pressure.

Artificial reefs are increasingly used worldwide as a method for managing recreational diving since they have the potential to satisfy both conservation goals and economic interests.

Although there are negative impacts associated with mass dive tourism, scuba diving has the potential to generate substantial revenues. However, balancing the requirements of reef conservation with the needs of local host economies represents a considerable challenge to managers and policymakers.

Whilst artificial reefs are not viewed as perfect substitutes for natural coral reefs, artificial reefs have been shown to alleviate user pressure on nearby natural reef habitats.

Although scuba diving is considered an environmentally friendly form of ecotourism, several studies have demonstrated the negative impact of divers on marine ecosystems damaging organisms and habitats regardless of whether they are accidental or deliberate actions, direct or indirect.

The damage level has often been linked to the intensity of use and the level of the divers' experience.

### Poor buoyancy control

The majority of damages are usually caused by mechanical breakage and sediment re-suspension. The most prevalent type of contact is fin kicks, and it has been noted that divers wearing gloves made contact with the substrate more often than divers with naked hands.

This type of damage is generally caused by inexperience and poor buoyancy control; and the advent of underwater photography seems to contribute

to an additional source of damage when divers try to remain still when taking pictures by laying down on the sea bottom or grabbing and anchoring themselves to irregularities that are usually biogenic substrates.

In a study conducted on the wreck of *Zenobia* off Cyprus (referenced in "Recreational diving and its effects on the macroalgal communities of the unintentional artificial reef *Zenobia*

*The ecological role of shipwrecks as artificial reefs is well established and they are often prime and exclusive destinations for diving tourism. But they are also extremely delicate and sensitive environments.*



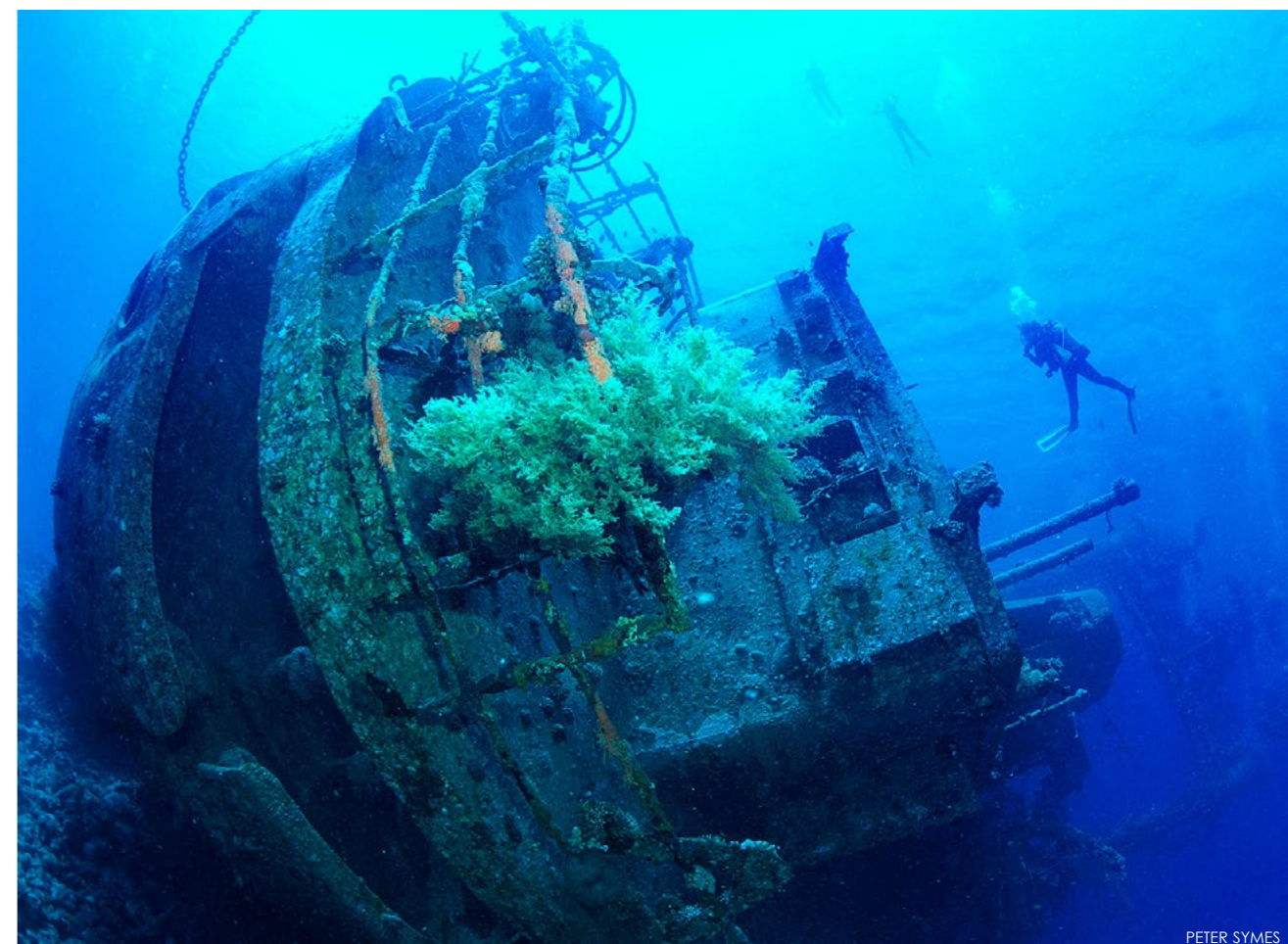
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PETER SYMES

Cedar Pride, Aqaba, Jordan, 2019. Wreck does not appear to have become more overgrown since 2002. Rather the opposite.



PETER SYMES

Gorgonian on railing at the stern of Cedar Pride, Aqaba, Jordan in 2002. Revisiting the wreck in 2019, that same railing had no growth on it.

shipwreck (Cyprus)" in the *Journal of Oceanography and Marine Research*, diving was seen to have a significant impact on the macroalgae coverage of the shipwreck, especially in areas subject to high levels of use,

and those differences in coverage and biological composition may be used as an important and significant indicator of health status. ■ SOURCES: JOURNAL OF OCEANOGRAPHY AND MARINE RESEARCH, PLOS ONE



Sipadan Island, Malaysia

## Tighter restrictions for visiting Sipadan

**Authorities are now limiting the number of visitors who get to visit Sipadan each day to 120.**

Sabah Parks has put stricter controls on diving at Sipadan island in an effort to better protect the island's sensitive ecosystem.

The coral reef has degraded slowly over time and the intensity or frequency of diving needs to be retained, Sabah Parks director Maklarin Lakim said in a statement to *Malay Mail*.

Effective 1 October 2022, one permit will only allow two dives, instead of three, per day. However, divers who have already purchased dive packages and registered with Sabah Parks will still be permitted three dives at Pulau Sipadan, instead of two.

Other restrictions include a maximum of 50 divers per dive site at any one time and there cannot be a repeat of the same dive site.

Each divemaster is allowed to bring up to four divers each and dive periods are between 7:00 a.m. and 4:30 p.m.

### Advanced certification required

Going forward, divers will also have to be certified as Advanced Open Water divers at a minimum.

In addition, diving fees have been increased from RM140 to RM250 per day for Malaysians and RM350 for non-Malaysians per day per individual. ■



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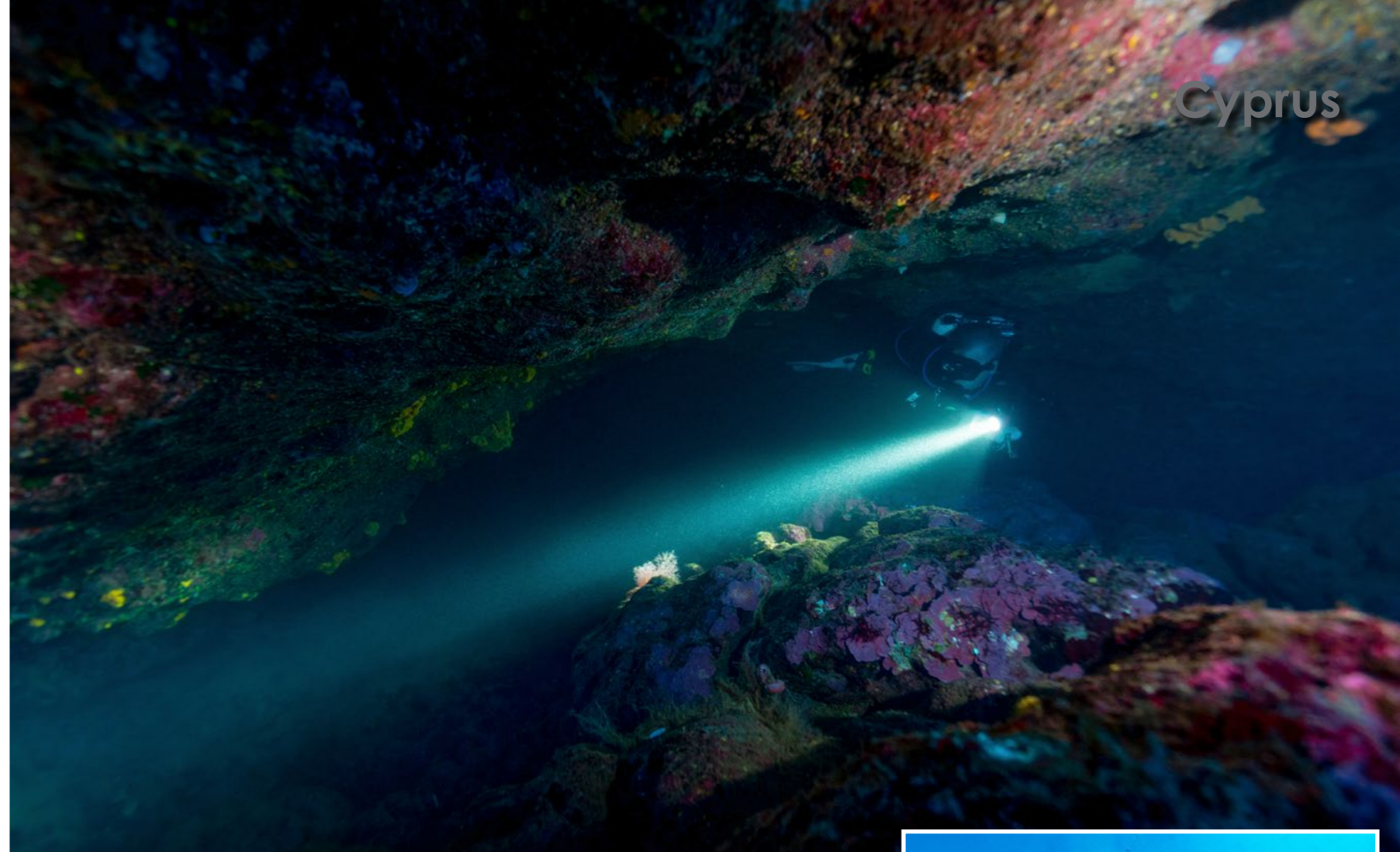
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Text by Peter Symes and Lelle Malmström. Photos by Peter Symes, Lelle Malmström and Andrey Bizyukin



Cyprus



Diver in swim-through at Geronisos Island (above and top left)

**In the far corner of Europe, in the Levant and almost wedged in-between Asia Minor, the Middle East and Northern Africa and at the crossroads of the same, Cyprus offers a nourishing mix of varied diving, culture and cuisine. Lelle Malmström and Peter Symes went to check it out.**

Lelle and I surely got our fair share of all the above in an action-filled week in the sunny island country of Cyprus, which saw us dive and explore different ends of the South Coast. Aside from some good dives, we also had some lovely land excursions, including a day spent up in the hilly, green wine country,

wandering ancient streets while sampling the local cuisine in style.

I should probably begin with a disclaimer: I have a penchant for the Mediterranean. Residing in Scandinavia, where the wonderful summers wane too fast and winters are dreary, dark and too long, it is always nice to escape to sunnier and warmer climes when the storms start howling and frost starts to bite at night. The Med is just a two- to four-hour flight from the lands of the Vikings, so I do not have to contend with the weariness of long trips, let alone whopping jetlag, which tends to bother me still more, when I must travel long-haul.

However, the main reason why I love this region is that in the Med, you can do and see so much more



Diver on Lady Thetis wreck

Diver on the Constandis wreck (above); Diver at ship's wheel on the Elpida wreck (previous page)



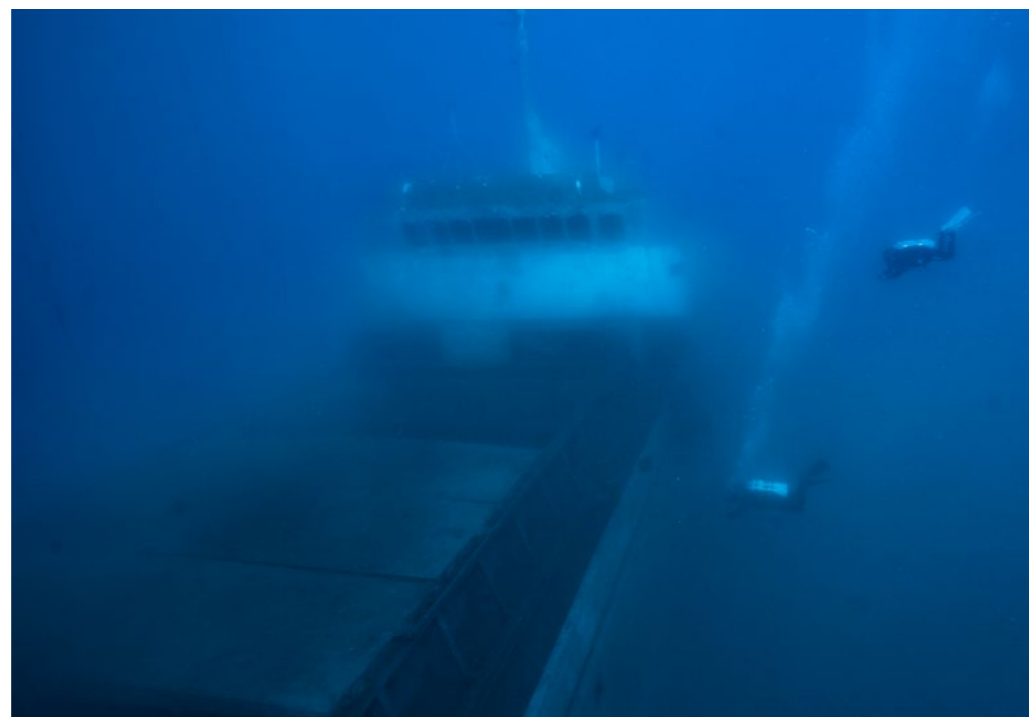


Diver on the *Elpida* wreck (above); Divers descend to the *Elpida* (right)

than just diving. I may well be just as much a dive-geek as the next bloke—I get antsy to get into the water and see what hides beneath the waves. But I am not so single-minded that I do not want to take in what else is going on, when I visit foreign lands. After all, how much time can you spend underwater every day? A few hours, tops. So, how are you going to spend the rest of your day? I am in for the whole mix. One can catch up on sleep when one gets back home.

**Diving**

So, let's dive in—if you will pardon the pun. Diving was indeed the first thing on the agenda in the wee morning hours, after a



rather late arrival in Larnaca the previous evening. It was already hot, and the sun was brutal, as we assembled our dive kit at a marina near Larnaca.

First, we were going to dive

the *Elpida* (which was sunk in 1919 to become an artificial reef), and then, the mighty *Zenobia*. I believe we were summoned so early to get a head start, before the crowds moved



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Divers explore the interior of the *Elpida* wreck (above, left and top right)

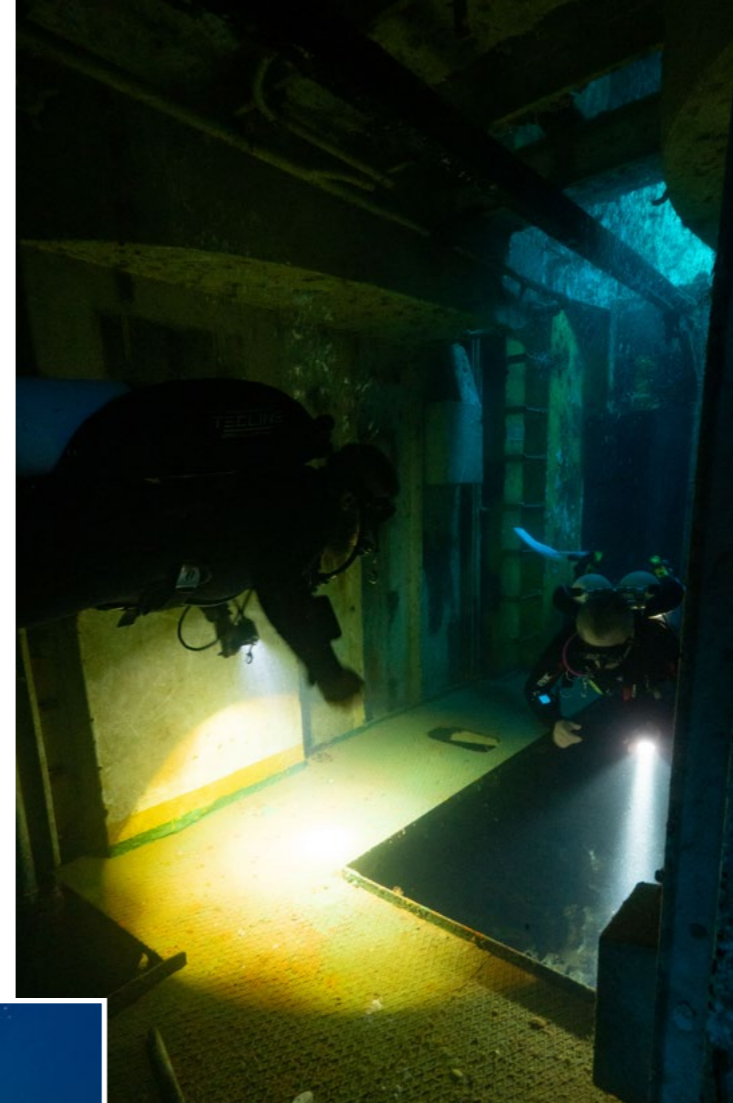
in and ruined visibility for good pictures. At least I hope so, because that would be the only acceptable mitigating factor for dragging me out of bed before I had a chance to get enough rest. Those who know me can attest to the fact that I am not a member of the perky early morning people's club. But there I was, and somewhat robotically, I got kitted up and checked my camera, after which, I was all set.

**Elpida.** Once I slipped under the almost glassy-smooth surface, I could not see anything beneath me at first, but a lot of blueness. Lelle and our guide Andreas were descending some 10 to 15m to my right, each with a wing BCD and bright white double 12-litre twin set on the back; they almost looked like



rocket ships descending in formation through the atmosphere of some alien planet, or skydivers wearing wingsuits.

Maybe my vivid imagination just ran away with me that morning, tired as I was, or coffee cravings were messing with me. In any case, it was not long before I picked out the contour of *Elpida* emanating out of the bluish haze below me, in the distance. Gradually, it came into better focus. It is quite a



Divers with twin-tanks descend to the *Elpida* wreck (left)

big ship, and we had it all to ourselves. Maybe I could forgive our planners after all, for getting me up so early.










It was a nice wreck in many ways. Being an artificial reef, it had been both cleaned and stripped of objects that could snare a diver and penetration had been made easier. The inner compartments were also quite spacious and did not have any claustrophobic notes to them, if one had such a disposition.

So, we swam about. First, we went inside the long cargo hold, which did not contain much of interest, except for some skittish fish. It was just a big open space. On the other hand, the superstructure, such as the wheelhouse (where the ship's wheel was still in place) and the stern were more interesting, with lots of spaces, nooks and crannies to inspect.

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## THE SINKING OF ELPIDA

Text and photos  
by Lelle Malmström

*Elpida* was sunk on 7 December 2019 as part of Cyprus' project to create artificial reefs and stimulate the growth of dive tourism. *Elpida*, which means "hope" in Greek, is a large 63m container ship from Greece. The wreck now lies at a depth just shy of 30m. The main deck is at 20 to 22m, and the top of the masts reaches up to a depth of 10m.

I witnessed the *Elpida* being scuttled; it was an incredible experience to see it. First, the stern disappeared, and as air trapped inside the vessel forced its way out, cascades of water shot high into the air. Then the middle part sank, and seconds later, the mast—the last visible thing to disappear below the surface. In the middle of these last dramatic seconds, the ship turned upright again, as if on command. Powerful!

As with the other artificial reefs in Cyprus, this new dive site has now been colonised by many different species of marine life. We have already seen large schools of fish attracted to the wreck followed by hundreds of chasing amberjacks. ■



In the end, we spent almost 50 minutes poking about, at depths ranging between 16 and 29m, so it was ultimately a matter of deco-limits that made us ascend, not running low on air. Those twin-12s we each carried were quite heavy to handle

topside, to put it mildly. But in the water, they were quite comfortable and very well-balanced. I enjoyed the sensation of simply having plenty of air with me, which gave me some added peace of mind and made the dives much more relaxing.

Diving with twin tanks in a wet-suit was also a new combination of equipment for both Lelle and me, but it worked quite well. We were both pleased with the combination, and I would definitely opt for it again, if it was on offer.

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**Zenobia.** About two hours and a snack later, we found ourselves descending on the nearby *Zenobia*. If there is a diver, with just a bit of experience, who has not heard about this wreck, they must have been living under a rock. It is one of the most famous shipwrecks for recreational divers, and probably the biggest within the recreational diving range.

The Swedish-built RO-RO ferry capsized outside Larnaca in June 1980 on its maiden voyage, under circumstances that have since provided plenty of fodder for various conspiracy theories over the years. It appears that a problem with the ballast occurred, and the then-advanced computerised ballast system apparently had a software bug, which prevented it from taking the intended corrective action to righten the ship. Instead, it made the list worse by pumping excess water into the ballast tanks on the wrong side.

Eventually, on 7 June 1980, *Zenobia* capsized and sank in Larnaca Bay, about 1,500m from shore, to a depth of roughly 42m (138ft), taking its estimated GB£200 million worth of cargo with it.

Famous as it was, I had surely both read and heard plenty about the wreck, but I was not quite prepared for how massive it truly was. It was ginormous and, by far, the biggest wreck I have ever visited.

As I descended and landed on the starboard side, at a depth of about 16m, all I could see was metal surfaces going on forever, in both directions. Okay, the visibility was not exactly stellar, but it was not bad either. In any case, I started moving along, having little idea where I was, or towards which end of the ship I was now heading.

In hindsight, I should have studied a diagram of the wreck beforehand and made myself more familiar with the site—my bad—or just had a better briefing that

day. Despite this, I made it to the wheelhouse area, before turning around and following the deck.

I passed under the vessel's huge starboard smokestack, which now strutted horizontally out, pointing into an empty void. I could not even see the tip of it. I ended up in the bow area, before having to turn about to get back to the downline. The ship was 175m long, so it was a bit of a swim, while tugging a not-exactly-streamlined camera rig along. So, I was left with plenty more to see and explore. But that would have to wait until the next day.

Once I was back in my comfortable hotel room later that afternoon, it was still less than 20 hours since I had left Copenhagen, having taken an almost four-hour-long flight, followed by a transfer, before checking in late. I was knackered but also filled with a pleasant feeling of accomplishment as I nodded off, completely

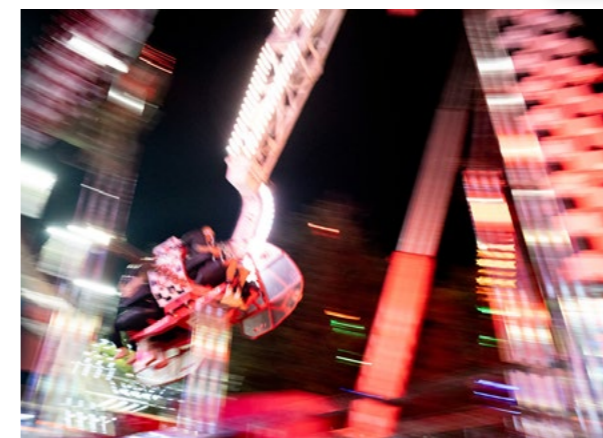
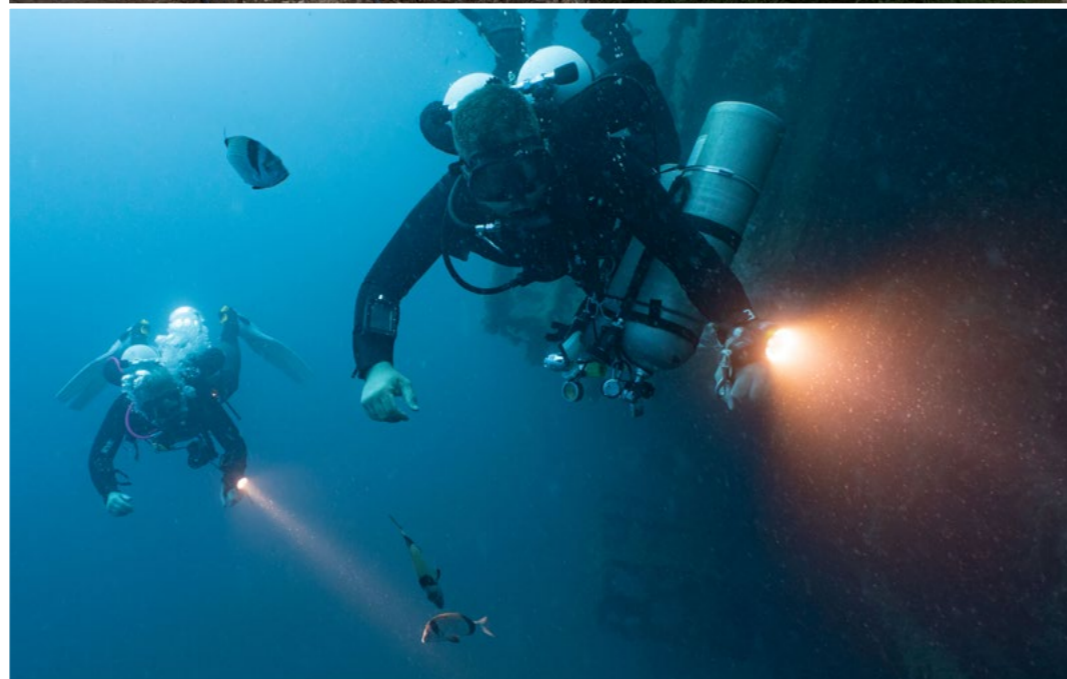
Divers explore the *Zenobia* wreck (above and top right). It is such a massive wreck, that it was hard to capture its full size in one frame.



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Divers on the *Zenobia* wreck (above); Diver at the huge propeller of the *Zenobia* (left); Sculpture park at Ayia Napa (top and upper right); Amusement park at Ayia Napa (right); Nicomas Cliff dive site (far right)

splatted on my bed, still wearing the same clothes.

I do not know how many hours I spent falling into a black hole before Lelle rang and summoned me to a late snack in the hotel bar, which was on a terrace overlooking the Mediterranean, sparkling in the moonlight. The mild air was a soothing balm, and it felt rejuvenating to be able to step away from the office for a few days.

### Second day on *Zenobia*

On my next dive to the *Zenobia*, I had a better grasp of the site I was diving, as well as the general layout of the wreck, but I still found myself finning

along extensive structures, struggling a bit to find some good angles to shoot. The surfaces of the wreck were just so long and their dimensions so oversized that the ends of them just disappeared into the hazy distance; it was hard to find interesting compositions or defining edges. I could not move far enough back either, to photograph the vessel's shape, without losing the wreck in the haze.

It was only towards the end of an already long dive, when I was nearly an hour into it, having already gone to a maximum depth of about 35m, that I spotted the vessel's huge propeller under me. I would have really liked to get a shot from down under

it, pointing the camera upwards at the giant propellers.

For a long while, I grappled with the temptation to sink down to the bottom at 42m. But I soon came to my senses. Being that far into the dive as I was, it would probably have resulted in a lengthy decompression obligation if I had darted down, and I had not planned for that. So, I gave it a pass. Next time, perhaps... Better safe, than sorry.

### On to Ayia Napa

Next, we went to stay in Ayia Napa for a couple of nights. It was a fun-filled tourist resort town where the partying seemed to be perpetual, with fes-

sive bars, fast-food joints and souvenir kiosks lining up and down the high street. Alas, in certain quarters, there was also plenty of hollering by drunk tourists behaving and dressing in ways they surely would not at home. If you are keen on bar crawling and karaoke, this is the place for you. There is even a fun fair with all sorts of joy rides, flashy lights and loud music.

Suffice it to say, this is not my kind of scene—but who am I to judge other people's proclivities? Call me a bit of a snob all that you like, I just pre-

fer a much different sort of holiday. Fortunately, the surrounding areas were quite nice, including an outdoor sculpture park, which I found interesting, and was within walking distance of our hotel.

**MUSAN.** Ayia Napa also happened to be the place where the MUSAN underwater sculpture park was located, as we reported in *X-Ray Mag* not too long ago. We were supposed to dive this site, but it was unfortunately called off because winds were



Diver with sunken statue at Turtle Bay (right); Divers with green sea turtle in a sea grass meadow at Turtle Bay (below)



picking up quite a bit and the sea became choppy, with plenty of rolling white-capped waves. Later, on an evening stroll along the pier, we suddenly found ourselves under a big sign stating that the Museum of Underwater Sculpture Ayia Napa was right there in front of us, but under the now frothing waves. We had no idea. Ah, well... It was still a beautiful moonlit evening, despite missing out on the dive. Plus, our colleague Andrey Bizyukin had already produced an **article** about it, which we published in issue #107.



ANDREY BIZYUKIN

**Turtle Bay.** Earlier that day, we drove to a place called Turtle Bay, somewhat aptly named, we would later find out. It was a little cove around the corner from Ayia Napa. It was also one of the most ideal natural confined water inlets for basic training I have ever come across. For the first 50m, the water is just thigh-, belly- or chest-deep—and it is sheltered on

most sides. There were several dive classes taking place here—or what appeared to be divers in training—as well as plenty of snorkelers.

Lelle, Andreas and I were still wearing the same semi-tech outfits, so we looked a bit out of place among all the other divers, as we swam through the shallow water to get out of the cove. Just outside the cove was a

Divers with green sea turtle grazing on the sea grass at Turtle Bay (right); MUSAN underwater sculpture park at Ayia Napa is an “underwater forest” of sculptures by British artist Jason deCaires Taylor, which was installed in 2021 (left).

little sculpture park on the sandy bottom. The depth was just 8 to 10m, which made it an ideal site to take dive students.

The statues were sort of cool and seemed to attract schools of smaller fish. Venturing farther out and across the moonscape-like terrain, we did not see a lot of fish but just more and more meadows of sea grass. Then, suddenly and out of nowhere, we spotted a small green sea turtle peacefully grazing on the seagrass. As I moved closer to frame a good composition, the turtle did not mind my proximity but kept on calmly munching away on the veggies. Eventually, it took off and glided gracefully away like a swallow, with a few but powerful strokes of its flippers.

Other than being an excellent site for students and novices, I did not quite know what to make of this location. We had quite a nice long swim along the varied bottom contours, but there was not much life to see—aside from a few skittish fish darting about, here and there.

**Nicomias Cliff.** I found the subsequent dive off Nicomas Cliff to be more interesting. Andreas had “warned” us, during our lunch break, that it was quite a “difficult” dive. But what he was actually referring to as being difficult, it turned out, was accessing the dive spot beneath a cliff—particularly if one was in bad shape.

The path down the incline was not too steep and had some steps but no





TOP ROW: Divers at Nicomas Cliff; Cyclops Cave at Nicomas. SECOND ROW LEFT TO RIGHT: Soutzoukkos made of almonds dipped liked candles in syrup; Super yummy souvlaki; Delicious Greek salad; Loukoumades, aka honey balls; Fresh market produce; Narrow street with shops at the village of Obidos

big deal. I just went up and down a couple times. I first carried my wing and tanks, and then my camera rig, before going back up one last time to kit up. No problem. We do this all the time back in Scandinavia where most of the coastline is rugged. Why risk straining oneself carrying heavy stuff, or slipping? This spot was more to my liking. It was steeper, of more varied depth and had a more interesting structure, with walls, boulders and crevices. Once again, we swam about for quite a while and managed to go to a depth of 25m. But once again,

there was not a great deal of fish life to be seen.

**Cuisine**  
Have I mentioned lunch? During the first couple of days of our trip, we only managed to have meals at our hotels due to our schedule. Breakfast at the hotels were a given, but returning to our hotel rooms quite late in the evenings, quite tired as well, for the first couple of evenings, we opted just to go downstairs for supper and quell our instincts to venture out in search of something genuinely local.

There was nothing wrong with the hotel food; it was excellently prepared and delicious. It was just that many international hotels tend to serve a somewhat same-ish range of standard dishes, such as Caesar salad, chicken salad, tortellini, burgers, etc—in order to offer something for everyone, regardless of nationality, I presume. However, in the attempt to not put anyone off, one

risks pleasing no one. In my case, the only local dish I got the first two days was Greek salad. But boy, was it yummy! The lettuce was crispy fresh, the olives succulent and intense, and the cucumber crunchy. I could eat this stuff almost every day. I surely did not mind that it was quite healthy too. But back to our lunch that day... Between the aforementioned two dives, we went to a nearby little town and sat down at a local cafe or bar,

which did not seem much, at first glance. No offence, but I would not have been able to pick it out among the many other similar-looking establishments. Yet here I was served wonderful souvlaki, so fresh that one could almost hear it bleat or moo, medium done, so that it was still succulent, and it perfectly hit the sweet spot between too dry and too undercooked, with a slight but distinct note of smoke from the barbecue.



I realise I may now sound like a downright foodie. I'm really not, but I do appreciate good and proper food. It builds and restores our bodies, and a good diet is the best medicine too. If we elect to put premium fuel in our cars, why should we not give a thought to what we put in our mouths as well? But I digress... Suffice it to say that a good meal is also a right mood enhancer. It surely did the trick for me, and I was quite content with life, as I waddled out of there with a ballooning tummy.

**Tank facility**

Between dives, we also paid an interesting visit to a unique facility. At least, I have not seen anything like it else-

where. It was a facility that serviced dive centres, not the general public, and provided all sorts of tanks and gas fills. The facility had 580 tanks, so we were told, and an impressive array of compressors, air banks and mixing panels. The scale and capacity were industrial. Here, or so it seemed, one could get any size of tank and all sorts of nitrox and trimix blends. There sure was a lot of advanced hardware crammed into the premises.

**Monument of Peace (promontory)**

Later that same day, we went up to the Monument of Peace, located

on the promontory opposite Cape Greco, which is a national park. That afternoon, we were supposed to dive a location off the cliffs, just below the monument, but the weather forecast had predicted quite strong winds, rendering it impossible to go to that spot under the prevailing conditions.

Glancing down from above, at the cove where we were supposed to go, it was clear why we could not proceed as planned. Somewhat mesmerised, we stared at the water below, which was being whipped into a white froth by pounding waves. At that point, the wind had indeed

picked up quite significantly. It was more than brisk. It also made the view all that more spectacular, with the sea behaving so dramatically, at least for a few hours. I do not know how far we could see, but it was at least 50km in each direction. It was breath-taking.

**Limassol**

This was my favourite town out of the three in which we stayed. It had a historic centre, which was undergoing continuous restoration. I was pleased to learn that much effort was going into restoring dilapidated old buildings (some of which were not much more

than virtual ruins), rather than tearing them down and building something modern. I applaud this principle. All too often, we see the historic identity of cities being ripped right out by demolition.

Our rooms at the Poseidonia Hotel offered the most spectacular view over the ocean. Some seven to eight floors up, I had a panoramic view over the ocean from my bed. What a way to wake up each morning! Imagine having an office with such a view? I could get used to that.

View from Monument of Peace (top left); Flat ocean and dive boat off Limassol (top right); Old street of restored buildings at centre of Limassol (right); Compressor filling panels (above) and lots of tanks (left) at tank facility; Monument of Peace (far left)

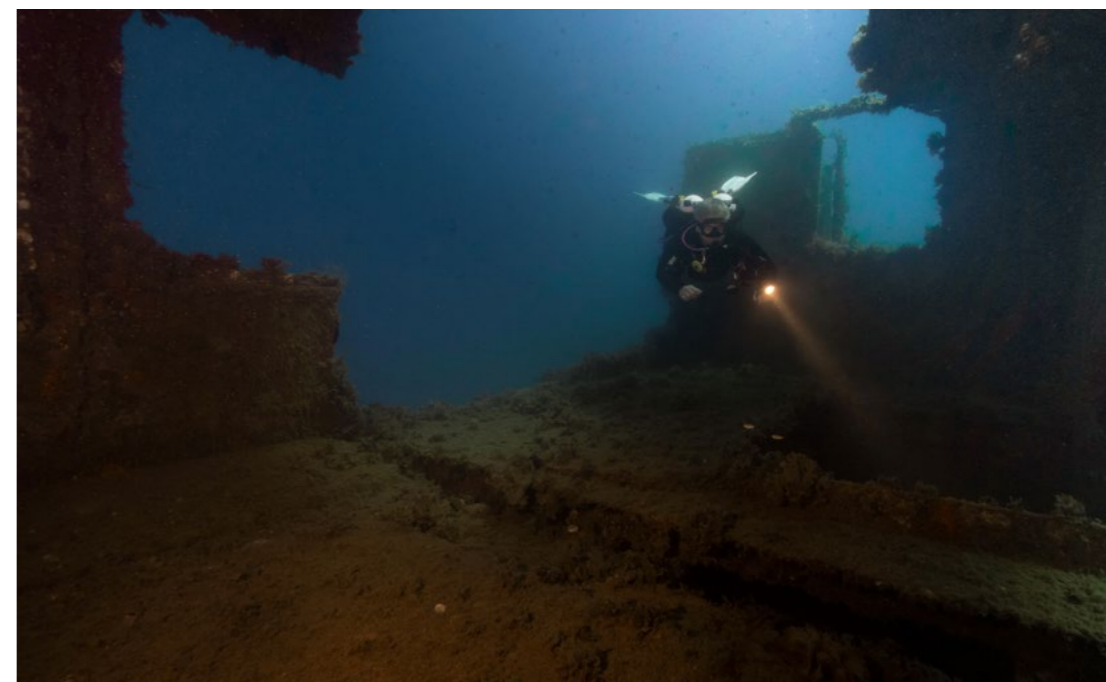


Lelle Malmström on *Lady Thetis* (top left, left and right) and backlighting the wreck's propeller (top right)

In the bay of Limassol, there were also some quite interesting wrecks, which were artificial reefs too. A pair of them, the *Costandis* and *Lady Thetis*, lay quite close to one another. So close, in fact, that it was hardly necessary to move the dive boat.

Being artificial reefs, the wrecks had been duly cleaned, with the innards made safely accessible for divers. This also meant that there would not be any historic artefacts to uncover; but it can still be quite a fun dive. At least, I enjoyed them both.

On the wrecks, one can spot schools of damselfish and parrotfish, along with jacks, local sea bream and groupers. *Constantis* wreck, which was



a USSR trawler built in 1989, sits at a depth of 25m. Meanwhile, *Lady Thetis*, which was formerly a coastal passenger vessel built in Hamburg in 1953, sits at a depth of 19m.

I think I managed to get quite a decent shot of Lelle,

with his torch backlighting the propeller and rudder of *Lady Thetis*. There were also a couple of big groupers taking up refuge here, keeping watch over the wrecks.

Also, mind you, we spotted several lionfish inside most of



the wrecks. I find the lionfish rather good-looking and photogenic, with its intricate fan-like fin structure. But sadly, it is also an invasive species both in the Mediterranean, which it

probably entered via the Suez Canal, and in the Caribbean, where it wipes out many of the local species for lack of natural predators that can keep it under control. Its fin rays are also

tipped with poisonous spikes that you do not want to come in close contact with, so mind what you grab hold of, touch or bump into, if you penetrate wrecks.

Grapes for wine on the vine (above); Wine country in the hills near the village of Omodos (top right); Grouper on the *Constandis* wreck (top centre)

**Into the green valleys**  
Driving up the hills in the hinterland and into the green valleys, where vineyards are kept and other produce is grown, was a really nice diversion from the diving; it offered a complementary contrast to the dry and sun-bleached coastline. First, we visited the ancient village of Omodos, which just so happened to be holding a reli-

Diver on the *Constandis* wreck (above and right)



Fried halloumi (left) drizzled with wine syrup (top left); Chef searing the stew meat at high temps (above); Adding celery to the stew (top centre); Adding tomato paste (centre); Peeling taro artichoke (centre right), which must be broken not cut (second from far right); Boiling the tortellini (far right); Tortellini served with white wine (top right)



gious festival and market day. We soon found ourselves wandering the cobblestone streets, looking at all the goods on display. There were all sorts of fresh produce, local specialties, including snacks and candies—the likes of which I have not seen anywhere else. We sampled foods, getting tasters right and left and enjoying ourselves mightily. We also paid a visit to the local church. It was full of patrons because of the festival. I was intrigued to note that the architecture appeared to be

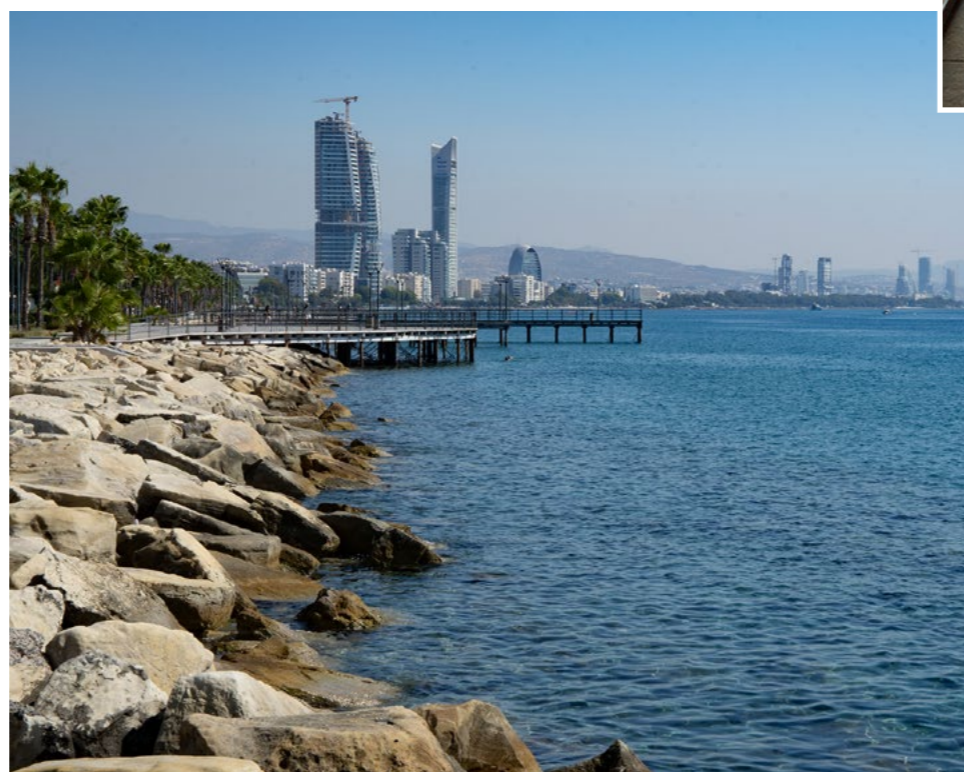
Gothic—not unlike old churches we have up in Northern Europe. The reason for this was, of course, the long and intricate history of the region where crusaders and others were in control of the island. As mentioned, Cyprus sits at the maritime crossroad between Europe and the Middle East, Asia Minor and North Africa—and it shows, if you care to pay a bit of attention, which I recommend that you do, as it places things in a wider context, giving more meaning to what you encounter along the way.

**Cooking lesson** For lunch—and here I go on again about the food, but for a special reason—we went to a restaurant at Petit Palais Platres Boutique Hotel, which has a wonderful view over the mountainous surroundings. It was a bit cloudy and markedly cooler up here, which was both refreshing and soothing, as several days out on the sea and sun-baked beaches had left my skin a tad sore from all the UV rays. Here, we had the most pleasant and interesting ex-

perience of being taught or shown by the cooks how to make a local dish with all the ingredients already lined up. For starters, we got grilled halloumi, which is a special sort of cheese made for cooking. We were implored to always go for quality halloumi, as bad or cheap varieties also taste like it. Thick slices were seared until browned and then sprinkled with grape syrup and coriander. Again, was it delicious? Wow! This was the real deal. Next was a stew made from a root vegetable, called kolo-

kasi (taro in English), and mut-ton—although beef or pork can also be used. There are different taro root varieties, but the variety grown in Cyprus is known as *Colocasia esculenta*. The root, which is some sort of artichoke, must be broken off in lumps and not cleanly cut, we were instructed. Apparently, it opens the porous surfaces that way. It is also important to remember never to wash kolokasi with water but wipe it with kitchen paper instead, as it gets peeled. Next, the meat must initially be seared under high tempera-

tures before reducing the heat. After that, various chopped veggies were added, as well as broth and seasoning, before the stew was left to simmer for an hour or more. About ten minutes before serving, some large tortellini were boiled and doused with a generous sprinkling of grated cheese (which was not parmesan). We had some local white wine to go with the dish, and for dessert, some sort of halva (confectionery) with cinnamon, syrup and ice cream. (See the recipe at: [yummycyprus.com](http://yummycyprus.com))



Inside Limassol Castle (above); Ancient Venetian Bridge (top centre); Waterfall on the mountain trail (top left)



Old centre of Limassol at night (above); Flowering rosemary (left); Cosmopolitan Limassol coastline (centre)

**Mountain trek**

Having enjoyed such a full meal, we decided to walk some of it off by taking a small hike on the mountain trails, which went through a deciduous forest with interesting vegetation. I soon spotted some wild fennel flowering and other herbs among the shrubs. After a short walk, we came to an ancient bridge that crossed a creek. It was called the Venetian Bridge and was another testament to Cyprus' long and complex history.

Farther up the creek, there was also the beautiful Caledonia waterfall,

and a dam with ducks. All this greenery and fresh water was a nice contrast to the rather dry and bleached coastal areas where we had spent most of our time so far.

But before too long, another eventful day was drawing to a close. As we drove down from the high lands, the sun sinking low, draping the landscape in soft warm light and bringing out its contours, I drifted off in deep thought, pondering the many different peoples and cultures that have

played a part in shaping the country of Cyprus.

**Limassol historic centre**

Who has not heard about King Richard the Lionheart—he, who came home from a crusade at the end of the tale about Robin Hood? In actuality, he never returned to England but died abroad. In any case, legend has it that Richard the Lionheart married Berengaria, the daughter of King

Sancho VI of Navarre, inside Limassol Castle on his way to a crusade in 1191. Their marriage lasted eight years before King Richard died, after being hit by a crossbow while besieging a castle in France.

It was not a very big castle, so paying a visit was manageable and worthwhile because of the exhibits







Museum marble relief sculpture depicting panthers (left); Antique ceramics and tiles at Limassol Castle (right); Delicious dinner in Limassol (below); Antique ceramic at Limassol Castle (centre)

Inside Limassol Castle (left). Here, it is said, that Richard the Lionheart married Berengaria, the daughter of King Sancho VI of Navarre, in 1191, on his way to a crusade.



inside. On display were artefacts from different epochs, spanning to early antiquity. I liked the intricate ceramics a lot. Surrounding the castle was a lively area with restaurants and bars, which were set in old, restored buildings, some of which I assumed must have been warehouses, tastefully decorated and furnished. It was touristy too, but in a much classier manner; many of the patrons were clearly locals, giving it a reassuring and more genuine feeling.

One night, we had a magnificent dinner in one of the establishments right beside the old castle. All the dishes were local, and we got to try something

new, learning about the recipes and preparation too.

**Paphos**

According to ancient Greek legend, the goddess Aphrodite landed at the site of Paphos when she rose from the sea, and old Paphos was the centre of worship of Aphrodite for the whole Aegean world. In classical antiquity, there were actually two locations called Paphos: Old Paphos, today known as Kouklia, which lies about 16km east of modern Paphos, and New Paphos, which was founded on the sea near a natural harbour. Archaeology buffs will have sites to visit to their hearts' content,

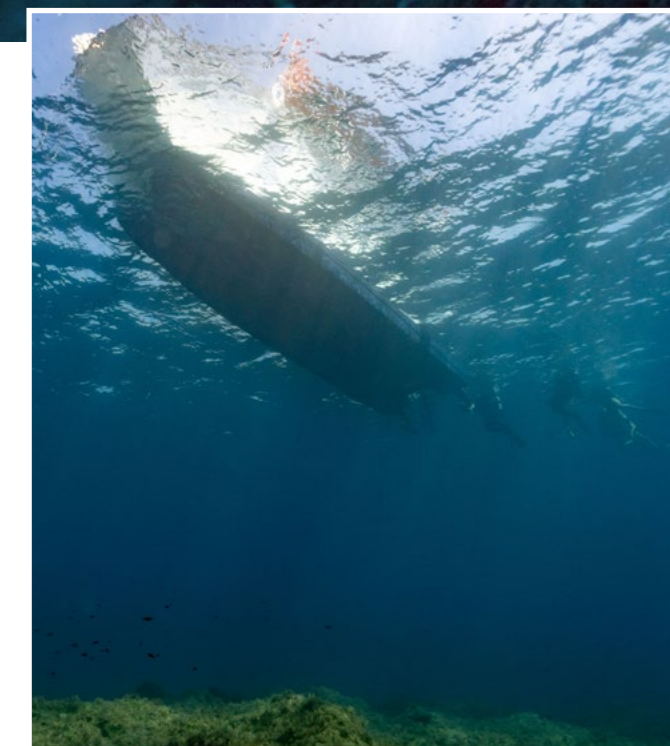
such as Paphos Archaeological Park, which covers most of the ancient Greek and Roman city.

Today, Paphos is a popular tourist resort and is home to a fishing harbour. It is also home to Cydive, the dive operator that would take us out on our last day of diving. Its facilities in downtown Paphos were quite nicely laid out, with a training pool right in the centre of the premises. I was also left with quite a good impression of this well-run operation. From Paphos, we drove farther west to St Georges Harbour, a small marina just south of Akamas Peninsula, which was the most western part of Cyprus.

**Geronisos Island**

It only took a few minutes by boat to get out to Geronisos Island, or rather the area surrounding it, because the island itself was nothing but a barren rocky outcrop. The bottom contour was quite varied, with rocks, cliffs and lots of crevices and caverns. Regarding topography, this was the most varied, fun and interesting of the dive sites we got to visit. There was also significantly more marine life out at this end of the island.

The boat was anchored over a plateau, with a depth of around 12m, from where one could easily swim outwards and relatively quickly reach much



Geronisos Island had quite a varied range of underwater topography—rocks, cliffs and lots of crevices and caverns (above, top right and far right); Cydive dive centre had very nice facilities (right); Dive boat moored over a plateau at Geronisos Island (left)



covered with a mix of kelp and sponges, it was also more colourful if one brought a dive lamp.

**Concluding notes**

If sprawling colourful reefs and macro-life are your main passion, then Cyprus is probably not the best choice and you should perhaps head out to Southeast Asia instead. But in all other aspects, Cyprus checks all the boxes. The wrecks are quite nice and varied—and the Zenobia, in particular,

can be explored time and time again. I would, however, recommend getting some advanced dive training beforehand to be able to fully explore and appreciate this majestic wreck.

Cyprus also appears to be a good location for any sort of dive training. The location at Turtle Bay is near ideal for Discover Scuba and entry-level training. But Cyprus also seems well-suited for further training, including technical diving, as the required infra-



structure is present, with plenty of dive operators to choose from.

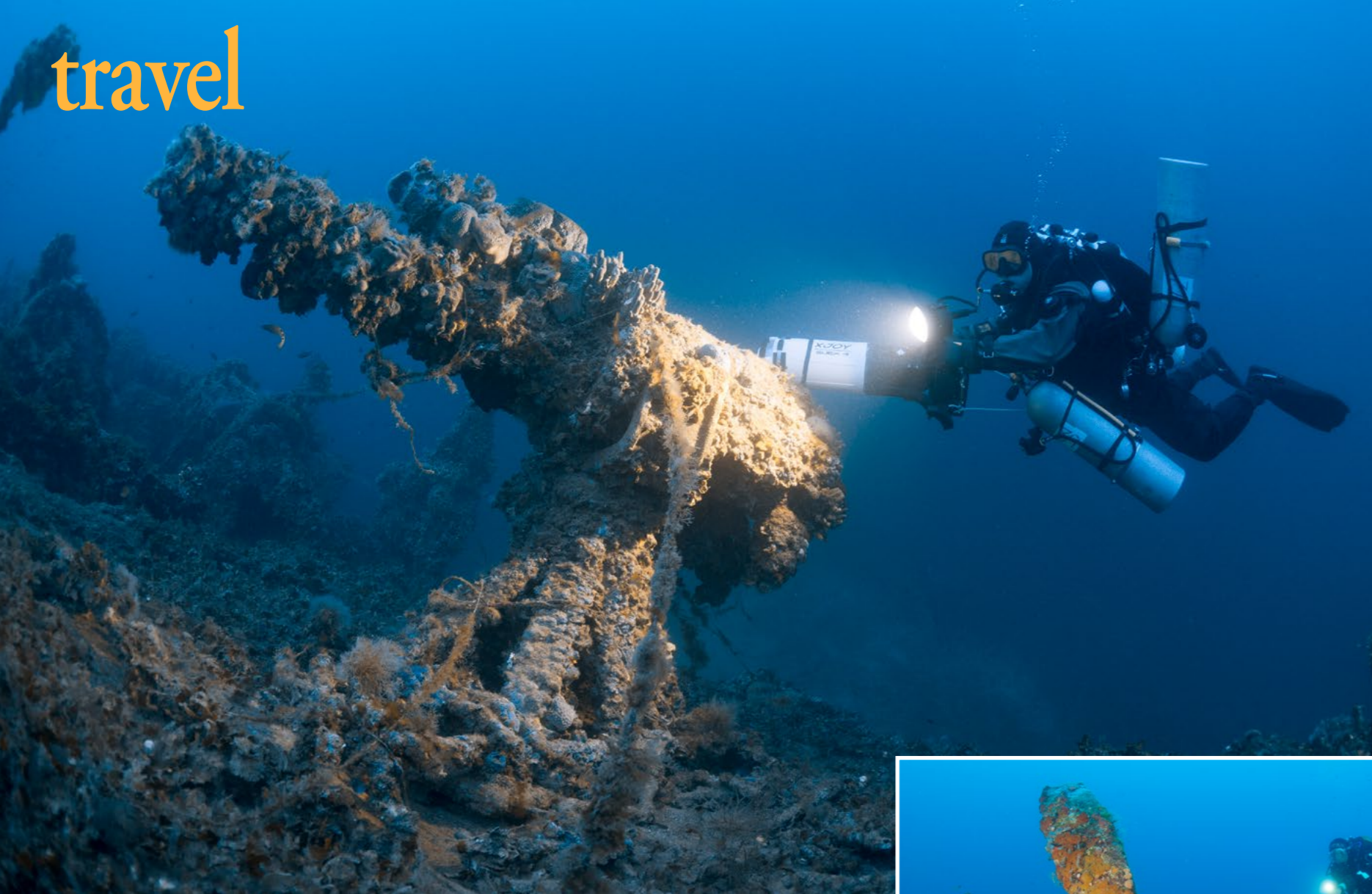
It is also a good destination for families and groups, as the island has plenty of other activities, things to do and places to see aside from diving.

One can just book a package holiday at one of the many travel agencies that serve Cyprus, and just hook up with a dive operator on location and make your own mix of diving and top-side excursions. ■

An underwater photograph showing a large, dark, heavily encrusted wreck structure on the left side of the frame. A diver is visible on the right, swimming horizontally and looking towards the wreck. The water is a deep blue, and the scene is dimly lit, with the diver's light providing a focal point of illumination. The wreck appears to be a large, rectangular structure, possibly a ship's hull or a large container, completely covered in marine life.

*Deep Wrecks of*  
**Malta**  
*— A Wartime Legacy*

Text and photos by  
Steve Jones



Malta

Diver on the wreck of SS Polynesien, Malta (above and previous page)

**The tiny Mediterranean country of Malta has seen more than its fair share of fighting throughout the ages, such is the significance of its location. Steve Jones explores the fascinating wrecks left by the World Wars.**

A stream of water trailed behind the bright orange buoy that marked our descent line, making no secret that there would be current on this dive. We jumped far upstream, yet any fast movement was made impossible by the 100kg of gear I was carrying, and the buoy rushed past before I could grab it. Without a second to waste, I squeezed the trigger and my Suex

scooter surged to life, powering me back to the line. A long hand-over-hand descent began, and the danger of overexertion lingered on my mind.

Minutes later, we touched down on the seabed at 65m, but before me, I saw only a trail in the white sand where the massive shot line weight was dragged. There was no sign of the wreck. We attached our own line to the shot line and fired up our scooters again, following the rut in the sand until we reached a colossal shadow that heralded our arrival at SS Polynesien, one of Malta's most spectacular wrecks!

Le Polynesien was a 6,373-ton



French liner sunk by U-boat UC-22 on 10 August 1918 during the closing stages of World War I, killing ten. It was carrying Serbian troops at the time. Lying some 11km from Malta's capital, Valletta, this large wreck lay on its port

Diver on wreck of Bristol Beaufighter in Malta (above); Diver with WWII wreck of a Royal Air Force Blenheim Bomber, which lies at a depth of 40m, off the coast of Malta (centre)





Divers on the wreck of the British steam tug HMS *Hellespont*, which was sunk by a bomb in World War II.

side and had an intact hull.

We had arrived on the wreck amidships and headed toward the bow, viewing the spectacular superstructure on the way. A solitary gun stood upright, encrusted in marine growth amongst deck machinery. We then looped around and headed back toward the stern where open holds and shafts enticed deeper exploration of this 150m-long ship. In what seemed like no time at all, we reached our time limit, yet only a fraction of the wreck had been explored on this one dive. During the long decompression stops, I pondered which areas to visit on my next dive on this majestic wreck.

### An island under siege

During World War II, Malta became one of the most bombed locations in history. Its position was important to British forces as they attempted to disrupt the supply lines to the opposing armies they were facing in North Africa. Initial attention from Italy was met with stubborn resistance, but the Italians were soon reinforced with highly capable German forces with a clear objective: Malta had to be neutralised as a threat once and for all!

Malta was besieged and the population starved. Constantly short of ammunition and fuel, outnumbered defenders were faced with increasing numbers of

attacking aircraft. A ferocious and unrelenting aerial war broke out that proved challenging for pilots from both sides, some of whom had already faced each other in the equally fierce aerial war in the Battle of Britain.

The key to Malta's survival was to keep the island supplied, and convoys became the vital life-line. Allied aircraft carriers made dangerous passages through the Mediterranean to get within range to fly their fighters to the island. Cargo ships carrying food, fuel and ammunition were under constant attack, which continued even if they made it to the harbour. Much of the legacy of the battle for Malta can still be found



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in the clear blue waters that surround this tranquil island.

### HMS Southwold

In March 1942, with the siege at a peak, convoy *MW10* steamed toward Malta with desperately needed supplies. They were spotted by an Italian battleship, but rather than retreat, the vastly out-gunned escorts attacked and, despite taking heavy damage, prevented the cargo ships from being intercepted. As a consequence, however, the convoy's arrival was delayed until the daylight hours, exposing it to aerial attack. HMS *Breconshire* was hit, and when the destroyer HMS *Southwold* attempted to tow the stricken tanker away from a British minefield, a mine exploded, killing five. *Southwold's* hull then split into two, whilst she was under tow.

These halves of the *Southwold*

now make two separate dives, as they lie 300m apart. The bow lay completely on its starboard side in 68m of water, and we started our exploration near the area where the ship was torn into two, a scene of complete devastation with masses of torn, twisted metal. We scooted forward, passing the top of the recognisable bridge. The whole forward area of the ship was still intact with the main guns pointing straight toward the bow.

A few days later, we ventured to the stern, which at 72m, lay slightly deeper and was upright. Aside from the damage at the break, it was in very good condition, and our first sight was the rear guns, which were still angled upwards as if ready to fire, reminding us that this ship was at battle stations when it went down.

Neatly arranged depth charg-

es could be seen in their racks, and amazingly, the nameplate of the ship was still there. Taking artefacts from any wreck here is strictly forbidden, evidenced by the number of personal items that still lie on the wrecks, preserving the scene from the day they went down. Dropping over the stern to the seabed, I arrived at the huge propellers, still attached, before our time constraints at this depth drew this visit to a close.

On several occasions in 1942, this country's fate hung in the balance and the surrender date, when fuel, food or ammunition would run out, was sometimes only weeks away. However, with dogged resistance aided by increasing numbers of deadly Spitfire fighters making it through the blockade, the aerial battle began to swing in favour of the defenders. The Axis powers changed their tactics, concentrat-

THIS PAGE: British destroyer HMS *Southwold*, which lies at 70m, was sunk by a mine in WWII.



THIS PAGE: The wreck of a German Schnellboot, a fast-attack torpedo boat, resting at 65m. The wreck is covered in ammunition, depth charges and the torpedo tubes are still loaded.

ing their efforts on trying to stop the convoys that were keeping Malta in the fight.

*“Malta is one huge battery of anti-aircraft guns.”*

— Luftwaffe Ju 88 Bomber pilot

### Exploring S-31 Schnellboot

HMS *Welshman* was a fast ship, targeted by the Axis powers due to its success on supply runs to Malta. In May 1942, a flotilla of seven

Schnellboots (fast-attack torpedo boats) set off to sink the *Welshman* before it could reach Malta.

Whilst laying a minefield, the S-31 Schnellboot exploded, probably after detonating one of its own detached mines. Half of the crew of 26 lost their lives.

A current-free descent revealed a wreck like no other I had seen before, looking more like a dinosaur’s skeleton than a torpedo boat. The S-boats were built for speed, constructed of a mahogany outer hull and light metal

frame, but the wood had long since rotted away, giving it a distinctive appearance. It was a small 35m-long wreck, but at a depth of 65m and with plenty to see, there was no time to waste. Swimming down from the bow, we soon came across the huge port-side torpedo tube, where an open door revealed a loaded torpedo. S-boats had two of these 533mm diameter torpedo tubes and packed a mighty punch.

Slightly aft of the torpedo tubes, we came to the scene of that cata-

strophic explosion. Ammunition cases lay scattered amongst numerous artefacts, and we swam past oil barrels before coming to the engines. This craft had not one but three huge Daimlers that provided 3,960BHP to the ship, which weighed only 102 tonnes, propelling it up to 38 knots. My dive partner, Steve Wilkinson, carefully placed my high-powered Orcalight inside the hull. The beam set up a surreal parting scene, making the wreck resemble a dragon’s head, breathing fire one last time.

### Stubborn by name, stubborn by nature

Regardless of which side they fought for, the life of the submariner during both world wars was fraught with danger. The statistics say it all: 52 US, 79 British and a staggering 784 German submarines were lost in WWII,



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THIS PAGE: Scenes from the wreck of the British submarine HMS *Stubborn*, which lies at 55m of depth.

with little chance of any crew member surviving a sinking. It was a sombre thought, before we descended onto a British S-Class submarine.

The cigar-like shape of this heavily armed, highly manoeuvrable patrol vessel appeared out of the blue gloom, and we arrived near a well-preserved conning tower, which lit up in beautiful shades of red and yellow under our powerful lamp beams. In the crystal-clear water, we could see the deck stretch away to the bow, and it was easy to imagine the view the captain once had whilst the ship was at the surface. Swimming forward along that deck, we passed an open hatch before coming to the large hydroplanes, which controlled the submarine's pitch in the water, helping to determine the angle of

dive or ascent.

It was in 1944 that problems with the rear hydroplanes nearly brought about the end of this ship. Following an unsuccessful attack on a German convoy in Norway, the escorts retaliated with 36 depth charges, jamming HMS *Stubborn's* rear hydroplanes in hard dive position and sending it to over 115m. The vessel resurfaced twice, still under attack before a third uncontrolled dive sent it beyond 150m, much deeper than its maximum operating depth!

The *Stubborn* bounced off the seabed four times, as a further 16 depth charges exploded nearby. The attackers broke off, and the crew just managed to generate enough gas to get their sub back to the surface,

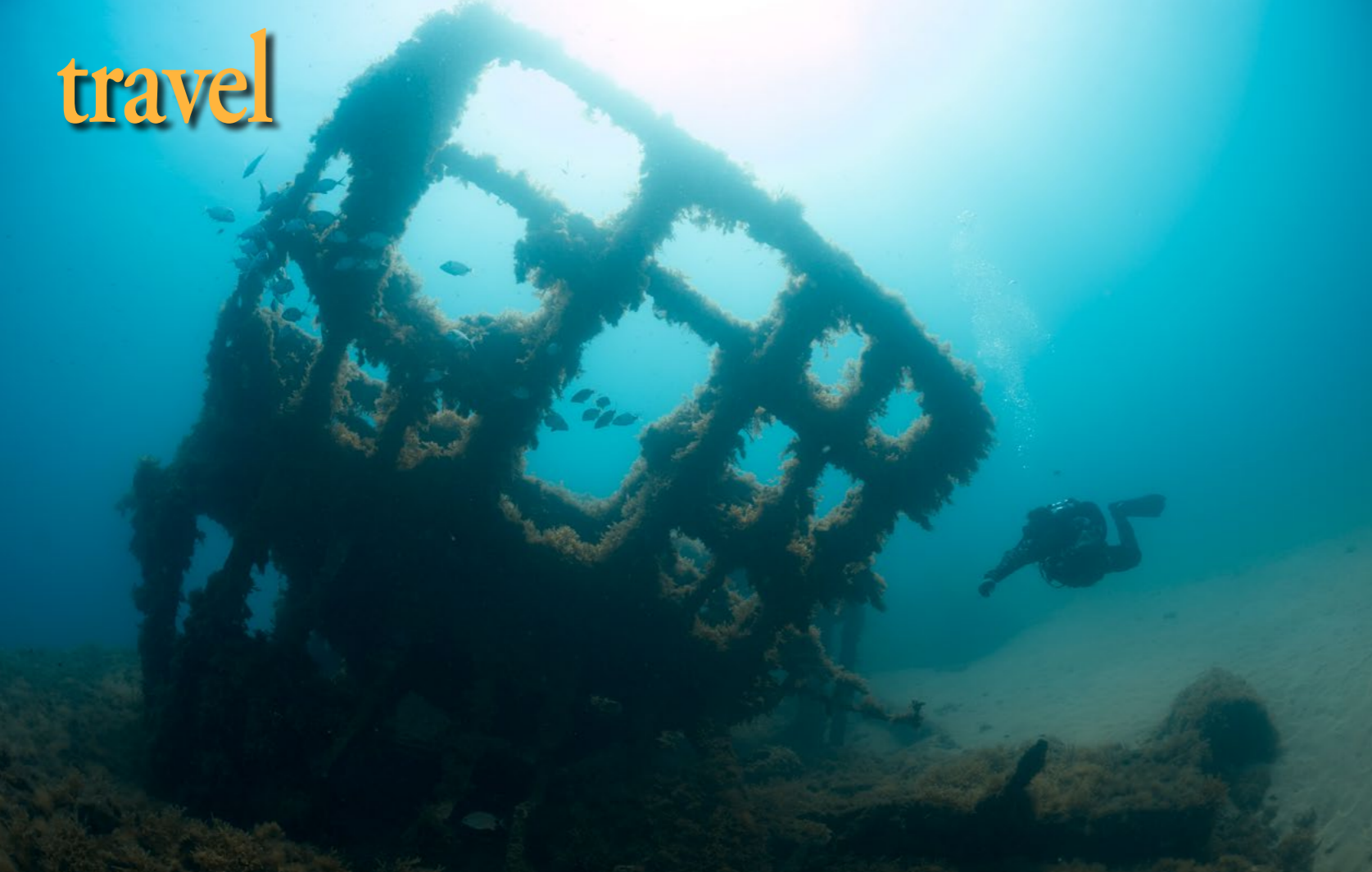
heavily damaged. As it set sail for home, the rudder then disconnected, but *Stubborn* was true to its name and made it back, its hull resembling a skeleton's chest due to the buckling caused by the water pressure.

We dropped to the seabed at 55m, and the sleek, knife-edge bow came into view, along with the forward torpedo tubes of which there were three on each side, giving the wreck an aura of menace. It rested nearly upright with a slight list to starboard, which allowed the sunlight to bathe the port side, illuminating this remarkably well-preserved wreck.

HMS *Stubborn* finished the war in the Far East, during the final months







Diver with wreck of British destroyer HMS Maori, which lies at 10-15m in Valletta harbour. Maori was sunk by a bomb in WWII. It is famous for helping pick up survivors from the sinking of the German battleship Bismarck.

of the battle against Japan. Afterwards, it made a final visit to Malta where its career ended. It was scuttled as an anti-submarine warfare target in 1946. Even though the British Royal Navy knew its location, it was not until 1994 that its position became known to divers.

By November 1942, German and Italian air power were diverted to support the fierce fighting in North Africa, and the siege of Malta came to an end. The Allied aircraft stationed here continued to disrupt Axis supply lines utilising formidable strike aircraft such as the Beaufighter, putting further strain on Axis commander Erwin Rommel's already pressurised forces. Such was the Battle of Malta's impor-

tance that, if it had fallen, it could well have affected the tide of the North African campaign. In these waters, divers can now visit the legacy of one of World War II's lesser known, yet pivotal, battles. ■

Special thanks go to operator DiveWise Malta/TechWise Malta ([divewise.com.mt/techwise.com.mt](http://divewise.com.mt/techwise.com.mt)), and to models Steve Wilkinson, Stephen Scerri, Howard Shaw and Alan Whitehead.

Steve Jones is an underwater photographer and journalist, whose award-winning work has been published in over 40 countries during a career spanning three decades. As a true all-rounder, his list of assignments

has included colossal battleship wrecks in the deep north Atlantic and sub-zero encounters with apex polar predators to equatorial seascapes awash with strong currents. He is a Blancpain Edition Fifty Fathoms photographer, a field editor at the Ocean Geographic Society and a member of the Ocean Artists Society. His thoroughly researched writing covers both maritime history and marine ecology. Visit: [millionfish.com](http://millionfish.com)

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## MALTA'S OTHER WARTIME WRECKS

Text and photos by Steve Jones

**Beaufighter:** The hardy twin-engine Beaufighters saw much service in Malta. This aircraft took off on an anti-shipping mission in March 1943 but developed engine trouble. Both crew members escaped unharmed. The wreck is at 40m on bright white sand, a short boat ride out from DiveWise Malta.

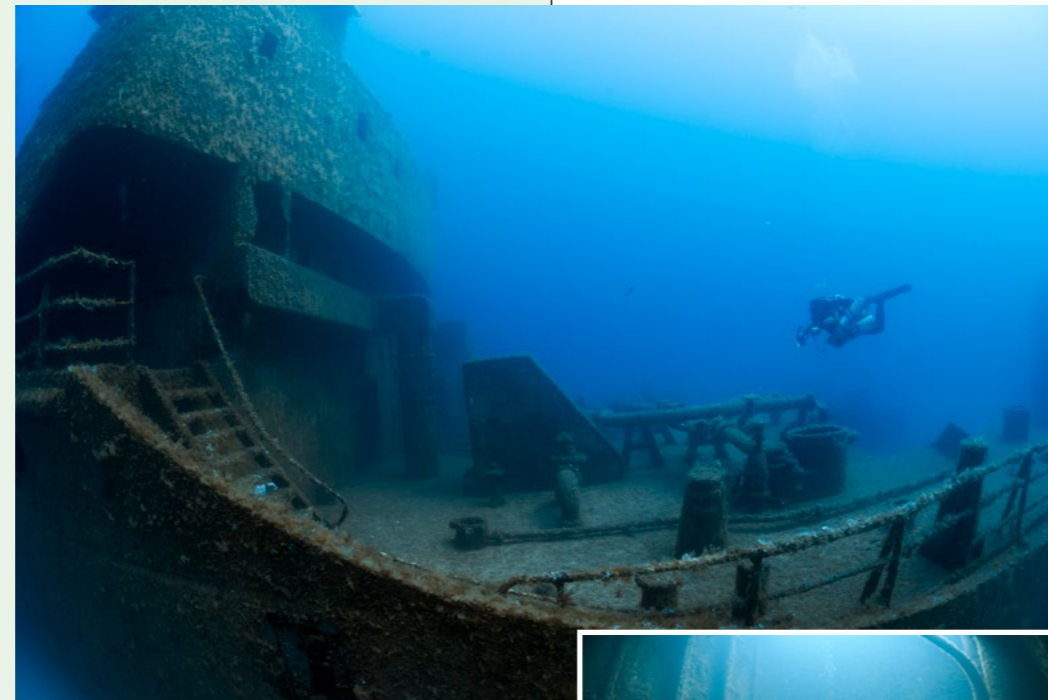
**Blenheim Bomber:** Shot down by an Italian fighter in December 1941. The pilot ditched at sea and all crew members were rescued. Now, it lies at 40m, with one propeller still attached.

**HMS Hellespont:** A paddle steamer tug sunk by Axis aircraft in April 1942, it lies upright at 45m outside Grand Harbour, with lots to see.

**HMS Maori:** A destroyer that participated in the hunt for the mighty German battleship *Bismarck*, this is a popular shore dive in around 15m of water in the Grand Harbour. It was sunk by a bomb in 1942, and later cut into two. The bow lies in St Elmo's Bay whereas the stern was towed to deep water.

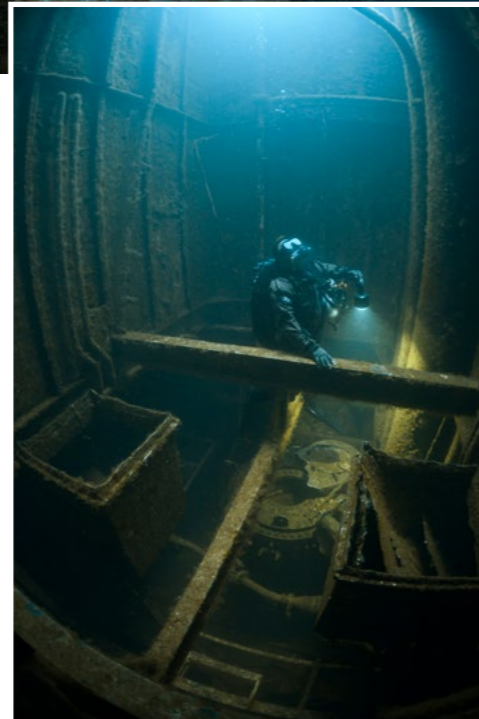
**HMS St Angelo:** A tug used as a minesweeper, it was sunk in May 1942, and lies at 55m near the harbour.

**HM Drifter Eddy:** A small minesweeper struck by a mine in May 1942 with the loss of eight lives. Wreck lies at 55m.



**X127 Lighter:** Originally built to support the ill-fated WWI Gallipoli landings, then used as a fuel barge when it was sunk by dive bombers right in front of the submarine base on Manoel Island in 1942. Lies between 5 and 22m. Visibility is often poor but it is a historically interesting wreck.

**Worth knowing:** Over the past few decades, multiple other ships such as the massive *Um el-Faroud* have also been deliberately sunk as dive sites. Malta is a wreck diver's oasis. ■



Royal Air Force Bristol Beaufighter (above); British steam tug HMS *Hellespont* (top right); X-Lighter craft X127, famed for taking part in the Gallipoli landings in WWI, was bombed and sank in Valetta's harbour in WWII (top left); Diver on and inside the wreck of the massive *Um el-Faroud*, which was deliberately sunk as an artificial reef (centre and left)



# Penghu

*Dive into Taiwan, Part 2*

Text by Simon Pridmore  
Photos by Kyo Liu



Table corals, Penghu in Taiwan (above); Penghu beach scene (top right); Anemonefish on anemone garden (right); Persian carpet flatworm (previous page)

**The Penghu Islands, an archipelago of 90 islands and small rocks in the middle of the Taiwan Strait, is a location of incredible landscapes with unique basalt columns and is home to some of Taiwan's most beautiful beaches and marine protected areas, which offer some of the best diving in Taiwan. Simon Pridmore has the story.**

Taiwan is a group of Pacific islands surrounded by warm tropical seas. It is easy to get to and get around, and it is a first-world society with outgoing, friendly, laid-back

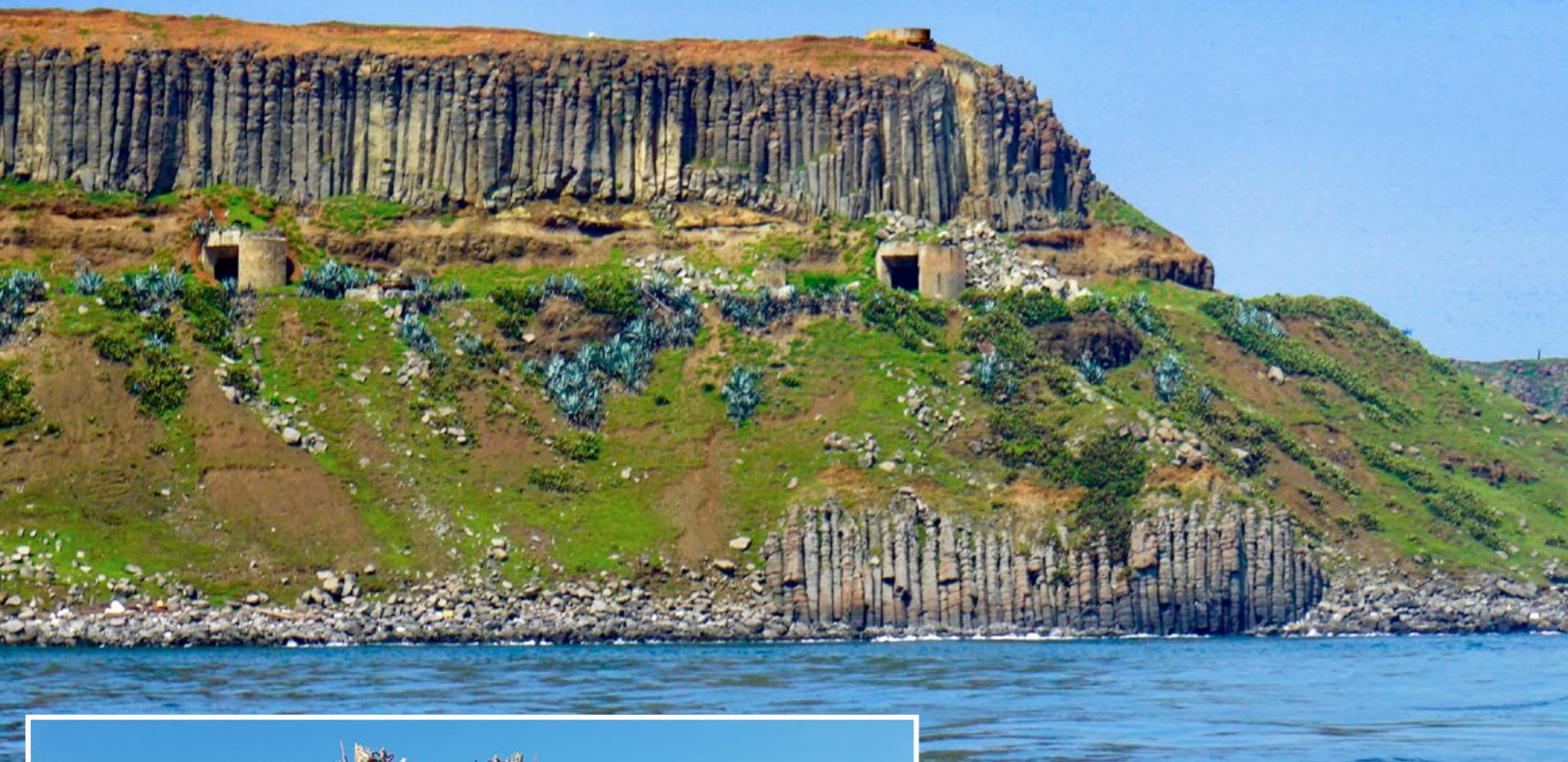
people. Taiwan offers some very good scuba and a network of dive centres and resorts, with first-class professional staff, equipment and services. They offer scuba experiences, basic training courses and fun diving for a young, enthusiastic first generation of Taiwanese divers.

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 there, and very few people inside Taiwan have ever thought to tell anyone about it. That was 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 second in a series of six articles, each covering one of Taiwan's diving regions,

SOHE HOSTYN



Penghu's unique geological formations of basalt columns, with old bunkers (above); Submarine postbox (right); Island temple (left)

**Penghu**

You have probably never heard of Penghu. Yet, it is a substantial archipelago consisting of 90 islands and small rocks in the middle of the Taiwan Strait and its main city of Magong is home to 60,000 people.

The Penghu Islands are a spectacular geological marvel, they have some of Taiwan's most beautiful and deserted beaches, and a Marine Protected Area (MPA) that has arguably the best diving in Taiwan.

There are a few diving operations in Magong City, but they tend to concentrate on providing scuba experiences and beginner courses for non-divers. The sites are all shore dives,

and the most distinctive of these is off Suogang Village on Penghu, where there is a submarine mailbox at a depth of around 5m. Local dive centres sell waterproof cards for divers to send underwater wishes to friends and family—written in waterproof ink, naturally. The centres then take turns emptying the mailbox and posting the cards off.

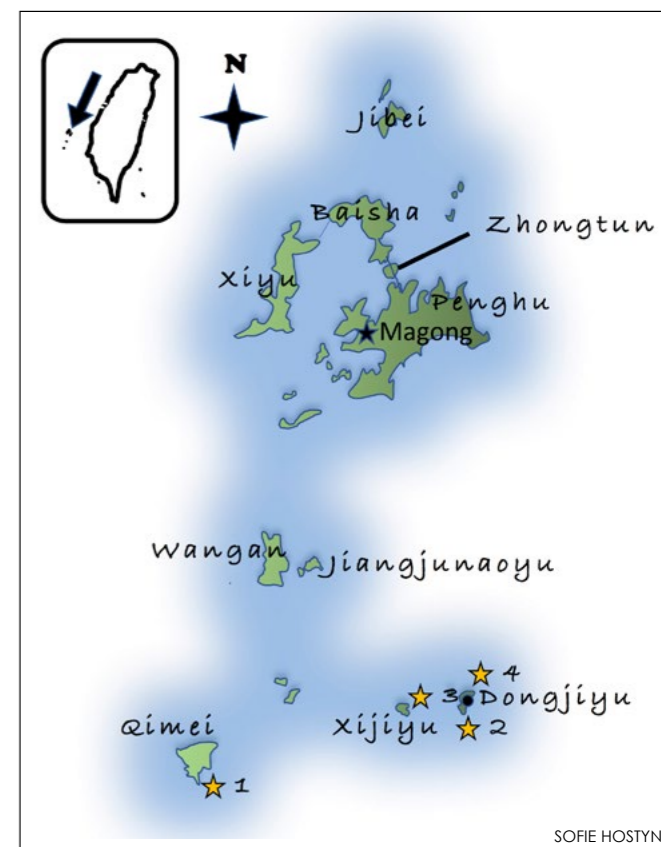
Experienced, adventure-seeking divers, however, will eschew the beaches of Magong and head straight down to southern Penghu for boat diving and some more challenging sites. There is only one dive operator currently offering dives inside the MPA and it runs 4-day/3-night packages between April and September, with pick-up from Magong Harbour early on day one and drop-off early on day four (which is day one for the next group). They have only one boat

and it carries a maximum of 24 divers, which means that the sites in and around the MPA see fewer than 700 divers per year.

**A typical South Penghu dive trip**

You need to be at the dock early for a 9:30 am departure. It is already hot but, if you get there early, there is plenty of shade available. The dive boat appears and offloads the people from the previous trip to make room for you. The boat has a covered dive deck with tank racks and the air-conditioned cabin has rows of seats like a small ferry.

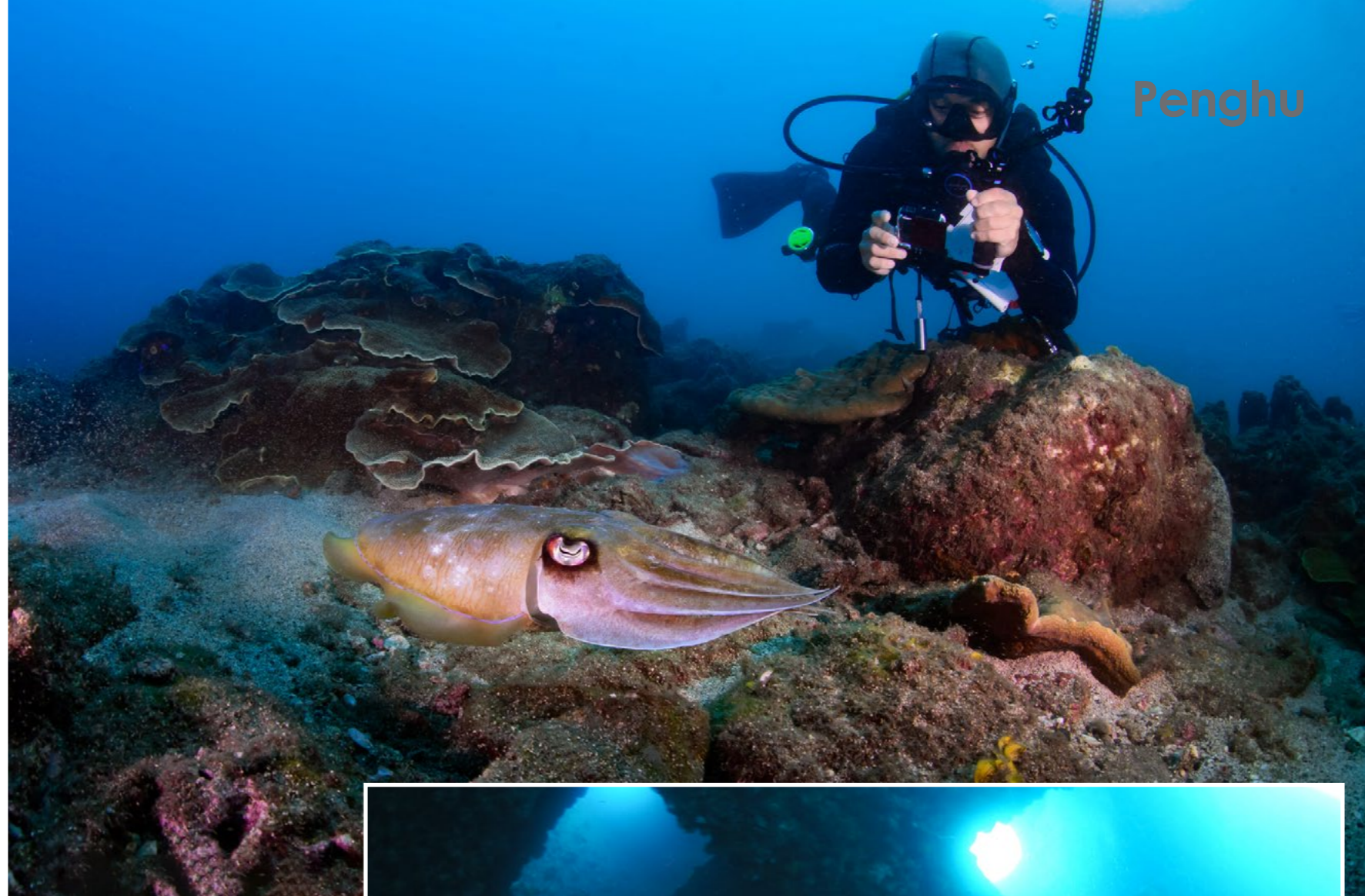
The journey to Jiangjunaoyu takes about 45 minutes. You can chill in the aircon, but the best views are from the dive deck, especially as you pass tiny Tongpanyu and long, thin Hujungyu soon after leaving Magong. Both islands have long coastal ridges



Map of Penghu Islands in Taiwan



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 fully 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.



Penghu

Stingray inside Lingyun Wreck (above); Diver with cuttlefish (top right); Diver explores the interior of Lingyun Wreck (lower right)

of basalt pillars and old, long-disused pillboxes and gun emplacements wedged into the cliffs.

You soon enter a narrow strait with the flat expanse of Wangan Island on the right and, on the left, Jiangjunaoyu, your home for the next three days. In the harbour, fishing boats are lined up at the docks on all sides. Your cylinders are waiting for you in front of the blue walls of the Island 77 Dive Centre. You unpack fins, BCDs and regulators and leave them beside the boat for the crew to load. After lunch, you reboard the boat and head south towards the MPA, passing a series of rocks that, in summer, provide a temporary home for thousands of migrating terns. Your first dive will be a checkout dive in a shallow bay, where there is little current or wave action.

### Lingyun Shipwreck

Due south of Qimei lies the wreck of a decommissioned Taiwanese Navy Lingyun-class inter-island passenger/cargo vessel, sunk twenty years ago as a fish aggregation device. It rests on its starboard side in the middle of a large sand pit at 30m. These days, it seems to attract divers, rather than fishermen, as there are no nets on it, nor is there any other sign of fishing activity.

There is not much coral growth, but there are plenty of fish and it is in the open sea, so expect some current. If the water is running, the dive boat will drop you upstream so you can drift to the wreck as you descend and then tuck in behind the ship in the calmer waters on the lee side, in the current shadow. Ideally, this will be the deck side with its superstructure and cargo booms, rather than the hull. All

around the wreck, the seabed is covered in a field of white coral whips, which undulate gently in the flow.

The deck has a few large inviting holes and offers some easy swim-throughs. Outside the ship, the visibility may be poor, depending on which way the current is running, but inside, the water is gin-clear, though dark. At least, it is like that before any careless divers go in and swim too close to the silty floor.

Having said that, on this wreck, it is not always the divers that are to blame for a silted-up swim-through. Any one of the spaces you enter may already be occupied by a group of huge marble rays that live inside the ship.

On one Lingyun dive, as we drifted lazily down a corridor, our lights illuminated a bright flash of white ahead of us. Several more flashes followed.



We had come upon the rays and what we were getting were glimpses of the white underside of their massive skirt-like fins as they gently circled in the darkness. As we drew closer, they became aware of us and began

flapping in agitation, throwing up clouds of silt into the previously clear water and turning the visibility to zero.

Outside the wreck, you can expect to find schools of barracuda, trevally, batfish and rabbitfish as well as blue-



striped angelfish and red-bar anthias. You will also see a wide variety of unusual surgeonfish, many of which do not feature in any of the standard marine life guides. This is something experienced Coral Triangle divers coming to Taiwan for the first time will notice all over the place. Many of the fish you encounter are like the ones you are used to seeing, but they have different patterns, designs and configurations.

### Wolf East

The dive off the south of Dongjiyu that they call Wolf East is likely to be the most exciting and rewarding of your Penghu dive trip, although, as always with big-animal encounters on land or sea, nothing is ever guaranteed. The main attraction here, apart from schools of surgeonfish, snapper and sweetlips, is a giant school of very large, fat yellowtail barracuda, which hang in the current sweeping around

the tip of the island.

You drop into calm waters in the shallows and your guide leads you out to the edge of the bay, does a quick check to make sure you are ready, and then gives the signal to go. After just a few kicks, the current picks you up and sends you flying. The pattern of the dive is to fly for a while, then stop in a patch of the reef where there are bommies to hide behind, out of the main thrust of the current. A reef hook is a handy thing to have with you at this point. You wait for a few minutes to see if the barracuda come along and, if they do not, on your guide's signal, you let go and fly off to the next stopping point. If they do show up, you hang with them for as long as you can as they swirl and surge around you.

The direction of the current flow here usually means that the farther you go, the deeper you get and,

once you are deep, there is no turning back—hence the wisdom of the fly-hang-fly-hang strategy. If you were just to fly, you would soon be in water too deep for you to be able to follow the seabed down any farther and the dive would quickly be over.

### Dongxiji Channel

In-between Dongjiyu and Xijiyu, an enormous pinnacle with a series of

smaller bommies around it acts as a magnet for oriental, gold-spotted and silver sweetlips, black snapper and red snapper, many and various types of surgeonfish, semi-circle angelfish, blue-lined angelfish, blue-barred parrotfish and regal angelfish. The list goes on. The rocks are completely covered in red, short, flowery algae and yellow tubastraea, making this a very scenic dive.

Oriental sweetlips at Wolf East (above); Island 77 dive boat (left inset); School of barracuda at Wolf East (far left)

Again, there will be current running through the site, but navigating your way around the rocks is usually quite easy. It is worth pointing out here that Penghu, Green Island and Orchid Island are all well known for drift diving, but conditions are certainly no more difficult here than at other dive destinations elsewhere in Asia famous for strong currents, such as Komodo, Bali or Raja Ampat.

### Dongjiyu Lavender Fields

These fields of lavender-blue staghorn coral are famous all over Taiwan. Along with the twin-heart-shaped fish weirs of Qimei, they are an iconic symbol of Penghu. This is mainly because they are accessible not just to divers, but snorkelers too, and a swim over the top of this reef is part of many of the island-hopping tours.

At depths of 6m and less, the purple staghorn is juxtaposed photogenically



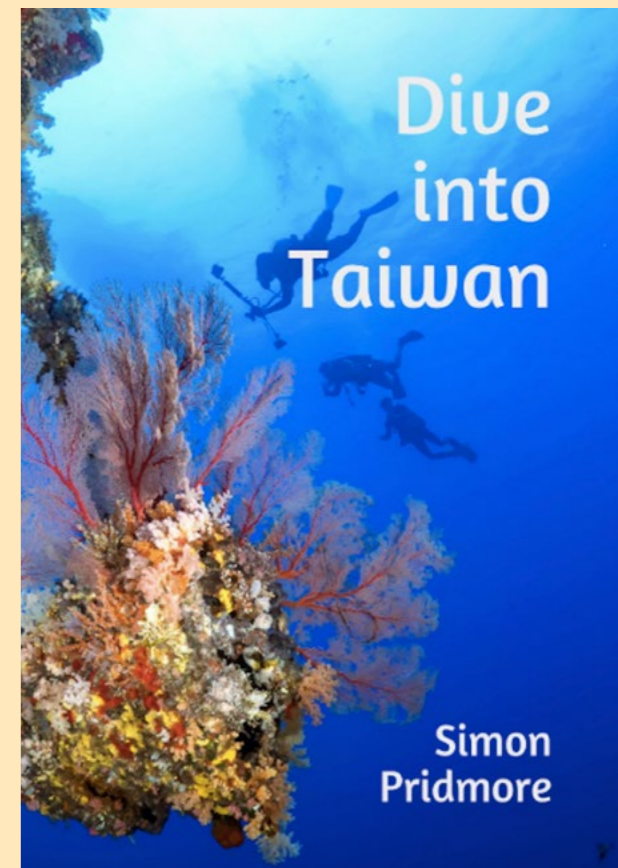
## Dive into Taiwan by Simon Pridmore

"In this book, Simon Pridmore takes the reader beyond the beaches and into the waters of six regions of excellent and exciting diving and snorkelling that the Taiwanese have enjoyed for some time—while the rest of the world has not had much of a clue. The beauty of this book is that the author intends it to be an immersive experience in more ways than one. He really wants you to dive not only into the waters, but the people, the food, the lifestyle... the entire Taiwan experience."

— Lonely Planet author Tim Rock

"This is the first comprehensive guide to scuba diving in Taiwan ever published, and it has the feel of an instant classic. Huge praise goes to photographer Kyo Liu. Almost all the underwater photos are his, and they're invariably superb."

— Taipei Times



Dive into Taiwan is available via Amazon, Apple, Kobo and other online bookshops worldwide.

Divers at Lavender Fields, Penghu (left); Sea apple at Xijiyu (lower left); Passing classic Penghu topography at Xijiyu (right)

Penghu dive operators include Gooday Dive in Magong [gooday-dive.com](http://gooday-dive.com) and Island 77 ([facebook.com/groups/1163605790420843/](https://www.facebook.com/groups/1163605790420843/)).

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, see: [SimonPridmore.com](http://SimonPridmore.com).

out in the staghorn, but also clouds of baby two-tone dartfish, lemon coral gobies, schools of sixbar wrasse, pearl-scaled angelfish, orange-tail filefish and wire-net filefish. It is a small-fish fancier's dream.

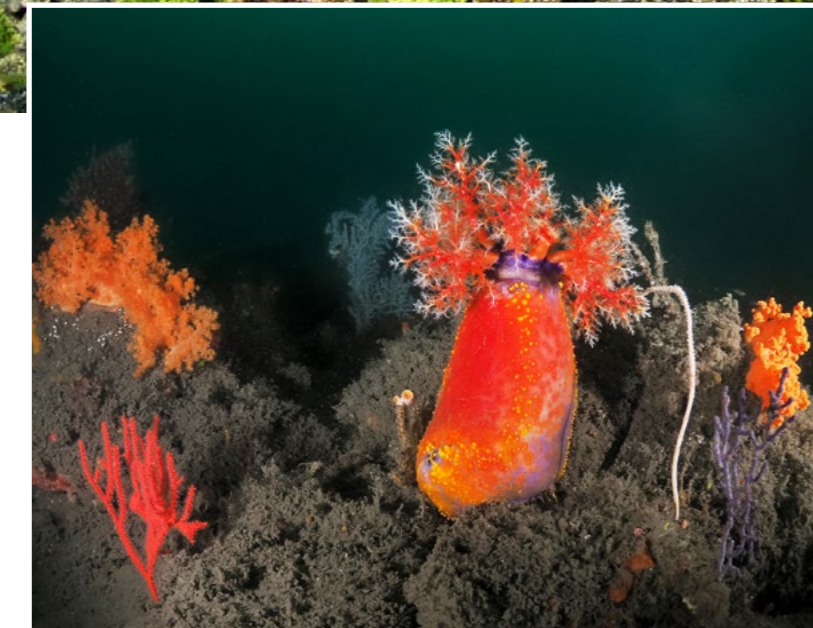
### Xijiyu Basalt Ridge

The underwater ridge of basalt columns at Xijiyu is the star attraction of this particular dive. There are

sea apples and nudibranchs on the ridge wall, along with small schools of reef fish and the occasional grouper, but the geology is more interesting than the biology, especially when, after the dive, the boat sails around to the other side of the island and

you get up close to a similar ridge, but this time above the surface and even more impressive.

Underwater, restricted visibility prevents you from seeing the scale of the ridge. Above water, the multi-sided columns are stacked closely together like soldiers at attention and the parade seems to go on forever. It is as if the entire island is one huge conglomeration of basalt pillars. Some are tilted at an angle, while others have collapsed or been washed away, leaving gaps. Where the cliff line finally ends, a meadow slopes down to a rocky beach and ruined, abandoned buildings are evidence that people once lived on this island at the end of the world. Today, Xijiyu is uninhabited, and landing is not permitted. ■



with green cabbage coral, but this site is much more than just an Instagram moment. The shallow reef system here is in excellent shape, despite the many visitors. It is home to a whole host of smaller fish and not just the usual anthias and damsels that like to hang







# Northeast Wrecks

*Part III: Artificial Reefs Off New York & New Jersey*

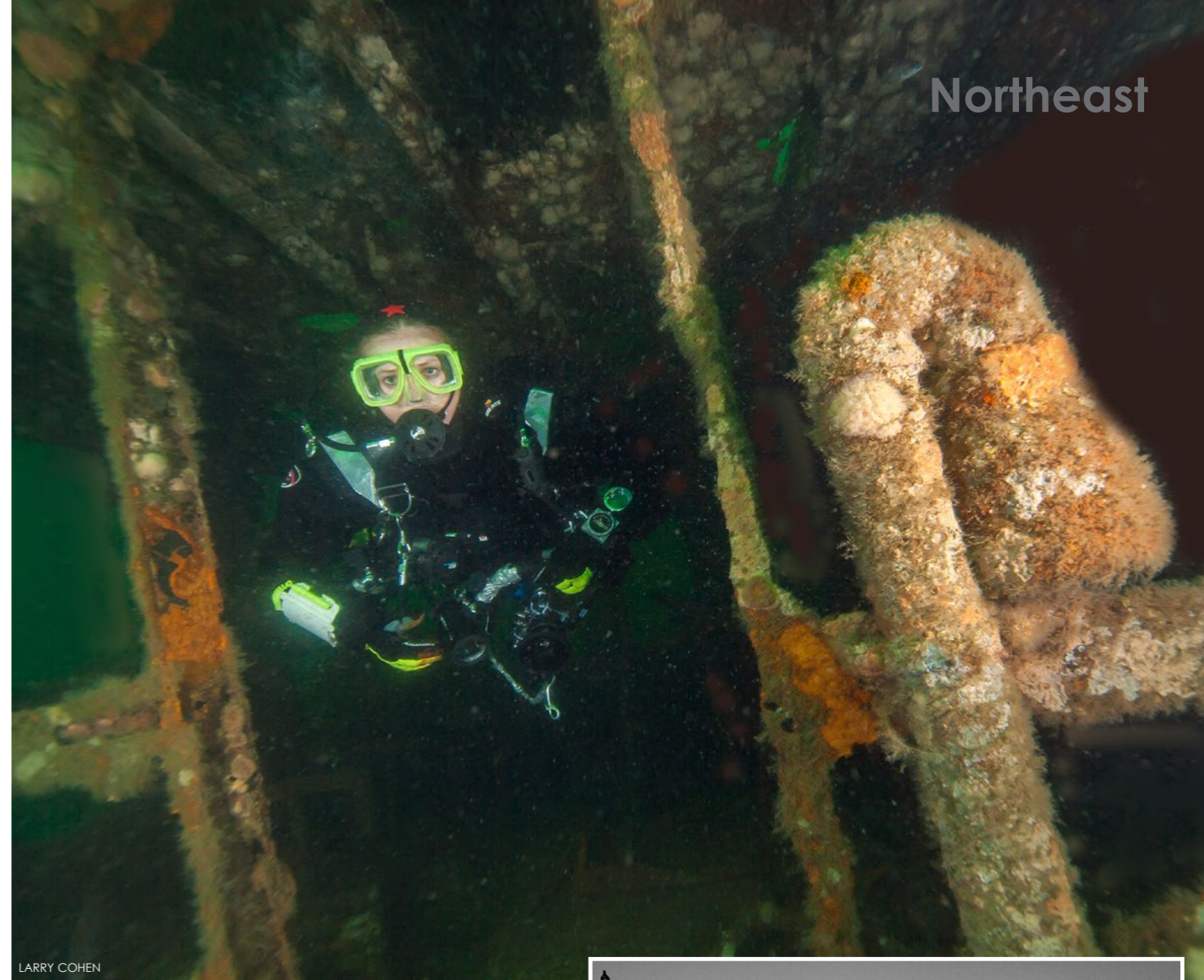
Text and photos by Larry Cohen and Olga Torrey



LARRY COHEN



LARRY COHEN



LARRY COHEN



LARRY COHEN



LARRY COHEN

The Venturo Tug is covered with marine growth (top left); Bollards on the Venturo Tug, named in honor of Capt. Greg A. Venturo (top center); Both new and experienced divers can enjoy the Venturo Tug (above); Turecamo tug of similar make as the Venturo Tug (right); Diver Olga Torrey exits the Venturo Tug sitting upright at 80ft (left); Venturo Tug's engine (far left); The Algol is home to various marine life (previous page).



MIKE THOMAS / FLICKR / CC BY-NC-SA 2.0

**In Part One and Part Two of this series, we discussed US Northeast wrecks that sank because of collisions and war. There are also many structures that have purposely been sunk as artificial reefs off the New York and New Jersey coasts. Larry Cohen and Olga Torrey have the story.**

The National Oceanic and Atmospheric Administration (NOAA) defines an artificial reef as any man-made structure that may mimic some of the characteristics of a natural reef.<sup>1</sup> Everything from tires, concrete reef balls, tanks, subway cars and barges to ships has been sunk as artificial reefs to attract marine life to a barren area. They have been cleaned, so they

<sup>1</sup> OCEANSERVICE.NOAA.GOV

would not cause any environmental damage. In this article, we are going to talk about two ships that are now artificial reefs.

### Venturo Tug

George S. Lawley and Sons of Neponset, Massachusetts, built what is now called the Venturo Tug for the United States Army in 1943. This 86ft-long, 146-gross-ton tug was named

the DPC-14. The vessel was used as an ST-class tugboat. In the late 1940s, the boat was transferred to the Wartime Shipping Authority and renamed the WSA-1. Finally, it was sold to the





The propeller is still attached to the haul (above); The tug's interior is easy to explore since there are cutouts on both sides (left)

Girt Artificial Reef in 1996. The boat sits upright in 80ft of water, but you can reach the main deck at 65ft. This dive site was renamed the GA Ventura Tug in honor of Captain Greg A. Ventura, who lost his life while scuba diving.

The Ventura Tug is an excellent dive for both new and experienced divers. It is a short boat ride from the Point Pleasant area marinas, and visibility is usually superb. The boat is intact, but the pilohouse was blown into the sand a

few years ago. The propeller can still be observed under the stern. The wreck's interior is easy to explore since large cutouts on both sides were made before the ship was sunk. The Ventura Tug is covered with marine growth and is now home to an assortment of marine life.

**USS Algol AKA-54**  
The Moore Dry Dock Co. in Oakland, CA, built the USS *Algol AKA-54* in 1943. This 459ft by 63ft Navy transport ship,

Turecamo Coastal and Harbor Towing Corporation. Its name was changed to *Matt Turecamo*. All the tugs owned by Turecamo Coastal and Harbor Towing Corporation had a wood-grain paint job.<sup>2</sup>  
The tug was sunk inshore close to Point Pleasant, New Jersey, on the Sea

<sup>2</sup> NJSCUBA.NET

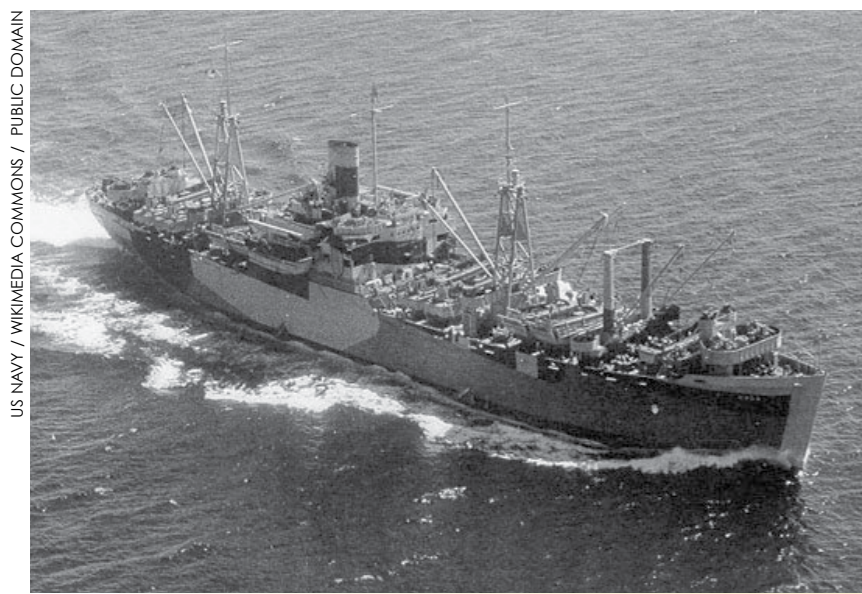


Northeast

OLGA TORREY

Mussels cover the superstructure of the *Algol* (left); The author exploring the *Algol's* superstructure (above); The *Algol* was sunk as an artificial reef on 22 November 1991 (right); US Navy attack cargo ship USS *Algol* (AKA-54) in 1944 (bottom left)

LARRY COHEN



US NAVY / WIKIMEDIA COMMONS / PUBLIC DOMAIN

which displaces 13,910 tons, is the largest vessel in the New Jersey Artificial Reef Program. It was named after a star in the constellation Perseus, also known as the Demon Star.<sup>3</sup>

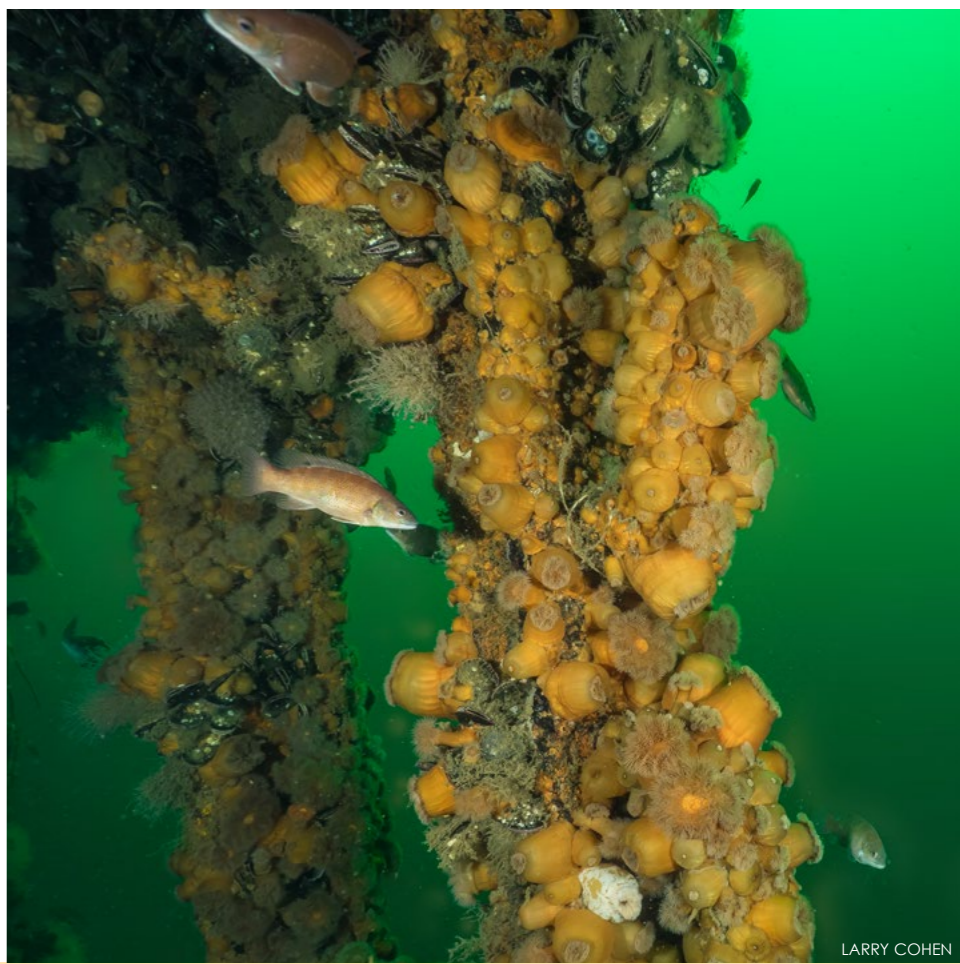
The *Algol* is a historic ship, which served from World War II to the Cuban Missile Crisis. During World War II, the vessel transported troops and served as a tender for the landing craft in the Battle of Okinawa. During the Korean War, the ship helped to evacuate UN troops from Chinnampo, North Korea, in December 1950.

After the Korean War, the ship was

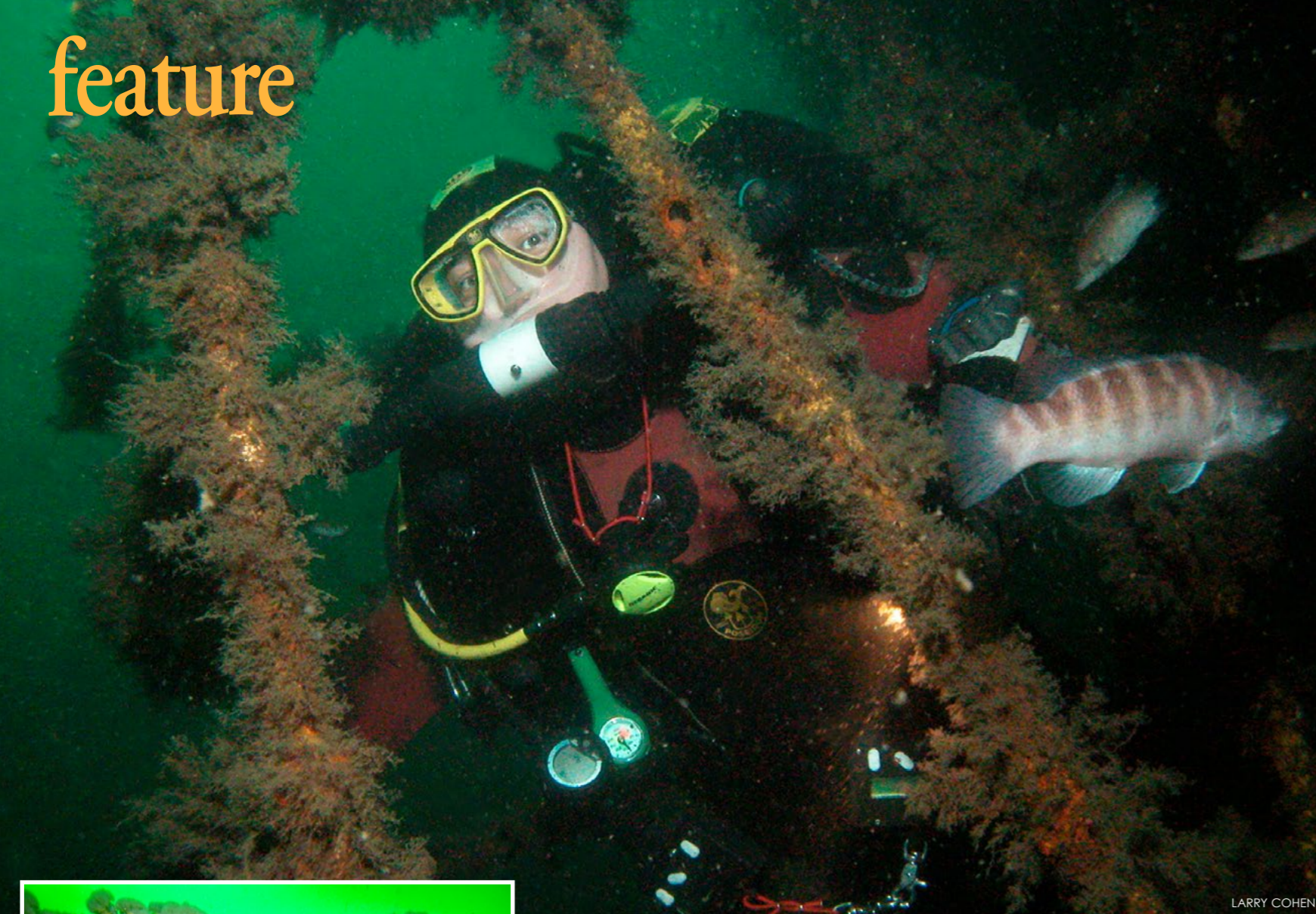
<sup>3</sup> NJSCUBA.NET

assigned to the US Navy's West Coast operations, conducting routine assignments and training. In January 1962, it was assigned to the Atlantic Fleet. In the fall of 1962, the *Algol* was a support ship for the quarantine of Cuba imposed by President John F. Kennedy during the Cuban missile crisis.

In 1964, the attack cargo ship was sent to the Mediterranean Sea. The vessel spent its remaining service operating along the eastern United States and West Indies. It was decommissioned in July 1970. In its time as a US naval ship, the ship earned two battle stars during World War II and five during the Korean War conflict.



LARRY COHEN



The *Algal* had an honorable military career before being sunk as an artificial reef (left); Rebreather diver on the *Algal* (above); Touring the *Algal* is like visiting a large building decorated with marine life (right).

The *Algal* remained in mothballs in the James River until 11 June 1991, when it was towed to Wilmington, North Carolina. At this location, it was prepared by Eagle Island Marine to be sunk as a New Jersey artificial reef.

Preparing a ship to be sunk is not an easy task. The *Algal's* towers and funnel had to be removed to prevent them from being a navigational hazard. All pollutants and floatable materials were removed as well. Also, machinery, portholes and all valuable metals were taken off the vessel and sold to help pay for the project. All windows, doors and cargo hold hatches were removed. These open-

ings allow divers to penetrate the wreck easily.<sup>4</sup>

The *Algal* was sunk on 22 November 1991. It is located about 12 miles off Point Pleasant, New Jersey, in 145ft of water. The wreck starts at 70ft, and the main deck is in 110ft of water. The deck was in 90ft of water when the ship was first sunk. Winter storms moved the wreck and pushed it deeper into the sand.

The *Algal* is intact, upright and gigantic. Besides the *Andrea Doria*, it is the largest wreck in the region. To see the whole wreck would take multiple dives. New divers can explore the super-

<sup>4</sup> NJSCUBA.NET

structure in only 70ft of water, while an advanced diver can penetrate the wreck in 140ft of water. Swimming around the *Algal* is like visiting a large building. The *Algal* is home to various marine life, including giant lobsters, as well as blackfish, for divers who want to bring some home for dinner. Because of this wreck's size and features, this is an excellent ship for photography.

### Conclusion

Consider bringing along your drysuit when planning a trip to New York City from April to November. Visiting the historic wreck sites underwater

is worth the effort. Unfortunately, in recent years, the number of dive boats has dwindled; nonetheless, there are still dive operations that will transport you to this fantastic underwater world. ■ SOURCES: OCEANSERVICE. NOAA.GOV, NJSCUBA.NET

*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](http://liquidimagesuw.com) and [fitimage.nyc](http://fitimage.nyc).*

OLGA TORREY

*Contributors' Picks*

# Bold & Beautiful

*Critters from Around the World*



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

Many intriguing creatures underwater have defensive mechanisms—they may sting, have venom, sharp spines, warning colors, or bite. We asked our contributors what their favorite underwater photos of these bold and beautiful critters were, and they came back with a variety of subjects including brightly colored nudibranchs, cnidarians that sting, scorpionfish with sharp spines, sharks and even crocodiles sporting sharp teeth. With a healthy respect for nature, *X-Ray Mag* contributors share their favorite images from the tropical waters of Fiji, Micronesia, Philippines, Indonesia, Malaysia, Mozambique, Egypt, Cuba, Mexico and Honduras to the temperate waters of the US East Coast.

Okinawan *Halgerda* nudibranch moving across the sandy bottom, Lembah Strait, Indonesia (right). Gear: Nikon D810 camera, Nikon 105mm macro lens, Subal housing, two Sea&Sea YS-250 strobes with snoots. Exposure: ISO 200, f/25, 1/125s



## Bold & Beautiful



*Risbecia tryoni* nudibranch moving over a pink sponge, Puerto Galera, Philippines (above). Gear: Nikon D810 camera, Nikon 105mm macro lens, Subal housing, two Sea&Sea YS-250 strobes with snoots. Exposure: ISO 200, f/18, 1/250s; *Chromodoris* sp. nudibranch on top of coral rubble on the sea floor, Anilao, Philippines (previous page). Gear: Nikon D3 camera, Nikon 105mm macro lens, Subal housing, two Sea&Sea YS-250 strobes. Exposure: ISO 200, f/25, 1/125s

Emperor shrimp riding on the back of a many-lobed *Ceratosoma* nudibranch, Lembah Strait, Indonesia (top right). Gear: Nikon D810 camera, Nikon 105mm macro lens, Subal housing, two Sea&Sea YS-250 strobes with snoots. Exposure: ISO 200, f/22, 1/125s; *Chromodoris kuniei* nudibranch on coral reef, Taveuni, Fiji (right). Gear: Nikon D3 camera, Nikon 105mm macro lens, Subal housing, two Sea&Sea YS-250 strobes. Exposure: ISO 200, f/25, 1/125s

### Bright Nudibranchs

Text and photos by Matthew Meier

Nudibranchs were an easy choice for this contributor's picks feature on defense mechanisms. With over 3,000 species, these soft-bodied marine gastropods use a seemingly infinite combination of colors and patterns to warn off prey or blend into their environment. The name "nudibranch" translates to "naked gills," and these animals literally breathe through bronchial plumes on their backs. They are benthic creatures, found crawling on the sea floor the world over, existing nearly entirely in saltwater from the intertidal zone to depths beyond 2,300ft (700m).

All nudibranchs are carnivorous, with

some feeding on sponges, others feed on hydroids or bryozoans, some eat other sea slugs, and in rare instances, they can cannibalize their own species. Nudibranchs that feed on hydroids can also store and use the nematocyst stinging cells for protection.

Others use the chemical defenses of the sponges they consume to render themselves distasteful.

In an effort to increase their chances to procreate, all nudibranchs are hermaphroditic and have reproductive organs of both sexes on the right side of their bodies. When they meet another of their species, nudibranchs fertilize each other, before eventu-



ally laying eggs in a ribbon-like spiral. Once hatched, the identical but tiny newborns will have a lifespan of a few weeks to a year, depending on the species. The largest concentration of nudibranchs is found in warm, tropical shallow reefs, such as the examples shown here from the Philippines, Fiji and Indonesia. Visit: [MatthewMeierphoto.com](http://MatthewMeierphoto.com)





Photo 1. Sea krait portrait, Fiji (left). Gear: Nikonos V camera, 35mm f/2.5 lens with 1:2 extension tube, Ikelite DS-125 strobe. Exposure: ISO 100, f/11, 1/60s; Photo 2. Turtle-headed sea snake in Dumaguete, Philippines (top left). Gear: Canon EOS Rebel T1i camera, Canon 100mm f/2.8 USM macro lens, Ikelite housing, twin Ikelite DS-161 strobes. Exposure: ISO 400, f/16, 1/160s; Photo 3. Diver and sea krait in Puerto Galera, Philippines (above). Gear: Canon 10D camera, Canon EF-S 10-18mm f/4.5-5.6 IS STM lens at 10mm, Ikelite housing, twin Ikelite DS-161 strobes. Exposure: ISO 400, f/16, 1/100s

### Sea Snakes

Text and photos by John Ares

The good news is that sea snakes and sea kraits, while both venomous, are not aggressive toward divers. As with any sea creature, it is prudent not to touch or harass sea snakes and sea kraits. While these creatures can be bold, “beauty” is in the eye of the beholder. I think they are gorgeous.

Sea kraits are not true sea snakes as they are semiaquatic. They need to come to land to digest their prey and to lay eggs. The portrait of a sea krait in Photo 1 was shot from inches away in Fiji. Luck had it that this individual was not at all intimidated by my presence. This image was scanned from a slide.

Superficially, the snake in Photo 2 resembles a sea krait, but the lighter bands contain

black spots. This animal was shot in Dumaguete, Philippines. A true sea snake, the young hatch inside the female and are delivered underwater.

Sea kraits can be very curious, as illustrated by this specimen in Photo 3 swimming alongside the diver and looking into the camera dome in Puerto Galera, Philippines. No doubt it was more fascinated by its reflection than by the diver. Visit: [JohnAres.com](http://JohnAres.com)







## Bold & Beautiful

Scorpionfish at Sponges Wall in Roatan, Honduras (left). Gear: Olympus OMD EM5 Mark II camera, Olympus M.60mm f/2.8 lens at 60mm, Olympus PT-EP13 housing, Sea&Sea YS D-1 strobes. Exposure: ISO 200, f/11, 1/125s

Rhinopias at Pasir Hitam (Black Sand) in Alor, Indonesia (below). Gear: Olympus OMD EM5 Mark II camera, Olympus M.60mm f/2.8 lens at 60mm, Olympus PT-EP13 housing, Sea&Sea YS D-1 strobe. Exposure: ISO 200, f/5.6, 1/125s

Rhinopias at Pasir Hitam (Black Sand) in Alor, Indonesia (left). Gear: Olympus OMD EM5 Mark II camera, Olympus M.60mm f/2.8 lens at 60mm, Olympus PT-EP13 housing, Sea&Sea YS D-1 strobe. Exposure: ISO 200, f/5.6, 1/125s



### Scorpionfishes

Text and photos by Sheryl Checkman

It is a dangerous world under the sea for many of its inhabitants. Evolution has created ways for many of them to beat the odds through various defense mechanisms. Scorpionfishes (Scorpaenidae) is one such family of fishes. They are mainly found in the Indo-Pacific, but some species are also found in the Atlantic.

Rhinopias are in this family and are found in the Indian and Pacific oceans. In Alor, Indonesia, on a dive at Pasir Hitam (Black Sand), I encountered a variety of these fish in all different colors and patterns, camouflaging themselves to blend into their surroundings. If our dive

guide did not point them out, I would never have seen them! Rhinopias, like all scorpionfish, are venomous, using their sharp spines, coated with a venomous mucus to defend themselves from predators.

I have also encountered this species in the Atlantic as well. In Roatan, at Sponges Wall, this scorpionfish was very well camouflaged against the sand, the only thing giving it away was its blue eyes staring up at me.

Another fish in the Scorpaenidae family is the lionfish. My first encounter with lionfish was in the Caribbean, where they do not belong and, having no natural predators, have become an invasive species that



needs to be controlled. However, in Mozambique, at the Manta Bay dive site, I photographed one in its native environment, with its color-

ful orange and white stripes and venom-coated fins fanned out like a lion's mane. Visit: [Instagram.com/sherylcheckman](https://www.instagram.com/sherylcheckman)

Lionfish at Manta Bay, Mozambique. Gear: Olympus OMD EM5 Mark II camera, Olympus M.9-18mm f/4.0-5.6 lens at 10mm, Olympus PT-EP13 housing, Sea&Sea YS D-1 strobe. Exposure: ISO 200, f/8, 1/160s





Lionfish feeding at night in Sharm El-Sheikh, Egypt (left). Gear: Olympus E-520 camera, Olympus 50mm f/2 Zuiko Digital macro lens, Olympus housing, Sea&Sea YS-01 strobes. Exposure: ISO 200, f/9, 1/200s; Since the mid-2000s, lionfish have invaded the Caribbean, including Cuba (above). Gear: Olympus OM-D E-M1 camera, Olympus 60mm macro, Aquatica housing, Sea&Sea YS-D1 strobes. Exposure: ISO 400, f/11, 1/100s; Lionfish are now in North Carolina (top right). Gear: Olympus OM-D E-M1 camera, Olympus 9-18mm fisheye, Aquatica housing, Sea&Sea YS-D1 strobes. Exposure: ISO 200, f/10, 1/250s

## Lionfish

Text and photos by Larry Cohen

Lionfish are the perfect example of bold and beautiful marine life. Their appearance is stunning, but they are poisonous. Lionfish have fan-like fins that look like feathers. However, hidden within this beauty are spines that can release venom. While they are predatory by nature, they also use their poison for protection. When the spine penetrates the skin of the lionfish's victim, a neuromuscular toxin similar to cobra venom

enters the target's body. Lionfish are not aggressive to divers, so stings are usually accidental.<sup>1</sup>

In the past, underwater photographers had to travel to the Indo-Pacific region to see these decorative fish. When diving on the house reef at Pom Pom Island Resort in Malaysia, I was excited to photograph a lionfish.

On a night dive in Sharm El-Sheikh in Egypt, my dive light attracted a swarm of tiny fish. The small fish was the perfect opportunity for a lionfish to have a late-night snack.

<sup>1</sup> HEALTHLINE.COM

Since the mid-2000s, lionfish started being seen in significant numbers in the southern and eastern Atlantic region. It is believed they were released or escaped from marine aquariums. Unfortunately, they are an invasive species in this part of the world.<sup>2</sup> For this reason, dive resorts encourage spearfishing lionfish.

Spearfishing is prohibited in the Garden of the Queen marine park in Cuba. However, dive guides have been allowed to hunt lionfish and have been

<sup>2</sup> OCEANSERVICE.NOAA.GOV

feeding them to the shark population, hoping the sharks will develop a taste for lionfish. I was still happy to capture an image of a lionfish under a ledge when diving in Cuba.

In the United States, lionfish have been spotted as far north as Rhode Island. Many have made the shipwrecks off North Carolina their home. Of course, this is a problem for the environment, but photographing a lionfish on the wreck of the Papoose still makes an intriguing image.

Visit: [liquidimagesuw.com](http://liquidimagesuw.com)

Lionfish photographed at Pom Pom Island, Malaysia house reef. Gear: Olympus OM-D E-M1 camera, Olympus 60mm macro, Aquatica housing, Sea&Sea YS-D1 strobes. Exposure: ISO 200, f/8, 1/125s





ANITA GEORGE-ARES



ANITA GEORGE-ARES

Photo 1. Great white shark, Guadalupe Island, Mexico (above). Gear: Canon EOS Digital Rebel XT camera, Canon EF-S10-22mm f/3.5-4.5 USM lens, Ikelite housing. Exposure: Available light, ISO 400, f/8, 1/80s

Photo 2. Two great white sharks, Guadalupe Island, Mexico (top right). Gear: Canon EOS Digital Rebel XT camera, Canon EF-S10-22mm f/3.5-4.5 USM lens, Ikelite housing. Exposure: Available light, ISO 400, f/8, 1/80s

## Great White, Silvertip & Bull Sharks

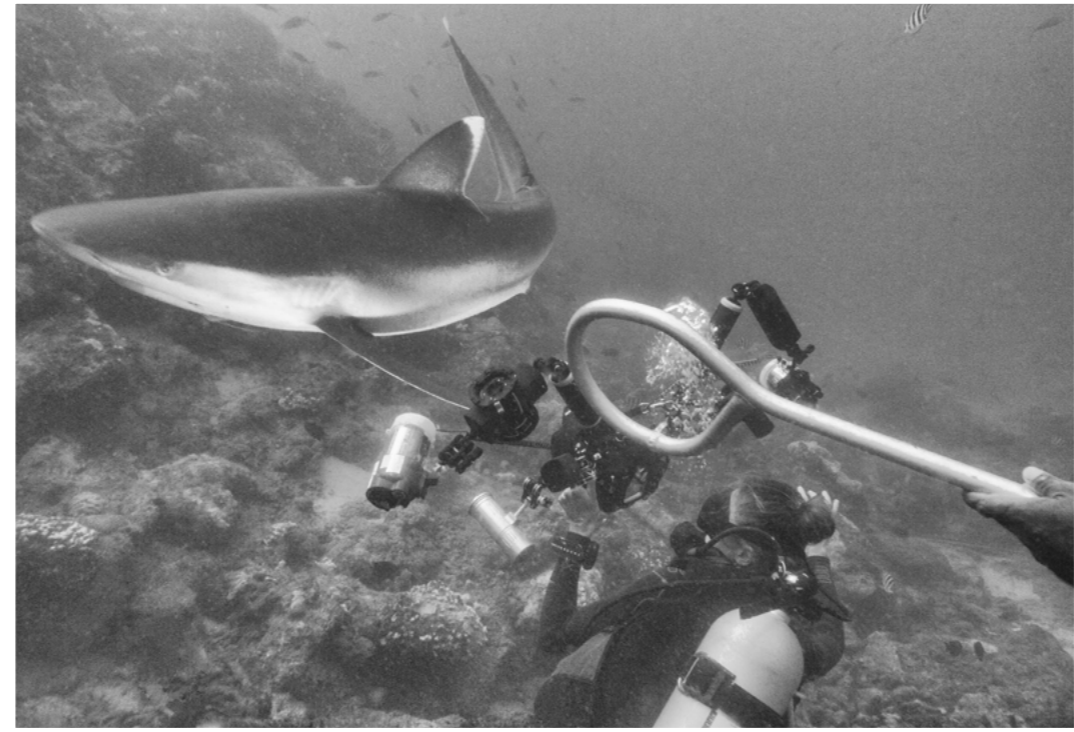
Text and photos by Anita George-Ares

Cage diving with great white sharks is a not-to-be-missed encounter off Guadalupe Island, Mexico. Photo 1 conveys the sleek beauty and purposeful movement of a great white shark and her escorts. Photo 2 captures two great white sharks on their approach to the cage.

I had another exciting shark encounter at the Bistro dive site in Fiji's Shark Reef National Marine Park. We descended to 70ft and knelt behind a low wall made of coral rubble. Bull, sicklefin lemon, blacktip reef, silvertip and tawny nurse sharks converged upon the bait-filled, large plastic bin

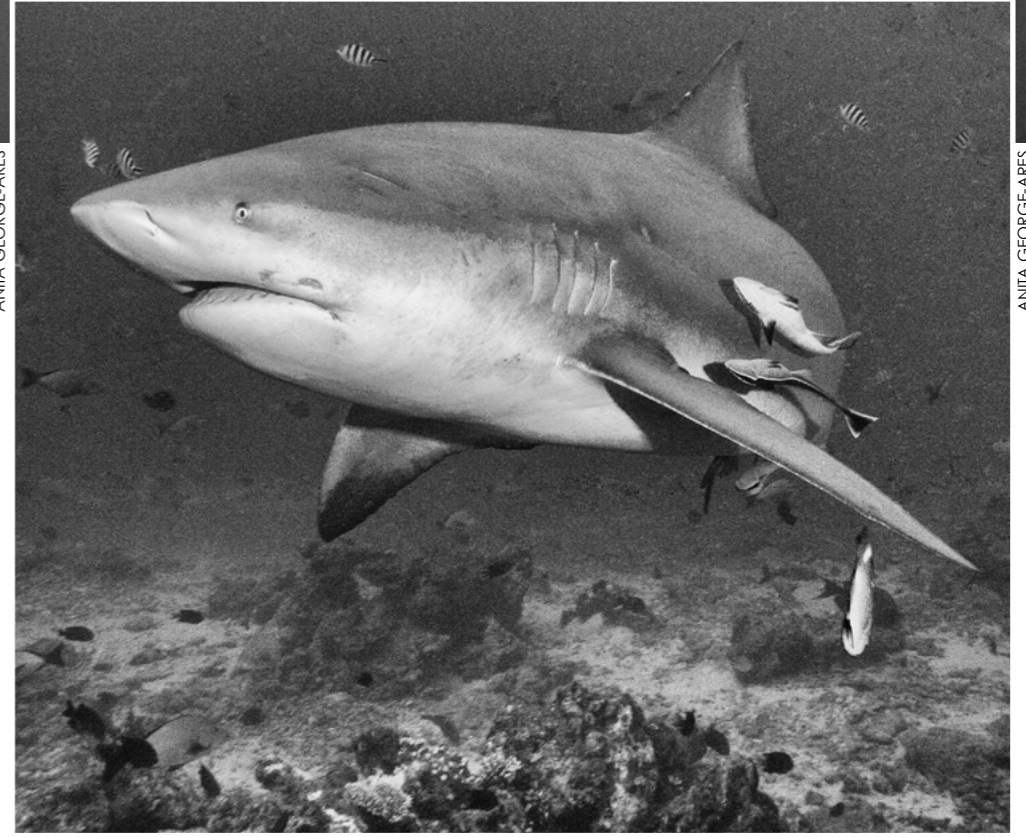
that was suspended in the water column. A bull shark swam near the rubble wall (Photo 3).

The silvertips sometimes sneaked up behind us. My dive guide explained that the silvertip sharks could not compete with the numerous bull sharks so the silvertips resorted to other tactics in their search for food. Aqua-Trek's guides maintained the safety of the divers and used long, stainless steel poles to push away overly inquisitive sharks, as seen in Photo 4.



ANITA GEORGE-ARES

Images were converted to black and white using Nik Silver Efex Pro 2 and Adobe Photoshop CC 2018 software. Please visit: [facebook.com/profile.php?id=100016947967639](https://www.facebook.com/profile.php?id=100016947967639)



ANITA GEORGE-ARES

Photo 3. Bull shark, Beqa Passage, Fiji (above). Gear: Canon EOS Rebel SL1 camera, Canon EF-S10-18 mm f4.5-5.6 IS STM, Ikelite housing, two Ikelite DS 161 strobes. Exposure: ISO 400, f/11, 1/160s

Photo 4. Silvertip shark, Beqa Passage, Fiji (center). Gear: Canon EOS Rebel SL1 camera, Canon EF-S10-18 mm f4.5-5.6 IS STM, Ikelite housing, two Ikelite DS 161 strobes. Exposure: ISO 400, f/11, 1/160s



*Jorunna parva* nudibranch, Lembah Strait, Indonesia (top left). Exposure: ISO 200, 105mm, f/18, 1/200s; *Goniobranchus fidelis* nudibranch and—if you look closely—a skeleton shrimp on the left rhinophore, Lembah Strait, Indonesia (center left). Exposure: ISO 200, f/22, 1/200s; *Chromodoris* sp. nudibranch with extra rhinophores, Lembah Strait, Indonesia (bottom left). Exposure: ISO 200, f/13, 1/200s



Bold & Beautiful

Gear for all images: Nikon D850 camera, Ikelite housing, dual Ikelite DS161 strobes. Mating *Goniobranchus* sp. nudibranch, Lembah Strait, Indonesia (above). Exposure: ISO 200, f/18, 1/200s; *Cuthona* sp. nudibranch, Lembah Strait, Indonesia (top center). Exposure: ISO 200, f/32, 1/200s; *Flabellina* sp. *exoptata* nudibranch, Lembah Strait, Indonesia (left). Exposure: ISO 200, f/18, 1/200s; *Flabellina* sp. nudibranch, Lembah Strait, Indonesia (center). Exposure: ISO 200, f/25, 1/200s.

**Nudibranch Chemistry**

Text and photos by Brandi Mueller

The prettier an animal is, the more likely it is to be deadly. Similar to the rainforest and jungle, oceanic organisms that display bright colors are giv-

ing a warning sign to predators that they taste very, very bad. One of my favorite underwater photography subjects is nudibranchs because of their beautiful and bright patterns and, as expected, many are toxic.

Some nudibranchs produce their own chemicals in defense, but others

are even more creative. They have adapted to be able to feed on other toxic organisms like hydrozoas, fire corals, sponges and anemones. Not only are they not poisoned by the stinging cells in the tissues that these toxic animals use for defense, but they are able to store the nematocysts from their

food in their bodies and use them for their own protection.

It gets even more exciting when some marine slugs that are not poisonous pretend to be so by mimicking the brightly colored patterns of noxious neighbors. They hope the predator going after them will think twice about

eating them because they display the toxic warning signs. They fool predators into thinking they are poisonous when they are not.

So, the next time you think about tasting a nudibranch, don't! As with all things in the ocean, look and do not touch. Visit: [brandiunderwater.com](http://brandiunderwater.com)



# feature

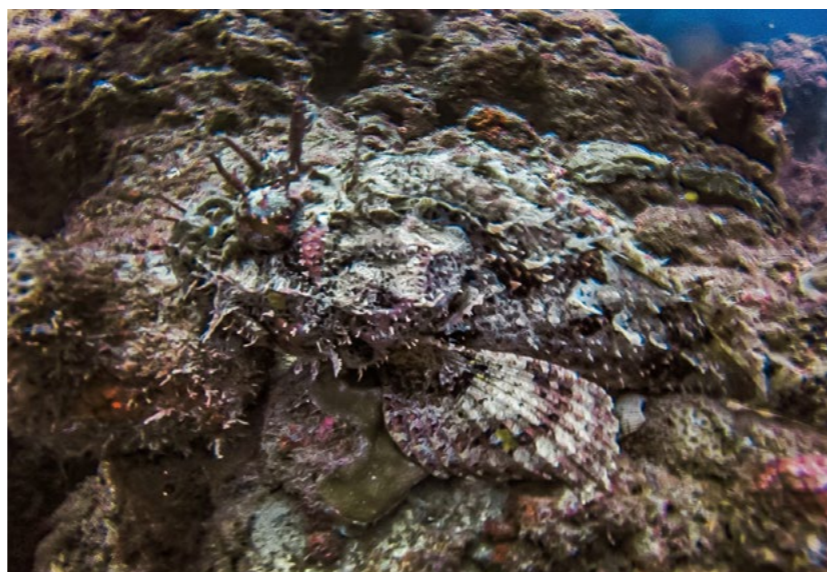
Photo 1. Lionfish on reef (top right).  
Gear: Nikon D500 camera, Nikon Macro 85mm lens, Nauticam housing, Inon Z330 strobes. Exposure: ISO 200, 85mm, f/8, 1/125s

Photo 3. Spiny lobster on reef (right). Gear: Nikon D500 camera, Nikon Macro 85mm lens at 85mm, Nauticam housing, Inon Z330 strobes. Exposure: ISO 200, f/11, 1/125s

Photo 4. Smiling lemon shark (far right). Gear: Nikon D500 camera, Tokina 10-17mm lens at 13mm, Nauticam housing, Inon Z330 strobes. Exposure: ISO 200, f/8, 1/125s



Photo 2. Scorpionfish on wreck.  
Gear: Nikon D500 camera, Tokina 10-17mm lens at 17mm, Nauticam housing, Inon Z330 strobes. Exposure: ISO 200, f/11, 1/100s



with you when the advice of "Do Not Touch" is for our safety. There are numerous sea creatures that have spines, projections, stingers and teeth that serve them well as survival tools.

The lionfish in Photo 1 is a very beautiful creature that has spread throughout most of the Western Atlantic as an invasive species. They are very popular with photographers, because of their exotic beauty and they do hold very still while suspended in the water column or on the reef. I chose this photograph because it clearly demonstrates the location and severity of the venomous spines. Each lionfish has 18 spines—13 dorsal, two pelvic, and three anal. Each is coated with venom that is toxic to many species of fish. For humans, it is extremely painful and, in rare cases, can lead to

death. Do not let its beauty lure you in too close.

The cousin to the lionfish is the scorpionfish (Photo 2). They are both in the same family, although their behavior is quite different. Unlike the lionfish, the scorpionfish always blends into its surroundings—reef, wreck, boulders—and, to the casual eye, is invisible. It is covered with multiple short venomous spines. However, the venom is stronger, more painful and more toxic than that of a lion-

fish. Divers get in trouble when they inadvertently settle on them during dives on shipwrecks and reefs, particularly when they are holding on in a strong current.

Spiny lobsters have lots of pointy barbs and spines (Photo 3). Fortunately, they are not venomous. Whenever handling a spiny lobster, it is imperative to wear gloves, or you will suffer many small punctures and lacerations, with each having the potential of becoming



infected. Many a diver, trying to be macho by not wearing gloves during handling, have found themselves with marine microorganism infections.

One of my favorite photo subjects is the lemon shark (Photo 4). I am very lucky to have them in my backyard in Jupiter, Florida, all year long. During their yearly aggregation, which occurs from January to February, they become particularly frolicsome.

It is common to find oneself, literally, in a "sharknado." Although lemon sharks like to play, cavort, bump and nuzzle, all divers still need to pay attention to the many rows of long, triangular, pointy, sharp teeth.

At my Update in Diving Medicine Courses, I go into much more detail, including management of the above-mentioned injuries. Please visit: [garyrosephotos.com](http://garyrosephotos.com)

## Look, But Do Not Touch

Text & photos by Gary Rose, MD

It all begins in our childhood. We are told, so many times, that we can look but we cannot touch. Most of the time, it was an adult who would admonish us. Later in life, when we could read, there were signs and placards. Of course, this warning usually increased our desire to touch, and we did. Most of the time, this warning was to protect the object from damage by our human fingers and hands.

Throughout our scuba instruction, and in every pre-dive briefing, we are told, "Do Not Touch." Most of the time, this is to protect the fragile sea life and delicate marine environment. I am now going to share





## Bold & Beautiful

Photo 1. Pink Anemonefish over an anemone, wreck of the *Fujikawa Maru*, Truk Lagoon (above). Gear: Canon EOS 7D Mark II, Tamron 60mm macro lens, Nauticam housing, dual Inon Z-240 strobes. Exposure: ISO 200, f/11, 1/250s; Photo 2. Lionfish over the wreck of the *Yamagiri Maru*, Truk Lagoon (left). Gear: Canon EOS 7D Mark II, Tokina 10-17mm fisheye lens (at 11 mm), Nauticam housing, dual Inon Z-240 strobes. Exposure: ISO 500, f/22, 1/250s

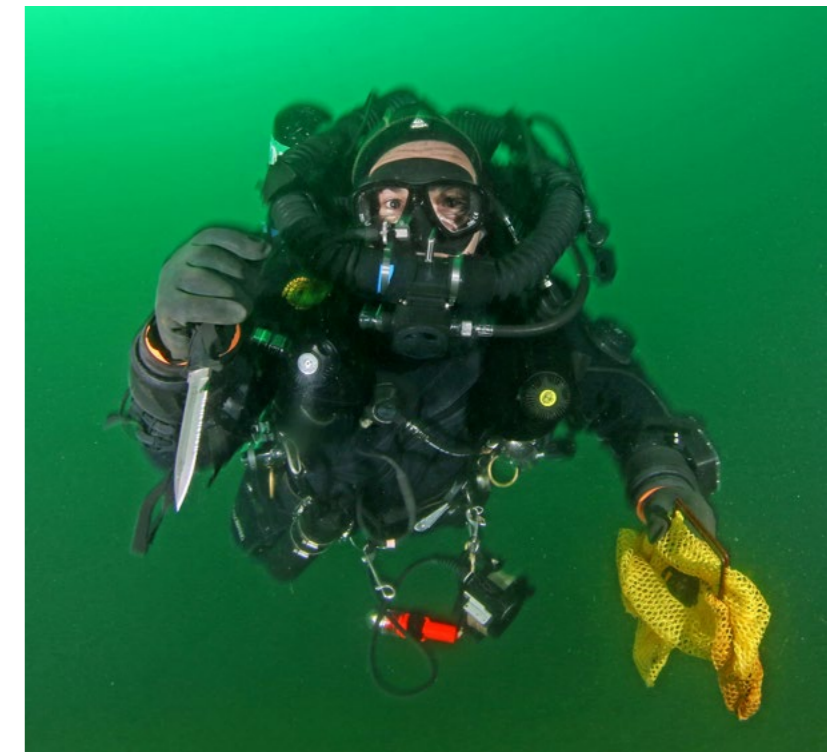


Photo 4. Diver on the wreck of the *Tolten*, New Jersey, USA (above). Gear: Canon EOS 7D Mark II, Nauticam housing, Tokina 10-17mm fisheye lens (at 10 mm), dual Inon Z-330 strobe. Exposure: ISO 800, f/11, 1/40s; Photo 3. Mauve stinger jellyfish over the wreck of the *Tolten*, New Jersey, USA (bottom left). Gear: Canon EOS 7D Mark II, Nauticam housing, Tokina 10-17mm fisheye lens (at 17mm), dual Inon Z-330 strobes. Exposure: ISO 200, f/8, 1/200s



## Bold and Beautiful

Text and photos by Michael Rothschild, MD

To paraphrase George Washington, the best defense is a good offense. While many marine creatures protect themselves with camouflage or armor, others take an active stance, employing fangs and venom not as predators, but as reluctant prey.

Stinging anemones use nematocysts for defense and offense, but as in most societies, some individuals have special privileges. The anemonefish in Photo 1 enjoys immunity to this poison, keeping his friend clean of parasites in return.

Photo 2 shows a lionfish in the South Pacific where it is supposed to be, and not as an invasive species in the western

hemisphere. These are great photographic subjects—dramatically beautiful and calm enough to pose as they drift by.

In Photo 3, we see the long tentacles of the mauve stinger. Fortunately, this one was in an area where divers tend to cover up thoroughly, so injuries are rare.

Finally, we have the most dangerous animal in the sea in Photo 4. His rebreather allows him to sneak up on prey in silence, making quick work of the slowest flatfish of the New Jersey shore. In this shot, however, he is using his weapon defensively, warding off a photographer who came too close for comfort. Visit: [dive.rothschilddesign.com](http://dive.rothschilddesign.com)



### American Crocodiles

Text and Photos by Olga Torrey

One of the most exciting experiences on a dive trip to the Gardens of the Queen in Cuba was being in one meter of water with two American crocodiles. We took one of the small skiffs from our liveaboard ship into the mangroves. The crew took hunks of chicken and hung them in the water. Within a few minutes, two American crocodiles showed up for a meal. As they enjoyed the meal, I looked at my dive buddy Larry Cohen and said: "Is getting in the water a good idea?" He shrugged his shoulders and said, "Well, you only live once!"

We got into our wetsuits, grabbed our cameras, and entered the water with our guide. We planned to let the crocodiles come to us, and we would capture the images when they moved in close. Having a housing with dual strobes could be used to push the crocodiles away if they got too close. Our guide Noel Lopez

Fernandez also had a long stick with a GoPro attached.

American crocodiles are not as aggressive as other species of crocodiles, but they are opportunistic. I asked my buddy to put down his camera so I could get a photo of him with the crocodile. One of the reptiles immediately took the opportunity and got up close and personal with Larry; luckily, Noel pushed the animal away with his stick.

We spent four hours in the water with these bold and beautiful creatures. Unfortunately, towards the end, the battery on my camera lost power. So, I handed my primary camera to the captain and asked him to give me my small Canon PowerShot ELPH point-and-shoot cam-



American crocodile with impressive teeth and powerful jaw, Cuba. Exposure: ISO 100, f/5.0, 1/320s (above); This American crocodile was happy to see me. Exposure: ISO 100, f/5, 1/320s (top left); American crocodile, showing off its impressive defensive weapons. Exposure: ISO 100, f/5, 1/320s (top right). Gear for all images: Olympus XZ-1 camera, wide-angle conversion lens, Olympus PT-050 housing, dual Sea&Sea YS-01 strobes.

era in an Ikelite housing. I continued to capture video, but this small housing did not offer any protection. So, I proceeded with caution, captured my images, and still had all my limbs. Visit: [fitimage.nyc](http://fitimage.nyc)

This American crocodile was curious about me. Exposure: ISO 100, f/5, 1/320s



POINT & CLICK  
ON BOLD LINKS

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# Equipment

Edited by  
Peter Symes



## ProTek 1000 Series

Smartwatches may be all the rage these days, but there is just something about a classic dive watch. Made with a carbon composite case, the Series 1000 timepiece from ProTek is everything but old tech. ProTek is a new brand of tritium tactical watches from the former owner and founder of Luminex, Barry Cohen. The Carbon Composite Dive Series uses a carbon composite case with a tight 60-click, unidirectional, rotating bezel with a stainless-steel screw-case back and screw crown that confers 300m of water resistance, and is fitted with sapphire crystals with anti-reflective coatings, and dependable Japanese quartz movements with 10-year batteries, the manufacturer writes. [Protekwatch.com](http://Protekwatch.com)

## Earplugs for divers

If you do not fancy getting water in your ears but would like to be able to hear what is going on around you, SurfEars might have the solution for you. The earplugs, which are designed for use by divers, surfers, kayakers and other water sports practitioners, are available in several sizes and consist of several different components that can be combined in different ways so that each user can adapt the earplugs to his or her personal needs. The earplugs are also designed so that the outer ear equalises pressure during diving. [Surfears.com](http://Surfears.com)



## Scubapro Seawing Supernova

Winner of the prestigious, internationally recognised Red Dot Award for product design, the new Seawing Supernova is a step up from the Seawing Nova in performance, construction, fit and versatility, Scubapro writes. The flexible central panel fine-tunes the angle of attack according to the strength of the kick by counterpivoting, providing a milder angle of attack for comfort when kicking gently, a more aggressive angle of attack when kicking at full strength, and anything in-between. The two-piece design, with blade and foot pocket moulded separately, makes transport easy; and with the optional full-foot pocket, the fin can be modified to handle any warm-water dive scenario. [Scubapro.com](http://Scubapro.com)

## DGX Gears BC Integrated Backup Regulator

This breathable inflator, which combines an alternate air source with a power-inflator, replaces the standard power-inflator found on your wing or BCD. This combination not only makes it quicker and easier to find your backup regulator in a pinch but it also does away with a hose and helps with streamlining. The DGX Gears BC Integrated Backup Regulator is attached to the wing or BCD corrugated inflator hose, and is fed by the first stage in the same manner as any regulator. It can be assembled on nearly any BC. "The DGX Gears BCI is a proven device that has been relied upon for years by sport divers the world over. The raw performance is suitable for use in sport depths, but we feel this device is not suitable for extended range depths," the manufacturer states. [Divegearexpress.com](http://Divegearexpress.com)



## Avelo

It was like wearing a mini-submarine, I thought when I tried on the Avelo kit at the recent Diving Talks event. What looks like just a slightly oversized tank with a fancy little backplate and two small canisters along the flanks, which resemble battery packs, is in fact also a buoyancy device. The tank is buoyant and can become lighter or heavier by using water from its environment. It works by taking in and expelling water, just like a submarine. When a diver is ready to dive, he or she presses a button and water is pumped into the Hydrotank—that is what they call it—and around an inner bladder, which holds the air (or some breathing mix). Once the diver is neutrally buoyant, the pump is stopped, and the diver can swim about, retaining that same buoyancy until enough gas has been consumed to make the diver a little buoyant. The pump can then be turned on to pump again for 20 to 30 seconds. The water in the Hydrotank replaces the mass of the gas consumed, and the diver can experience another 20 to 25 minutes with neutral buoyancy. At the end of the dive, a purge valve is opened to drain, and all the water from the Hydrotank becomes buoyant and lightweight, making the climb back onboard or ashore easy. [Diveavelo.com](http://Diveavelo.com)



There are many ways you can review a dive computer, but wearing it on your arm for one or two dives does not constitute a proper test—at least, not a meaningful one. The following review is therefore based on the use of the unit over a six-month period, during which time, around 65 dives were conducted in different locations and water conditions. Lelle Malmström puts the Ratio's new dive computer iX3M 2 through its paces.

Text and photos by Lelle Malmström

When the parcel arrived in the mail, I was initially surprised not to find any instruction manual. In the box, there was just the computer and a charging cable. However, on the box, it showed how the manual could be downloaded from Ratio's website, which I did. Saving paper not only benefits both the environment and me, but the online download also ensures that I can always access the latest



Ratio iX3M 2 dive computer in the box

edition, which includes all the latest updates. One can also study and get familiarised with the computer before deciding whether to purchase it.

The first thing that struck me was how large it was and how strong and solid it felt. The computer had four buttons below the display, which, at first glance, appeared a bit small; however, in practice, I found that the buttons were quite easy to operate, as I navigated through all the menus, even while wearing thick dry gloves.

Once I got the computer out of the box, which was made from recycled cardboard, I switched it on and began exploring all the menus. The structure and operation were quick to

learn, as it was clearly stated in the display what each button did when you were in a sub-menu.

### Diving

The wide elastic straps, which were also equipped with quick-release buckles, made it easy to put the dive computer on the arm even when wearing a drysuit.

Alternatively, bungee cords could be used instead of straps, if so preferred. Since I have drysuit rings on my suit, I prefer the straps, as they made it much easier to take



## Review: Ratio iX3M 2 Dive Computer

the computer off after a dive.

The computer started automatically when I entered the water, and the display was very easy to read, even in bright sunlight. During the dive, time, depth, time to surface, nitrox mixture and pO<sub>2</sub> were displayed in very clear numbers. That was all the information one really needed during the dive. However, if needed, a large amount of additional information could be accessed by scrolling through the menus, using the buttons.

At first, I did not like the menus the computer brought up underwater. I felt there was too much information and too many settings that I did not need during the dive. But after 10 to 15 dives, it grew on me. I came to grips with it and no longer had to look at the computer while pressing the buttons.

Now, I think the menus are logically structured and easy to navigate. In a simple way, the Ratio iX3M

2 shows how many minutes I have at the current depth, and at the safety/deco stop, the computer shows with clear numbers what depth I should stay at, as well as the time left until the next stop. If I want to see the entire decompression table, it can be accessed with a few button presses.

### The compass

I just love its compass! Why don't all dive computers have a compass like this? Choose the compass heading, press a button and the compass heading is locked. If you swim in the correct direction, you will see two arrows pointing straight ahead on the display. If you get off course, an arrow will point to



The compass on the Ratio iX3M 2 dive computer shows direction on and off course.



## Ratio iX3M 2

Ratio iX3M 2's Logbook display (left and centre), and Gas Blender display (far left)

the right or left, indicating the direction to take to get back on the right course. It could not be simpler.

### Many new functions

The Ratio iX3M 2 comes with many features that you probably did not know you wanted or needed. It can connect to up to ten wireless transmitters to obtain tank pressure, and if you dive sidemount, the computer will automatically switch to display information about the tank from which you are breathing.

Another function, which I find superb, is a simple gas blender programme, which lets you see what kind of mix you end up with in the tank if, for example, you top it up with air after a dive. Once you know the mix by using the gas blender programme, it is easy to use the built-in deco table to provide times for the next dive.

Furthermore, with an accessory that connects to the computer via cable, the diver can analyse which nitrox mixture is in the tank; the measurement is then simply saved to the computer with the push of a button. Visit Ratio's website ([ratio-computers.com](http://ratio-computers.com)) for loads of videos on many of the functions and explanations of how to use the iX3M 2.

### The dive log

The logged dives are easily reviewed on the computer's large display and

transferred to a desktop computer or laptop. Ratio uses a logging program called Subsurface ([subsurface-divelog.org](http://subsurface-divelog.org)). The software is open source and free to download and use. The programme supports most computers on the market, so you do not need to have your logs in several different programmes when you have upgraded to an iX3M 2, and it is fine to import entire backup files into the programme.

### Updating the software

Updating iX3M 2 is quite easy. Download the ToolBox programme from Ratio's website, start the programme, press "Upgrade," wait a while... and hey, presto! It sounds simple enough, but I initially had a bit of trouble using it with my Mac computer. However, instructions are given on the same website, and after following them, I soon had the programme up and running.

### Summary

Do you need such an advanced dive computer? That is not a simple or easy question to answer. But my response would be YES! The iX3M 2 not only has all the features that I currently need, but I will never "outgrow" this computer either. The iX3M 2 suits all divers from beginners to technical divers.

Yes, it is a big computer, and not one you would wear at a bar to show

off that you are a diver. However, its large and clear display makes the information easy to read, even if you are older and feel that the numbers on your little watch computer are getting hard to read.

The manufacturer states that a fully charged battery lasts approximately 20 dive hours. In any case, I never worried about the battery not having enough juice, as the dive computer automatically charges when it is connected

to a desktop or laptop computer as you download the dives to the log programme. Most USB chargers can also be used, but I found that my iPad charger charged the iX3M 2 the fastest.

Are there any features I feel are missing? Not really. But I would like to suggest perhaps adding some games, which can keep me entertained during long decompression stops. Hopefully, the manufacturer will consider including one in a future update. ■

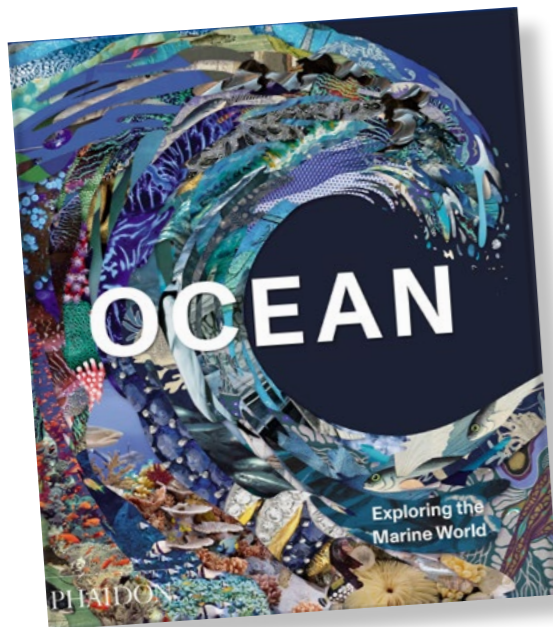
### FACT FILE

Display	Colour, IPS, 2.8-inch, 320x240 pixel, 144 dpi, 100% matrix
Wireless Air Integration (Transmitter, Sender)	Compatible with Ratio Colour Coded Wireless Transmitter
Multi Transmitter	Up to 10 wireless transmitters
Mix	10 mix (+ 3 diluents) (O <sub>2</sub> : 05% - 99% / He: 0% - 95%)
Deco model (Algorithm)	Buhlmann ZHL-12 + Buhlmann ZHL-16 B + Buhlmann ZHL-16 C + VPM-B
Algorithm adjustment	User settable Gradient Factors (GFL/GFH) for Buhlmann and user-settable Bubble Radius for VPM
Water type	Salt water / fresh water / EN13319
Deep Stop	Standard method + Pyle method
Alerts	Vibration + acoustic + visual
Dive Planner	No Deco Limit + Full Deco Planner
Compass	3D Compass, 1° resolution, +/- 1° accuracy
Battery	USB rechargeable Li-ion (~20 hours of diving)
Weight	220gr / 7.7oz
Logbook	~160 hours of scuba (sampling 10 seconds)
Max Depth	220m / 721ft

The author testing the Ratio iX3M 2

PETER SYMES

Edited by  
Catherine GS Lim

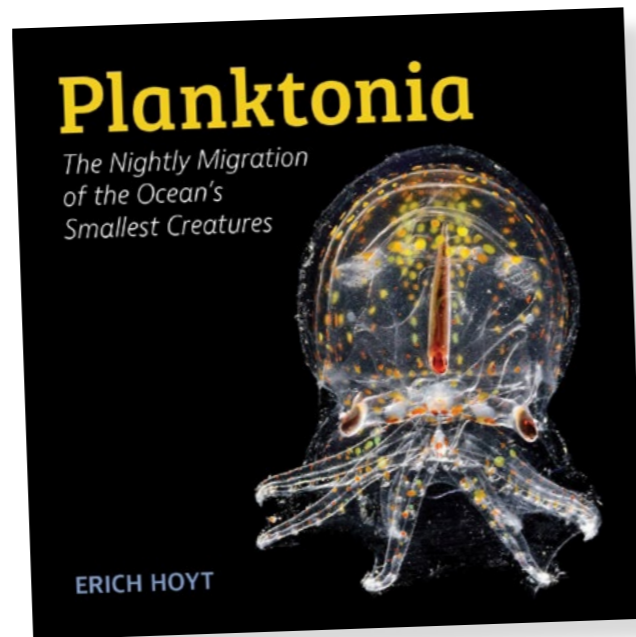


## Ocean Art

*Ocean, Exploring the Marine World*, by Phaidon Editors and Anne-Marie Melster

Spanning more than 3,000 years of history, this book contains over 300 images celebrating our relationship with the marine world. Besides photographs, paintings and sculptures, there are also early nautical cartography, scientific illustrations, maps of the ocean floor, ancient Roman mosaics, Japanese woodblock prints, etc. A fusion of oceanography and art, this compilation has been developed with a panel of marine biologists, research scientists, conservationists, photographers, museum curators and experts from various organisations.

Publisher: Phaidon Press  
Date: 12 October 2022  
Hardcover: 352 pages  
ISBN-10: 1838664785  
ISBN-13: 978-1838664787



## Plankton

*Planktonia: The Nightly Migration of the Ocean's Smallest Creatures*, by Erich Hoyt

As night falls, countless microscopic plankton around the world ascend to the upper waters of the ocean to feed, then descend back to the depths before dawn. This nightly migration attracts a diverse range of predators, from the 15cm bigfin reef squid to the 2m female blanket octopus. This is more than just a fascinating spectacle, as plankton plays a critical role as a carbon sink in the face of climate change.

Publisher: Firefly Books  
Date: 15 August 2022  
Hardcover: 176 pages  
ISBN-10: 0228103835  
ISBN-13: 978-0228103837

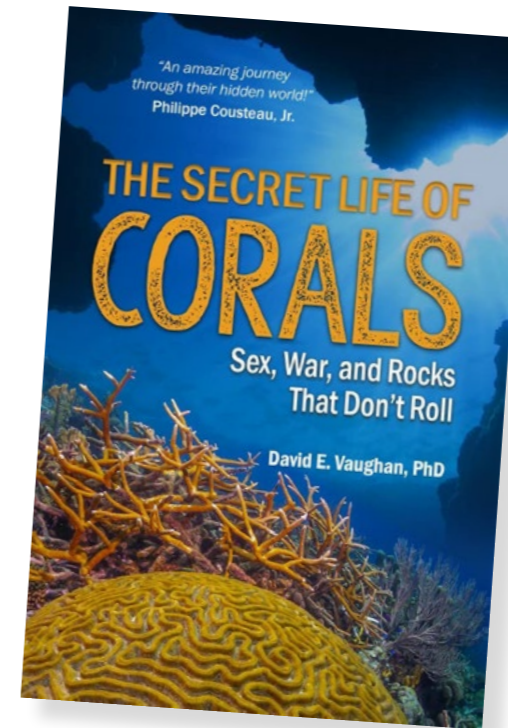


## Reefs

*The Lost Continent: Coral Reef Conservation and Restoration in the Age of Extinction*, by David Alexander Baker

The story and beauty of the world's coral reefs is told through three sections in this book: Discovering Corals, Wonder and Devastation, and Searching for Hope. Through gripping stories and more than 60 breath-taking photos, readers gain a deeper understanding of coral reefs and learn why corals are vital to the health of our oceans. The book also highlights the incredible conservation and restoration efforts undertaken around the world.

Publisher: Imagine  
Date: 18 October 2022  
Hardcover: 208 pages  
ISBN-10: 1623545145  
ISBN-13: 978-1623545147

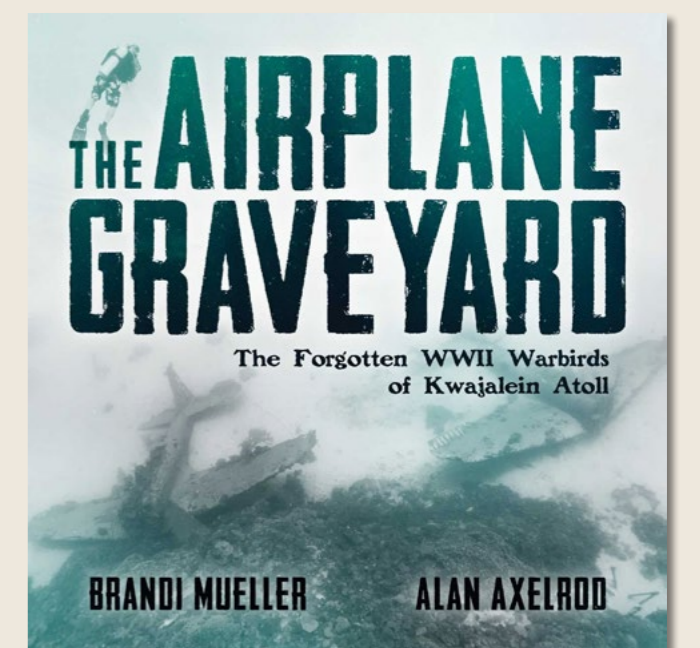


## Corals

*The Secret Life of Corals: Sex, War and Rocks That Don't Roll*, by David E. Vaughan

Corals are more than just colourful subjects in underwater photography. In this fun book, author David Vaughan shares fascinating information about them, including how they live, grow, reproduce, protect themselves and defend their territories. He also explains why they are essential to all lifeforms above and below the ocean surface, as well as the urgent environmental threats they face and the restoration efforts undertaken to boost their survival.

Publisher: J. Ross Publishing  
Date: 15 November 2022  
Hardcover: 260 pages  
ISBN-10: 1604271884  
ISBN-13: 978-1604271881



Never before published in book form, see extraordinary images of the forgotten American WWII airplanes resting on the bottom of the Kwajalein Atoll lagoon, from award-winning underwater photographer Brandi Mueller. Available on: **Amazon.com**

Text by Simon Pridmore

In his *Scuba* series books, Simon Pridmore often tells tales of diving close calls or near misses. He tries to identify the key factors and suggest what the divers might have done differently to pre-empt or better deal with what happened. All the stories are true. Some he witnessed, some were recounted by friends, and others just crossed his radar screen at some point to be filed away for future sharing. This is one of the latter.

Whenever someone gets into difficulty on a dive and takes the time to write down what happened and post the experience on social media or in a magazine, they help make us all safer divers. This is not an easy thing to do as it can expose the diver to criticism or ridicule, but none of us has the right to judge. None of us is immune from human error or the caprices of the ocean.

We can point out lessons to learn though.



# Out of Control

— *A Case of Strong Current, Narcosis & Blue Orb Syndrome*

JOSEPH ILLINGWORTH / FLICKR / CC BY-NC-ND 2.0

## Chris' story

This is Chris' story. It is not the hairiest "bad dive" story you will ever read but it raises a whole host of valuable talking points, and it shows how easy it is to fall victim to simple body

chemistry. I am grateful that he chose to share it.

"It was a typical tropical day: sunny with a chance of showers, although the currents on the reef had been weird all week. So, we chose a site

where conditions were usually straightforward. We planned to go down to a maximum depth of 60m (200ft), then come up the reef wall and do a drift. I had a single AL80 of air and an AL40 pony containing nitrox 36. My buddy

was diving twin 80s, one with air and one with nitrox 36.

"The deep section of the dive was uneventful; visibility was outstanding. Then we headed up. I switched to my nitrox at 27m (90ft), and we

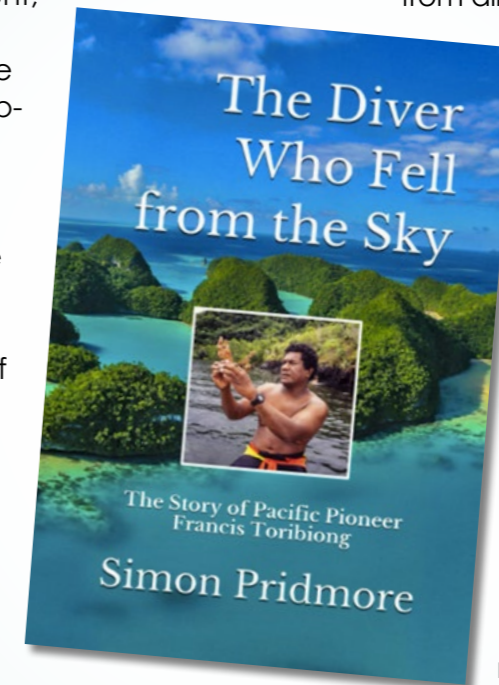




IMAGE SOURCES: CRAIG HATHFIELD/CC BY 2.0, ITIPINABAY

## A Pioneer Story by Simon Pridmore

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



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

sky.” In giving him this title, people were speaking both literally and figuratively.

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

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

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drifted along the reef at 15m (50ft), just sightseeing. Forty minutes into the dive, my computer told me my deco obligation was around 12 minutes at 6m (20ft). By that time, we were hanging out just over the top of the reef at about 10m (35ft), where there was always plenty to see, so we just stayed there, waiting for the deco minutes to count down. My buddy sent up his surface marker buoy (SMB) to let the boat know where we were.

“I had about six minutes of deco left to do when I felt a gentle tug from the ocean. The current was picking up and pulling me away from the reef. I was not overly con-

cerned. I was fit, I was diving with large freediving fins, and I was feeling great: no worries. I started finning horizontally back towards the reef. However, no matter how hard I finned, the reef kept receding into the distance. The current had picked up. I glanced at my buddy and saw him drifting out into blue water too, on the end of his SMB line.

“Every instinct told me, “Get back to the reef!” I looked down and thought I saw a huge swirling vortex. It looked terrifying. The current was still pulling me away, but I was determined to get back to the reef. I had never encountered a current I could

not beat, and I was not going to let this one defeat me.

“Then, the current changed. Suddenly, I was being pulled straight down at a terrible pace. I inflated my BCD to try and arrest my descent. It was no help. I was still going down. I started finning as hard as I could to stop myself from going down and, to make things worse, the current started spinning me around violently. Bubbles were everywhere. I had an iron grip on my inflator and the dump valve was screaming as it released the air in my already full BCD. My mask was half full of water and I was panting hard.

“Suddenly, I found myself heading up fast! The ocean had relaxed its grip and released me. Before I knew it, my head broke the surface. My first thought was, “I am in trouble. I am probably going to get bent here.”

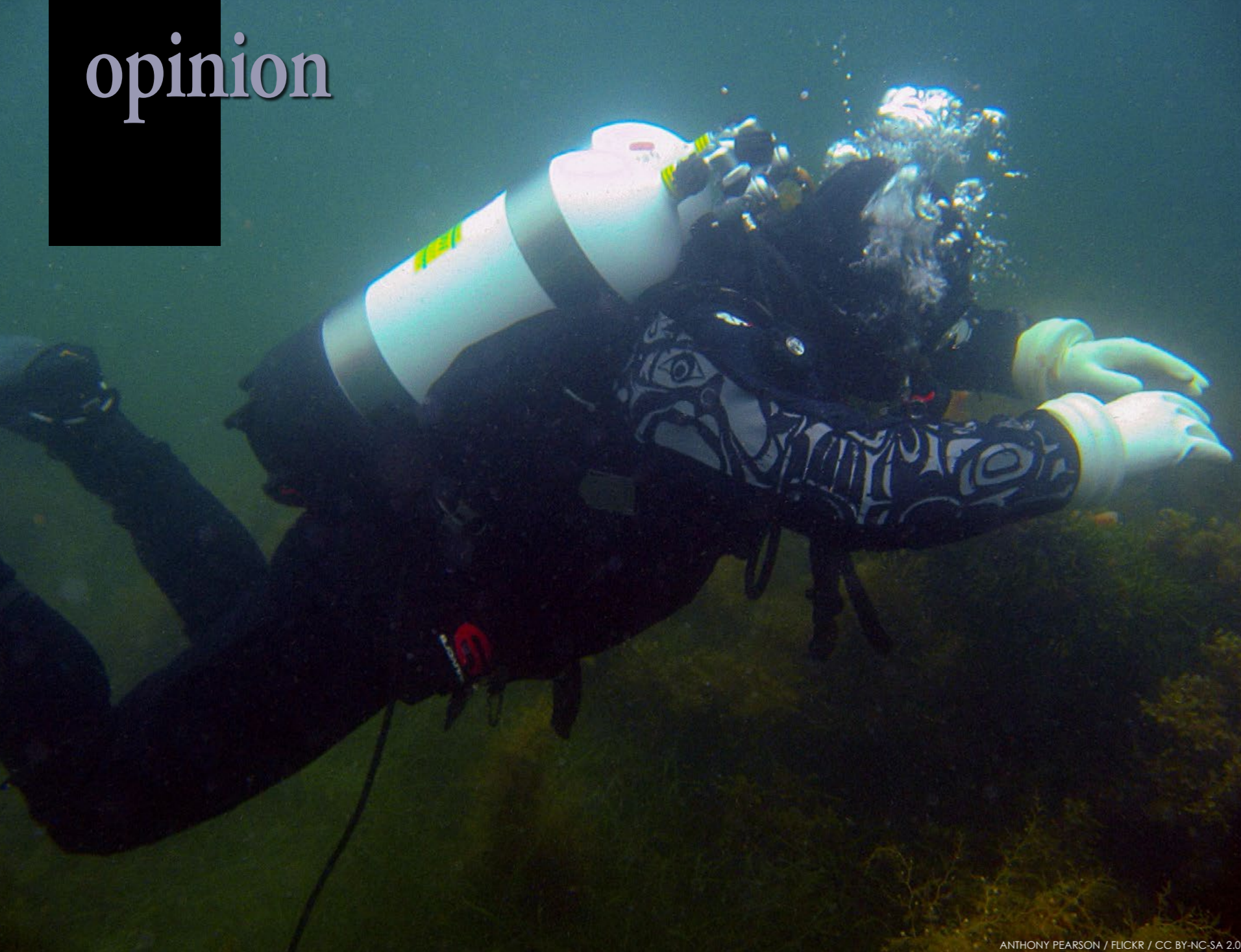
“I immediately descended again. I was low on gas in both my cylinders, and I was frightened that the current would pull me down again. I could sense it toying with my feet. I raised my SMB and floated along at 6m (20ft). By the time my computer cleared, my nitrox cylinder was empty, and I had less than 15 bar (300psi) in my AL80. I returned to the surface and the boat picked me up.

“After 90 minutes of rest and no DCS symptoms, we went back in and did a second shallow dive on 36% nitrox. Later, I reviewed my dive log and saw that the current had pulled me down to 18m (60ft). It had felt much, much deeper! The computer clocked my rapid ascent at 45m (150ft) per minute.”

### Talking points

There is plenty to unpack in Chris' story. Let's start with the idea of doing a 60m (200ft) dive with a single cylinder of air and a pony of nitrox 36 or back-mounted independent twin cylinders, one containing air and the other nitrox 36.





ANTHONY PEARSON / FLICKR / CC BY-NC-SA 2.0

**Two cylinders.** First, the strategy of carrying two cylinders on your back, one with your deep gas and the other with your deco gas, has been killing divers for decades because it is so easy for a diver with this configuration to breathe the wrong gas at the wrong depth. No training agency teaches it, yet the practice persists.

The configuration issue aside, experienced divers in the tropics do dives like this all the time, without really considering the true risks. If you have an air supply emergency at depth—either

a blown cylinder O-ring or a regulator free-flow—you have two options:

1. Switch to your nitrox 36, which at 60m (200ft) has a PO<sub>2</sub> of 2.52 atmospheres and is likely to give you instant oxygen toxicity convulsions, or
2. Ascend immediately to 33m (110ft), where your nitrox 36 will be safe to breathe. This sounds fine until you calculate that this ascent will take you three minutes at a safe speed and that your air cylinder will be

empty before you get there, even if you think clearly and act quickly, an impossible feat at 60m (200ft) with the level of narcosis that breathing air at that depth brings on.

So, effectively, you have no viable backup plan for dealing with an air supply emergency at 60m (200ft).

**Narcosis.** Narcosis is the biggest threat to a diver on an air dive to 60m (200ft). Not only is your breathing gas narcotic, but the density of air at

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

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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.

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As soon as he felt it carrying him away from the reef, he thought he was in danger, and he was afraid of leaving the wall behind. He did not need to fight the current. He could have just popped his SMB up and drifted with the flow, as his buddy did.

**Blue orb syndrome.** Some divers are affected by a phenomenon known as “blue orb syndrome,” which leads them to become anxious when they can no longer see the reef or seabed. In Chris' case, this anxiety would

have been exacerbated by his frantic finning and contributed to the panic that was about to grip him when he encountered the downcurrent and interpreted his inability to maintain depth control as a risk to his

safety. His narcosis-fueled brain perceived the downcurrent to be a terrifying, vicious force dragging him into the abyss. On the contrary, as he found out when he looked at his computer later, it carried him

down less than 10m (33ft).

All he had to do when he was caught in the downcurrent was to keep calm and swim laterally until he escaped from its pull. Instead, he chose the worst possible response and



## Out of Control

CHRISTIAN GLOOR / FLICKR / CC BY 2.0



CHRISTIAN GLOOR / FLICKR / CC BY 2.0

inflated his BCD while finning hard upwards. This gave him his first genuine problem, as he discovered when the current released him, and he shot to the surface.

**Stay on the surface.** Finally, after his rapid ascent, the smartest thing for Chris to do would have been to stay on the surface, instead of returning to depth to clear his computer. He had only blown a few minutes of deco and modern dive computers operate with substantial margins of safety. The greatest risk posed by a rapid ascent is the generation of bubbles in the body. Going back down and starting to breathe gas under pressure

again can cause any bubbles generated by the rapid ascent to take on more gas and grow, and big bubbles are more harmful than small bubbles.

This also argues against the wisdom of doing a second dive after an episode like this. Physiologically and psychologically, if you have had a bad dive, it is always best to sit out the rest of the day on the surface, self-monitor and leave any further diving to the next day, assuming you have no residual DCS symptoms or anxiety. ■

*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](http://SimonPridmore.com).*

# marine mammals

Text by Catherine GS Lim



MOLLIE NACCARATO, SOOKE COASTAL EXPLORATIONS, PWWA

Humpback whales and orcas were spotted interacting at the Strait of Juan de Fuca on the US-Canadian border. Watch the [video >>>](#)

## Orcas and humpbacks brawl

The Pacific Whale Watch Association (PWWA) witnessed a rare event unfold as a large group of Bigg's (transient) orcas and a pair of humpback whales harassed each other during a dramatic hours-long encounter in the Strait of Juan de Fuca.

Whale watchers were making their way toward the US-Canadian border in the Strait of Juan de Fuca when the captain spotted the group of whales. At first, whale watchers observed what they thought was a pod of roughly 15 Bigg's orcas swimming and "being unusually active at the surface." Before long, it became apparent that two humpback whales were in their midst.

### Intense

According to observers who came and went throughout the day, the intense encounter that unfolded included an astonishing three hours of breaching, tail-slapping and loud vocalizations.

Eventually, the whale watchers lost sight of the epic encounter when a thick cloud of fog rolled in, so the result of the contest remains a mystery.

"I'm still trying to wrap my head around it because it was absolutely unbelievable," said Mollie Naccarato, captain and naturalist for Sooke Coastal Explorations on south Vancouver Island. "At first, the orcas seemed to be chasing the humpbacks, but then when it seemed there was space between them, the humpbacks would go back toward the orcas." ■ SOURCE: PACIFIC WHALE WATCH ASSOCIATION

## Orcas hunt great white sharks

Footage shows pod of orcas killing a great white shark and devouring its liver.

For several years, scientists have suspected that orcas have been killing and eating parts of great white sharks. Now, they have video evidence to prove it. New drone and helicopter footage show a pod of orcas ruthlessly pursuing a great white shark in Mosel Bay, South Africa, for more than an hour before going in for the kill. The video culminates with one of the killer whales gobbling up a large chunk of the shark's liver.

The footage may shed new light on the way white sharks try to evade orca attacks: staying within sight of their predator. That is a common strategy used by seals and tortoises to evade sharks, the researchers said. But that circling approach is probably ineffective for escaping orcas, which are social mammals and hunt in groups, cornering their prey, the scientists wrote.

They are highly intelligent mammals and this is reflected in the way they hunt. First, they stun the shark by ramming it, then turn it upside down to disorient it, causing it to enter a trance-like state known as tonic immobility. Sharks essentially stop moving in this pos-

ture, allowing the orcas to drown the animal at the surface. The orcas then selectively cut open the shark to extract its liver and, in some cases, other internal organs.

### Sharks keep clear of orcas

Researchers have also discovered that dozens of great white sharks have been actively avoiding parts of the Gansbaai coast, a white shark aggregation site in the Western Cape in South Africa, when the orcas are around.

By combining long-term sightings and tagging data, they found that tagged sharks sometimes disappeared for weeks or months at a time, abandoning territory that, historically, has been dominated by these animals. ■ SOURCE: ECOLOGY

*I always refer to the orcas as being like the wolves of the ocean. They've kind of got the edge on this because, you know, they're coordinated and they've got teamwork, whereas the white sharks are on their own. They're caught by surprise and they're basically just panicking.*

— Alison Towner, shark biologist



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Watch the video of the orcas hunting great whites [here >>>](#)



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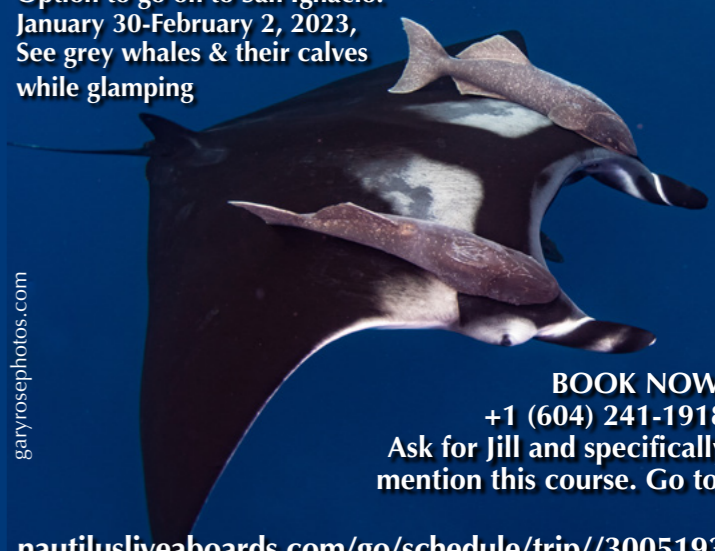
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Diver comes face-to-face with a giant moray in a shipwreck at Mabul, Malaysia.

Text and photos by Nigel Marsh

Aside from sharks, moray eels are one of the most maligned and misunderstood of all marine animals. Thought by most people to be highly dangerous because of their depiction in films and books, morays are not malicious monsters, but an important predator of any healthy marine ecosystem. And as most divers will attest, morays are generally shy and docile if not harassed. Nigel Marsh shares insights about these intriguing animals.

I met my first moray as a thirteen-year-old and it was an encounter I will never forget. At the time, in the 1970s, the moray was considered to be a very dangerous animal, reported to attack divers and fishers. I had read stories of Roman slaves being fed to hungry morays for entertainment and had recently seen the film *The Deep*, which included a scene where an enormous moray attacks and kills a diver. So, when I encoun-

tered a 2m-long giant moray while snorkelling on the Great Barrier Reef, I was understandably terrified!

The incident occurred as I was happily snorkelling the reef edge, but my feeling of joy turned to terror the

instant I stuck my head into a cave and came face-to-face with an enormous giant moray!

I almost swallowed my snorkel, and quickly backed out of the cave and shot to the surface before I was sav-

aged by this vicious denizen of the deep. Catching my breath on the surface, I kept an anxious eye below, fearful that the eel would emerge from its lair and attack me at any second.

But after several minutes, there was

no sign of the moray.

Building up my courage, I dived again to get a better look at this so-called "monster". I slowly approached the cave and stopped several metres away from the large eel.



## Morays

*Misunderstood & Maligned*

# ecology

Not all morays have sharp teeth, as some, like this snowflake moray, have short stumpy teeth designed to crush the shells of prey (right).



Morays, like this impressive mosaic moray, are renowned for their sharp fang-like teeth, but morays also have a second hidden jaw located in their throat to assist in swallowing prey (right).

I dived down several more times to study this large eel, and each time I got closer and closer, and the moray continued to ignore me. It was only at this point that I realised the moray was not alone, as an even bigger giant moray was lurking at the other



## Morays

This huge moray, with a body as thick as my thigh, did not seem to be interested in me at all. I closely studied the eel, looking for signs of aggression, worried that it might suddenly lunge forward and attack. But it seemed to be content simply resting in its cave looking at passing fish, not even snapping at them. It did look very fierce and threatening the way it constantly opened and closed its mouth, revealing rows of razor-sharp teeth, but apart from that, it seemed to be quite unassuming, not the monster I had been brainwashed into believing was a threat to divers.



Morays constantly have to open and close their mouths to breathe, as illustrated by this fimbriated moray.

end of the cave. Seeing this second larger moray was a huge shock, especially when I realised, I had had my back to this moray the entire time. It could have attacked me several times, but it did not, as it seemed to be completely indifferent to me.

I suddenly realised that all I had seen, read and heard about these animals was completely untrue. Returning to this cave the next day, I was disappointed to find it empty, the morays having moved to another lair.

That experience taught me that morays are not dangerous, aggressive animals as presented in the media at the time, and it also started my fascination with these incredible reef residents.

### Biology and behaviour

Morays are placed in the family

Muraenidae and 211 species are currently recognised. Like all eels, they have an elongated body, and most are nocturnal hunters, hiding away in a lair by day. The great majority of morays live in tropical and subtropical waters, especially on shallow coral reefs. However, a few species inhabit cooler temperate waters, others deep water, some venture into brackish waters and a few are even found in freshwater.

Morays are easily distinguished from their cousins, the conger eels, as they have a larger head and deeper body, but smaller eyes. However, some small morays do look similar to conger eels. The easiest way to tell the two families apart is to look for pectoral fins behind the head, congeners have them and morays do not. Morays also typically have much more prominent

teeth, with most species having long dagger-like fangs. These teeth vary in size and arrangement depending on the species and what they eat, but a few have short blunt teeth that are designed to crush the shells of crustaceans and molluscs.

**Jaws and teeth.** Morays use their sharp teeth to catch and restrain prey, or in the case of the stumpy teeth morays, crush and detain. Some even have an extra row of teeth on the roof of their mouth to restrain prey. Morays do not chew their food, so it has to be swallowed whole. To assist in this process, morays have a second unique set of teeth located in the back of their throat called the pharyngeal jaw. Some fish also possess pharyngeal jaws, but they remain static and are used to further process





food while it is swallowed. In morays, the pharyngeal jaw can extend forward to grab prey and smoothly transport it into the stomach. It is thought the movable pharyngeal jaw has evolved in morays as they do not suck in prey like fish, as residing in tight crevices leaves little room for them to open their mouth wide enough to create a suction action.

**Diet.** Morays eat a variety of prey, most of which are captured at night. Some species are very active hunters, searching the reef and even rock pools for prey, some even exit the water to grab shore crabs. While other morays are ambush predators, only seizing prey that venture close to their lair. Morays consume fish, octopus, cuttlefish, squid and some even have a preference for crabs, shrimps and even seashells. When tackling large prey, or prey wedged in a crevice, morays have been observed tying their body into a knot to exert more force, and also knotting themselves around large prey to rip it apart or compress it for easier swallowing.

**Hunting behavior.** Encountering a hunting moray on a night dive is an unforgettable experience. On one memorable night dive on the Great Barrier Reef, I watched a giant moray (*Gymnothorax javanicus*) stalking the reef, hunting for sleeping fish. When a fish was discovered, the moray would instantly snap at the dozing fish. Some



Most morays reside in tropical or subtropical waters, but the green or yellow moray lives in the temperate waters of Australia and New Zealand (left); Morays often share their lairs with cleaner shrimps, like this honeycomb moray and a white-banded cleaner shrimp (below); Some morays are solitary creatures, but others, like these white-eyed morays, are happy to share a home (right); Morays make homes in caves, cracks and crevices in natural and artificial reefs, but this small sieve-patterned moray has selected a sea squirt as its lair (bottom right).

fish woke just in time and shot away to safety, but the moray managed to grab several small fish, including one fusilier that it bit in half!

Most morays have very prominent tube-like nostrils at the end of their snout to detect the scent of prey. This is their most important sense for hunting quarry, as many morays are considered to have poor eyesight. However, hunting at night, good eyesight is not essential. But this statement is not true for all morays, as some feed by day, grabbing prey that swims by their home or even hunting crabs on shore. In these instances, good eyesight is required to successfully capture prey.



**Predators of morays.** A number of animals feed on morays, including groupers, sea snakes and barracuda. And some morays are known to be cannibalistic, feeding on other morays. Several shark species also prey on moray eels. On one notable dive off Tweed Heads, Australia, I encountered a spotted wobbegong shark (*Orectolobus maculatus*) with a tail of a stout moray (*Gymnothorax eurostus*) hanging out of its mouth!



**Toxicity.** Humans should avoid eating morays as their skin and flesh are toxic, but some cultures do consume them. Morays, unlike most of their fish cousins, lack scales and instead have smooth skin that is covered in a toxic mucus. Their flesh, especially the liver, also contains high levels of ciguatera toxins, which can result in ciguatera poisoning if consumed. A number of deaths have been recorded from people eating moray flesh.

The secreted mucus that coats the body of morays protects the skin, making it easier to slide through the water, over the reef and in and out

of holes when looking for prey. The mucus also assists a number of sand-burrowing morays, like the ribbon eel (*Rhinomuraena quaesita*), to slide through the sand and keep their burrow walls from collapsing.

A number of morays can change sex, but only the ribbon eel changes colour as well. This ribbon eel is in the process of change from its black juvenile phase to its blue male colouration (right); Many morays have decorative skin patterns that assist with camouflage, like this whitelip moray (bottom left); The whitemouth moray is appropriately named as it does have a white mouth, while other morays have patterned mouths (bottom right).

**Skin patterns, gills and size.** Some morays have very plain and even drab skin patterns, but most have decorative skin patterns of spots, bands, reticulations and marbling. These skin patterns have evolved to aid in camouflage. In some species, these patterns also decorate the inside of the mouth, and a few also have brightly coloured mouths, most notably the yellowmouth moray (*Gymnothorax nudivomer*) and whitemouth moray (*Gymnothorax meleagris*).

The gills of morays are quite small, simply a round opening located behind the head. To assist in pumping water through these small gills, morays

constantly open and close their mouth. When first encountered, this behaviour does look very threatening, especially with the mouth gaping and revealing rows of very sharp teeth, but this is simply the way morays breathe.

Morays vary greatly in size. Most are around 1m long, but the smallest, the Synder's moray (*Anarchias leucurus*), reaches a length of only 12cm, while the longtail moray (*Strophidon sathete*) can grow to 4m in length. It is thought that morays live between 10 and 30 years.

**Reproduction.** The sex lives and breeding habits of morays are poorly



understood. Most morays are solitary, only coming together to breed. There is no known breeding season, but an abundance of food and warmer water temperatures over summer are thought to be triggers that lead to more successful mating. Courting morays have been documented opening their mouths wide in an elaborate courtship display and wrapping their bodies around each other. The female then lays her eggs, and the male fertilises them with his sperm. Some lay their eggs in a secure hiding place in the reef, while others release them straight into the water column.

**Life cycle.** The young take between 30 to 45 days to hatch, then they drift with the plankton in a ribbon-like larval stage, known as a leptocephalus. Depending on the species, they remain in this larval form for months and even years. Moray larvae have no digestive tract, and with a body wall only one cell thick, they cannot digest plankton and instead eat the discarded exoskeleton of plankton and plankton faeces. As they start to develop into their adult form, they find a reef to call home. It takes around three years for most morays to

become sexually mature.

The life cycle of some morays is not that simple, as some species can change their sex from female to male or vice versa, most notably the ribbon eel. This strange moray not only changes its sex, but also changes colour, with the juveniles being black, the females yellow and the males blue. How long this process takes is unknown, but morays transitioning

their sex are sometimes observed with a mix of yellow and blue colours.

We know sadly little about the lifestyles of most morays. Some have a limited home range and a preferred lair, while others roam the reef and use a variety of hideouts. Most live solitary lives, but others are happy to share a lair with other morays of the same and other species. Some morays have also been documented hunting co-oper-



# ecology

Dead barred moray, a victim of fishing activities



actively with other fish, mostly groupers, with the two species working together to corner and flush out prey.

**Intelligence and interaction.** Morays are considered to be more intelligent than the average fish. This is especially evident to divers that have struck up a relationship with a moray through feeding them, with the moray recognising and sometimes interacting with only one diver.

The most famous example of this is Valerie Taylor's relationship with a yellow

Eating morays is not recommended as they have toxic skin and flesh. However, some cultures do risk eating morays. I found these fangtooth morays in a market in Morocco (right).



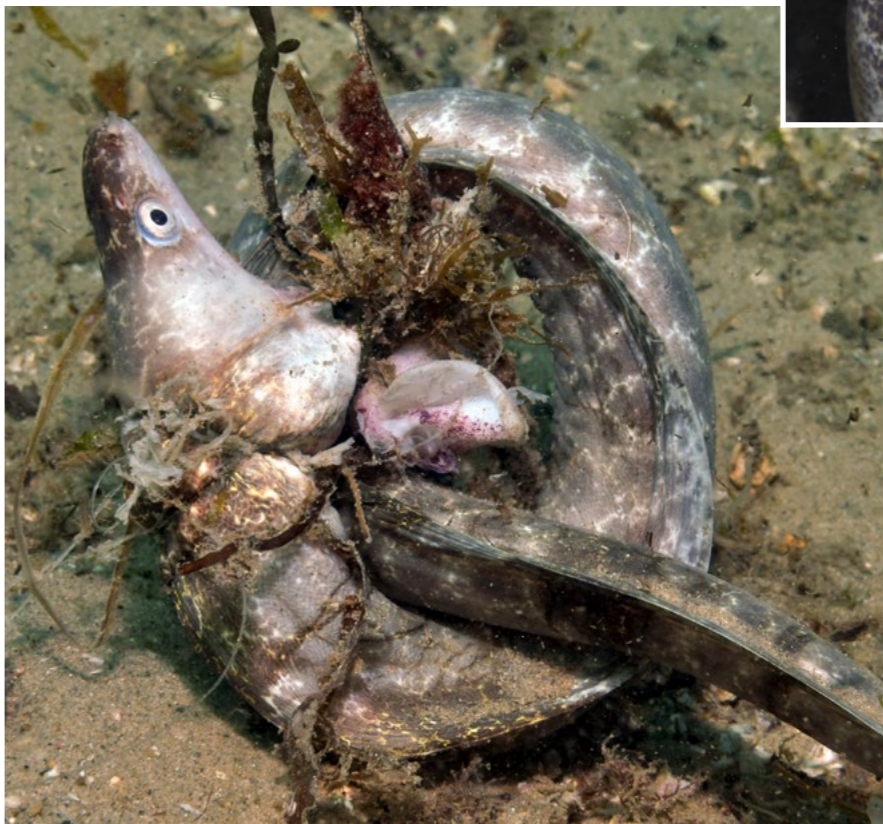
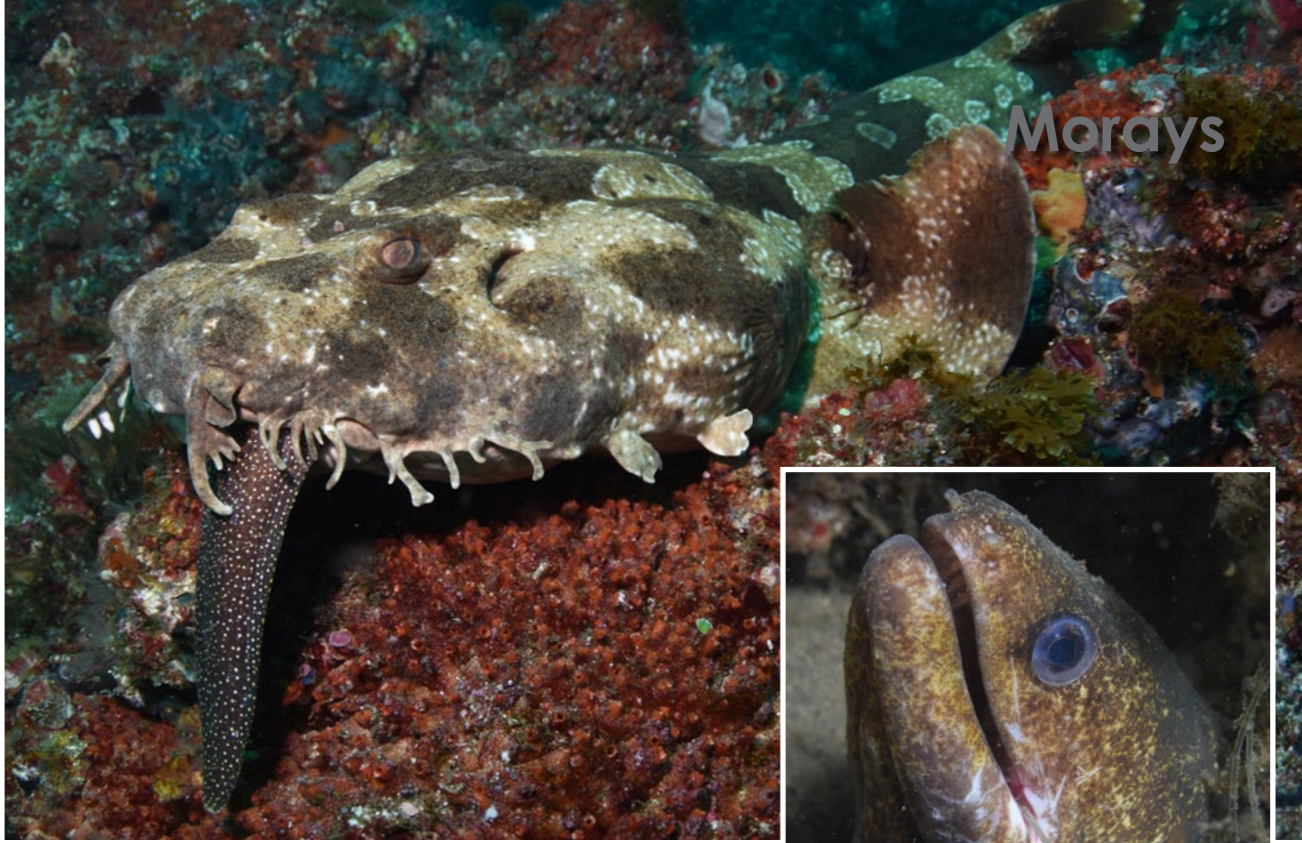
lowmargin moray (*Gymnothorax flavimarginatus*) at Heron Island, Great Barrier Reef, called Harry. Throughout the 1970s, Val would feed, pat and play with this friendly moray, even pulling him out of his home and carrying

him around. He recognised and trusted Val, even if she only visited Harry once a year. Val later had a similar relationship with a spotted moray (*Gymnothorax isingteena*) in the Banda Sea, Indonesia.

Feeding morays is not recommended, as numerous divers have been bitten in these situations. Apart from feeding incidents, how dangerous are morays? Morays are not normally aggressive, but accidents do happen, and divers have been bitten when placing their hands too close to a moray's head or home. However, moray attacks are rare, and morays have much more to fear from humans.

### Fishing threats

While not commonly targeted for food, morays often fall foul of fishers, and unfortunately, some kill the poor moray either thinking they are performing a public service or getting rid of competition. However, most fishers cut captured morays free, not wanting to tangle with a mouthful of sharp teeth.



This unfortunate sieve-patterned moray has tried to twist itself in knots to escape a hook and fishing line, sadly without success (left); This poor highfin moray has swallowed a fishhook and still has fishing line protruding from its mouth (above); A number of animals eat morays, including sharks. I encountered this spotted wobbegong shark eating a stout moray off Tweed Heads, Australia (top right)

This unfortunately leaves the hook in place in the moray's mouth, throat or stomach, which can lead to a slow death from septicaemia. I have occasionally found dead morays at popular fishing spots, with the poor moray tangled in yards of fishing line. Morays are also captured for the

aquarium trade. How many are taken and die each year for the entertainment of a few is unknown.

### Moray species

There are 211 recognised moray species that are split into two subfamilies and sixteen different genera based



Giant morays are often attracted to shark feeds and even muscle out the sharks. This one was photographed at a shark feed at Beqa Lagoon, Fiji.





The shy barred moray has short stumpy teeth and feeds on crustaceans and molluscs (left); The barred-fin moray is a species found on tropical reefs of the Indo-Pacific region (below); The geometric moray has a wonderful pattern of dots on its head (right); The spotted moray is easily confused with the very similar looking honeycomb moray (bottom right).

*isingteena*). However, this species has a sparsely spotted pattern and only grows to 1.8m in length.

While members of this genus are found around the world, they are far more common in the tropical and subtropical waters of the Indo-Pacific region. Common tropical members of this genus include the white-eyed moray (*Gymnothorax thyrsoideus*),



Morays

on similar body characteristics. Most species are placed in the subfamily Muraeninae, which I like to call the true morays. The eleven genera in this group have a continuous dorsal fin that starts above the gill opening and runs the length of the body, before wrapping around the tail and fusing with the anal fin. The other five genera are placed in the Uropterygiinae subfamily, or the snake morays. These morays typically have less obvious dorsal and anal fins starting farther down their body, closer to the tail, and many have a more rounded snake-like body.

### The true morays

**Gymnothorax.** Most of the familiar morays that divers encounter are placed in the very large *Gymnothorax* genus. All 125 species in this genus have very sharp fang-like teeth. The best-known member of this genus is the giant moray (*Gymnothorax javanicus*), a common eel seen throughout the Indo-Pacific region. This large moray often makes an appearance at shark feeds, mus-



cling out the sharks, and has been known to eat other morays. Another common member of this genus is the honeycomb moray (*Gymnothorax favagineus*). This black-and-white patterned moray is found in the Indo-Pacific region and is reported to reach 3m in length. This species is easily confused with the very similarly patterned spotted moray (*Gymnothorax*

the fimbriated moray (*Gymnothorax fimbriatus*) and the barred-fin moray (*Gymnothorax zonipectus*). The prettiest member of this genus found in the western Indian Ocean is the geometric moray (*Gymnothorax griseus*), which has a pattern of dots on its head. One of the few members of this genus found in the temperate waters of Australia and northern New

Zealand is the yellow or green moray (*Gymnothorax prasinus*).

**Echidna.** The eleven members of the *Echidna* genus all have stumpy-blunt teeth to crack the shells of crustaceans and molluscs. The wide-ranging snowflake moray (*Echidna nebulosa*) is the best-known mem-

ber of this genus, easily identified by its black and white bands and yellow spots. This species grows to 75cm and is another species found in the Indo-Pacific region. The barred moray (*Echidna polyzona*) is found in the same region and is of a similar size, but like many other members of this genus, it is shy and rarely seen.

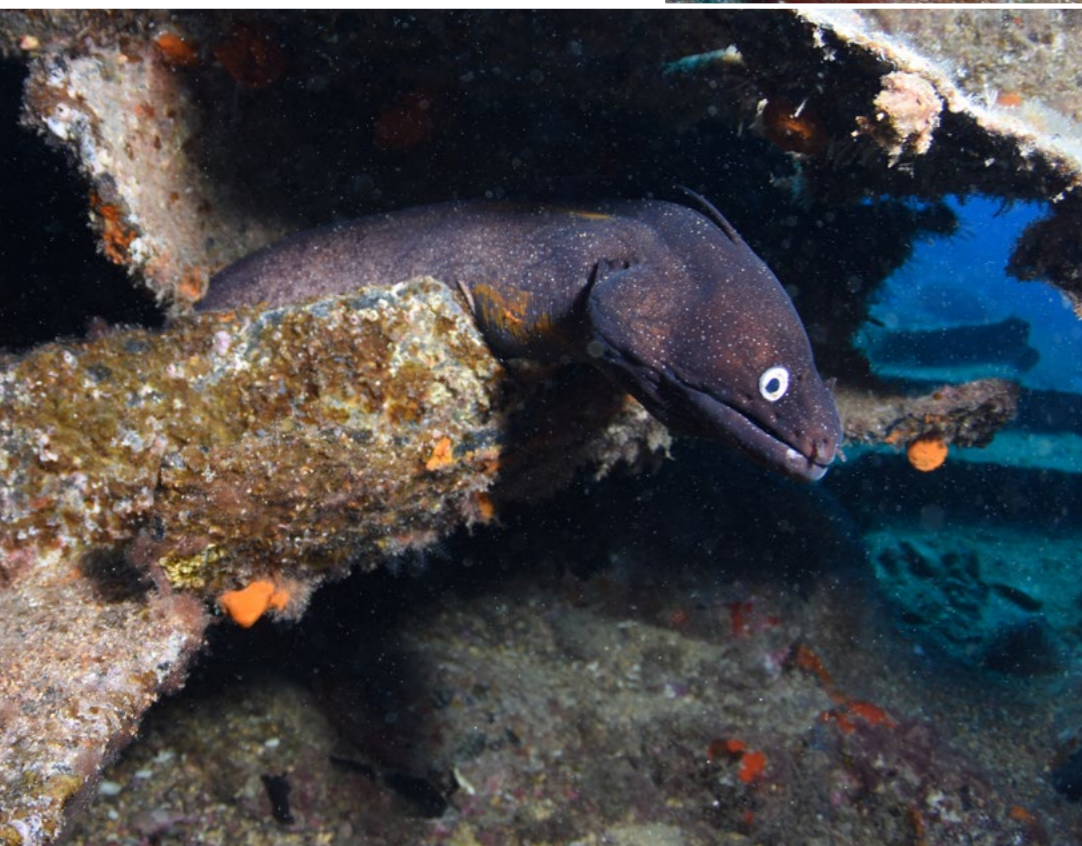


# ecology

The fangtooth moray is a spectacular member of the family found in the eastern Atlantic (right); Black moray residing on a shipwreck in the Canary Islands (below)



## Morays



The beautiful zebra moray is another species lacking sharp teeth (top right); With flaring nostrils and beard-like whiskers, the ribbon eel is one of the most unique members of the moray family (lower right)

eastern Atlantic. My favourite from this group is the mosaic moray (*Enchelycore ramosa*) which grows to 1.6m in length. This attractive moray is only found in a limited area off the eastern coast of Australia and northern New Zealand.

**Muraena.** Twelve species make up the *Muraena* genus of morays. These eels typically have sharp teeth, and most are only found in the Atlantic Ocean. The Canary Islands is a good place to see one of these morays, with the black moray (*Muraena augusti*) often encountered by divers. This black-coloured moray has white eyes and grows to 1.6m long.

**Rhinomuraena.** The ribbon eel (*Rhinomuraena quaesita*) is the only member of the genus *Rhinomuraena* and some argue that it is so different from all other morays that it should be listed in its own separate eel

family. These fascinating eels grow to 1.6m in length and have a very thin ribbon-like body. Ribbon eels typically live in sand and rubble, with their body mucus cementing their tunnel walls together so they can quickly slide in and out of their home. Two of the more unusual features of the ribbon eel are a set of large flaring nostrils and chin barbels, used to detect prey.

**Pseudechidna.** The white ribbon eel (*Pseudechidna brumeri*) is a close relative of the ribbon eel but is placed in a separate genus *Pseudechidna* all by itself. While it does have a ribbon-like body and resides in the sand and rubble, it lacks the large flaring nostrils of the ribbon eel, having a more traditional moray head decorated with small brown spots. This is another Indo-Pacific species that grows to 1m in length.



**Gymnomuraena.** The zebra moray (*Gymnomuraena zebra*) is very similar to the Echidna morays, having short blunt teeth, but is placed in a genus all by itself—*Gymnomuraena*. Found throughout the Indo-Pacific region, this pretty moray is brown with white bands and grows to 1.5m in length.

**Enchelycore.** The most spectacular morays are found in the genus *Enchelycore*. The 13 members of this family have

long dagger-like teeth and a curved jaw that prevents them from completely closing their mouths. Most members of this genus also have remarkable colour patterns, including the dragon moray (*Enchelycore pardalis*). Although found throughout the Indo-Pacific, this extraordinary moray is only locally common to a few locations. The fangtooth moray (*Enchelycore anatina*) is another striking member of this genus that is found in the

### The snake morays

**Scuticaria.** The two members of the *Scuticaria* genus are typical of morays in the Uropterygiinae subfamily, they almost lack dorsal fins and have rounded bodies. The tiger snake moray (*Scuticaria*

*tigrina*) is found throughout the Indo-Pacific region but is only occasionally seen by divers at night. This blotched coloured moray grows to 1.4m in length and is sometimes seen in the Red Sea and Southeast Asia.





The white ribboned eel looks very similar to the ribbon eel but is placed in a separate genus (right); The tiger snake moray is a shy species occasionally seen on Indo-Pacific reefs (below)



Morays



ants, that indicated any geographic separation. And while they found variations between the genes of individual morays, they discovered nothing related to geographic separation. This was quite astonishing; how can morays over 20,000km apart have no distinctive regional genetic markers?

The researchers came to the conclusion that morays are genetically homogeneous because of their long larval stage, which allows them to widely disperse and constantly stir the gene pool. Biologists have theorised that the longer the larvae stage of a fish, the more genetically homogeneous the species and the wider its distribution. Some morays remain in their larvae stage for months and even years. While some fish also have long larval stages, moray larvae are the only fish found to cross vast ocean distances and survive barriers that other fish larvae never manage to bridge. This theory also explains why some morays have a limited range and others are widespread, the wider distribution linked to the longer larval stage of some species.

**Uropterygius.** The 20 morays of the genus *Uropterygius* are rarely seen by divers. The only member of this genus that I have encountered is the blotched snake moray (*Uropterygius fasciolatus*). This species grows to 60cm in length and is very shy.

There are a number of other genus groups that I have not included, mainly because they are rarely seen by divers.

**Moray research**

With their dangerous reputation, it is understandable why little research has been done on morays. One of the few researchers to study morays was Joshua Reece, when he did his Ph.D. at the University of Hawaii in 2005. He

was inspired to study morays after a dive of Oahu and seeing five different moray species sharing the same lair. He wondered how this could be, especially after capturing them and finding out they were eating the same prey. This broke the basic rules of nature on diversity, similar species do not exploit the same niche as one will always prevail, but morays do not appear to follow this rule.

Collecting morays across the Indo-Pacific region, with a focus on the undulated moray (*Gymnothorax undulatus*) and yellowmargin moray; Reece discovered that morays are the most cosmopolitan of all reef fishes. Studying their genes, the researchers looked for unique alleles, or vari-

The yellowmargin moray is a widespread species found throughout the Indo-Pacific region (above); The blotched snake moray is another shy species that is rarely seen by divers (top left)



The grey moray is a common species at the Poor Knights Islands and often boldly sits out in the open or is draped over sponges and kelp (right)



Unfortunately, the research did not find answers to why a great variety of moray species can share the same niche of food, habitat and distribution, and how over 150 species evolved in the Indo-Pacific region in the first place.

Another recent study in the Caribbean found that morays are more common on reefs with higher levels of human pressure, with the research-

ers theorising that with the removal of sharks, morays have become the top predators on these reefs. In addition, another recent study of California morays (*Gymnothorax mordax*) off Catalina Island discovered that morays residing in marine protected areas were longer, older, heavier, in better condition and in greater abundance than the morays in unprotected areas.

Moray eels are the most cosmopolitan of all the reef fishes, with the undulated moray found across the Indo-Pacific region (left); Large honeycomb moray hanging out of a hole at Kanduhgiri in the Maldives (right)

### Special moray dive sites

**Brisbane, Australia.** Morays are seen at dive sites across the planet, but being shy and retiring, they are sometimes hard to find. I feel very fortunate to live in an area where morays are very common, in Brisbane, Australia, right in the centre of the Indo-Pacific. This subtropical region is home to over a dozen species of moray.

On most dives, I encounter between five and ten morays and have found that some species are very common, others locally common, some only occasionally seen and some extremely rare. A few morays that are recorded in the area I have never seen, even after diving this region for almost 40



Morays

years. I am not sure if this is a case of some species being abundant and others sparse in numbers, or simply that some are extraverted and happy to be seen and others are introverted and prefer to remain hidden—or maybe a combination.

### Poor Knights, New Zealand.

While I feel blessed to be able to see such a great variety of morays at my local dive sites, they are not the best moray destinations I have found. Over the 40 years I have been diving, I have found only two special sites where the morays are the dominant creatures—the Poor Knights Islands in New Zealand and a wonderful dive site in the Maldives called Kanduhgiri.

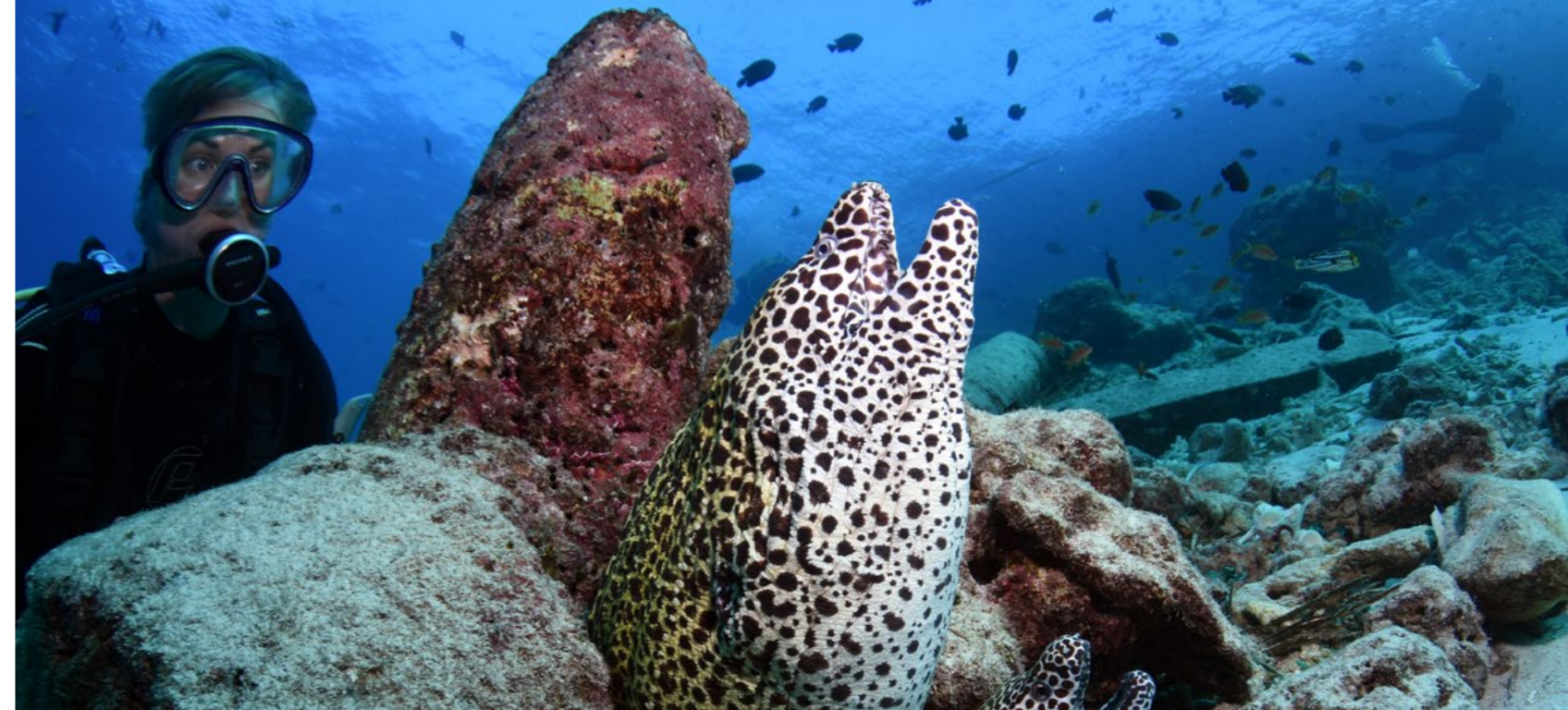
The Poor Knights Islands are located in a temperate zone, so it is a big surprise that so many subtropical moray species are found here. The reason they are here is due to the warm waters of the East Australia Current, made famous in the film *Finding Nemo*, warming the local waters and also bringing subtropical visitors, including morays.

At every dive site at the Poor Knights, divers see moray eels, and not just one or two, but dozens upon dozens. The most common species are two temperate morays, the yellow moray and the endemic grey moray (*Gymnothorax nubilus*). The grey morays are particularly obvious; unlike most morays

that hide in a lair, these morays like to drape themselves over sponges and kelp.

Two other morays are commonly seen at the Poor Knights in smaller numbers, the spectacular mosaic moray (*Enchelycore ramosa*) and the more low-key low-fin moray (*Gymnothorax porphyreus*). If that was not enough, two less-common species are seen from time to time, the mottled moray (*Gymnothorax prionodon*) and the Lord Howe moray (*Gymnothorax annasona*).

However, I got a big surprise when diving this area when I found a completely unexpected moray—the Y-patterned moray (*Gymnothorax berndti*).



A completely unexpected find at the Poor Knights Islands was this deep-water Y-patterned moray (above); The lowfin moray is a little harder to find at the Poor Knights Islands (centre)

This pretty moray, with its black-and-white reticulated pattern, is found throughout the Indo-Pacific region, but is one of the few deep-water species found at depths up to 300m. What it was doing in 15m of water at the Poor Knights I do not know, but I was extremely excited to photograph this rare moray. If you are into morays, the Poor Knights Islands are a must-do destination.

**Kanduohgiri, Maldives.** The most specular individual moray dive site I have ever visited is located just north of the Maldives capital of Malé. I visited this site on the liveaboard *Emperor Virgo* as our checkout dive on a week-long dive trip. The dive brief mentioned lots of fish and eels, but I was not prepared for the sheer number of morays at Kanduohgiri.

Seconds after descending, I encountered the first eel, a large giant moray hanging out of a hole in the reef wall. I was just about to photograph this moray when we spotted

a more spectacular sight nearby, a honeycomb and giant moray sharing a hole. Beyond this pair of morays was another large honeycomb moray, and another, and another.

During the dive brief, the chief guide Issey had mentioned that this site was adjacent to a tuna processing plant and was home to a few morays, but over the course of this dive, I saw well over one hundred morays. The large honeycomb morays were easily the most spectacular with their bold black-and-white colouration, but we also saw white-eyed, yellowmargin, giant, snowflake and undulated morays. And with a limited number of hiding places, most holes were packed tight with five, ten and even 20 morays. This has to be the greatest collection of morays on the planet!



### Afterthoughts

Morays may be still feared and hated by the non-diving general public, but these much-maligned and misunderstood creatures are slowly revealing their secrets, which is showing them to be some of the most fascinating of all the reef fishes. ■

*Nigel Marsh is an Australian underwater photographer and photo-*

There are so many morays at Kanduohgiri that they often have to share holes in the reef. This hole was home to two honeycomb morays and a giant moray (above).

*journalist whose work has been published in numerous magazines, newspapers and books, both in Australia and overseas. Over the last*

*40 years, he has dived extensively around Australia and also throughout Asia, Pacific Ocean, Indian Ocean and the Caribbean. He has also produced a number of diving-related books, including two dive guidebooks with Neville Coleman: Dive Sites of the Great Barrier Reef and the Coral Sea (New Holland, 1996) and Diving Australia (Periplus Editions, 1997). In addition, he has*

*also self-published a book—HMAS Brisbane Queensland Coral Warship (Nigel Marsh Photography, 2011), a photographic exploration of one of Australia's most popular dive sites. He has recently been busy working on a series of children's books on marine-related subjects (A to Z of Sharks & Rays, Exploring Shipwrecks, Crabs & Crustaceans, Weird & Wacky Fish) and a series of dive guides (Underwater Australia, Muck Diving, Coral Wonderland, Diving with Sharks) for New Holland Publishers. For more information, visit the author's website: [nigelmarshphotography.com](http://nigelmarshphotography.com).*

# Ear Problems in Diving *Part II: The Middle 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.**

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 involves 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.

In the last installment of this series, I discussed conditions affecting the outer ear. We now turn to the problems of the middle ear, and their prevention and management.

## The middle ear

The middle ear is the space behind the eardrum (also known as the tympanic membrane, or TM). It is lined with mucosa, which is the same sort of "skin" that lines the mouth and nose. It also contains the three bones of hearing, known as "ossicles," which carry sound vibrations from the eardrum to the inner ear, where they are convert-

ed into electrical impulses that are sent to the brain (see illustration).

The middle ear is basically an extension of the upper airway (the nose and throat), and it is connected to the back of the nose by a pathway called the Eustachian tube (ET). The walls of this pathway are supported by cartilage, which springs back to the

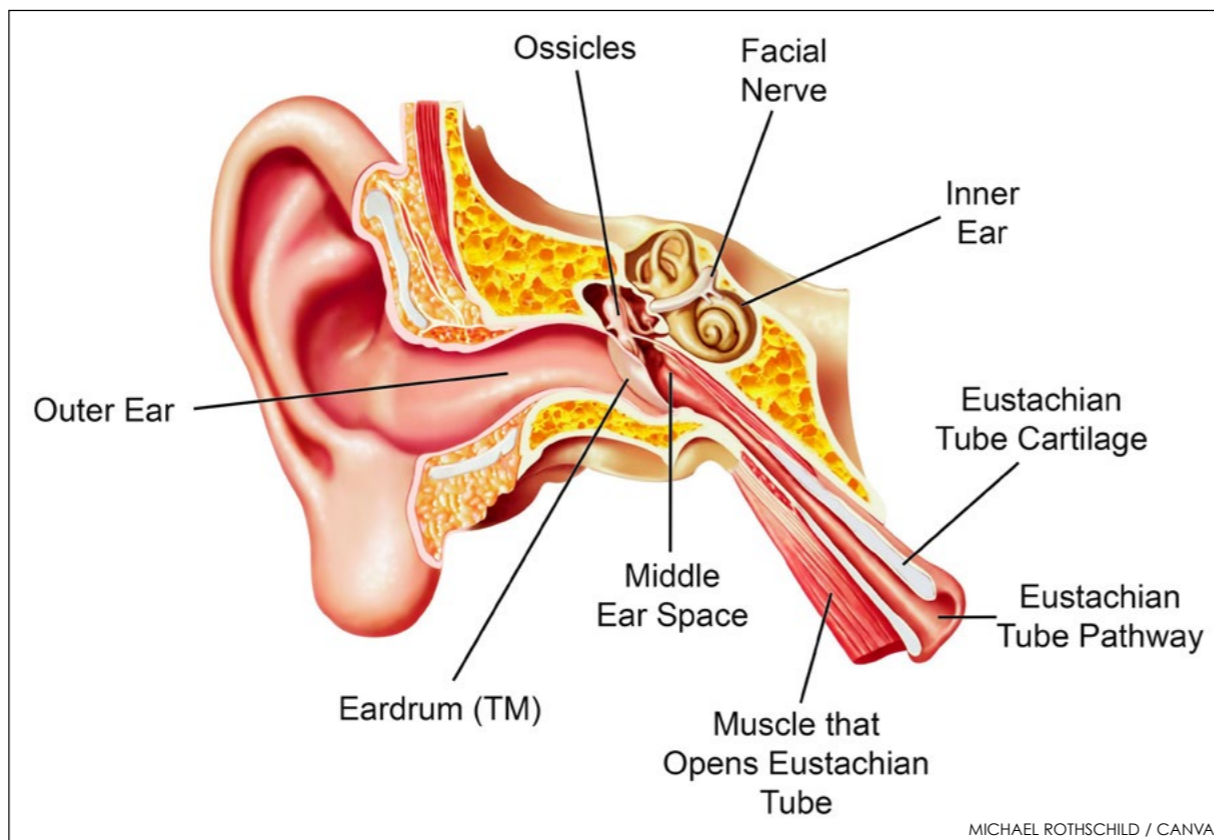
normally closed position after being opened. This opening can be active—for example, by the muscle action of ear clearing maneuvers on descent. It can also be passive, as gas flows from the middle ear back into the airway during ascent.

Diving injuries to the middle ear are the result of barotrauma, which is damage caused by gas pressure changes. As every certified diver knows, diving requires equalization of the pressure outside of the body with that inside, otherwise a gradient builds up. In the ear, this refers to a difference in pressure between the middle ear and the outer ear, across the TM. This can cause pain and eventually damage. Since fluid is essentially non-compressible, there are only significant pressure gradients in the air-filled spaces of the body.

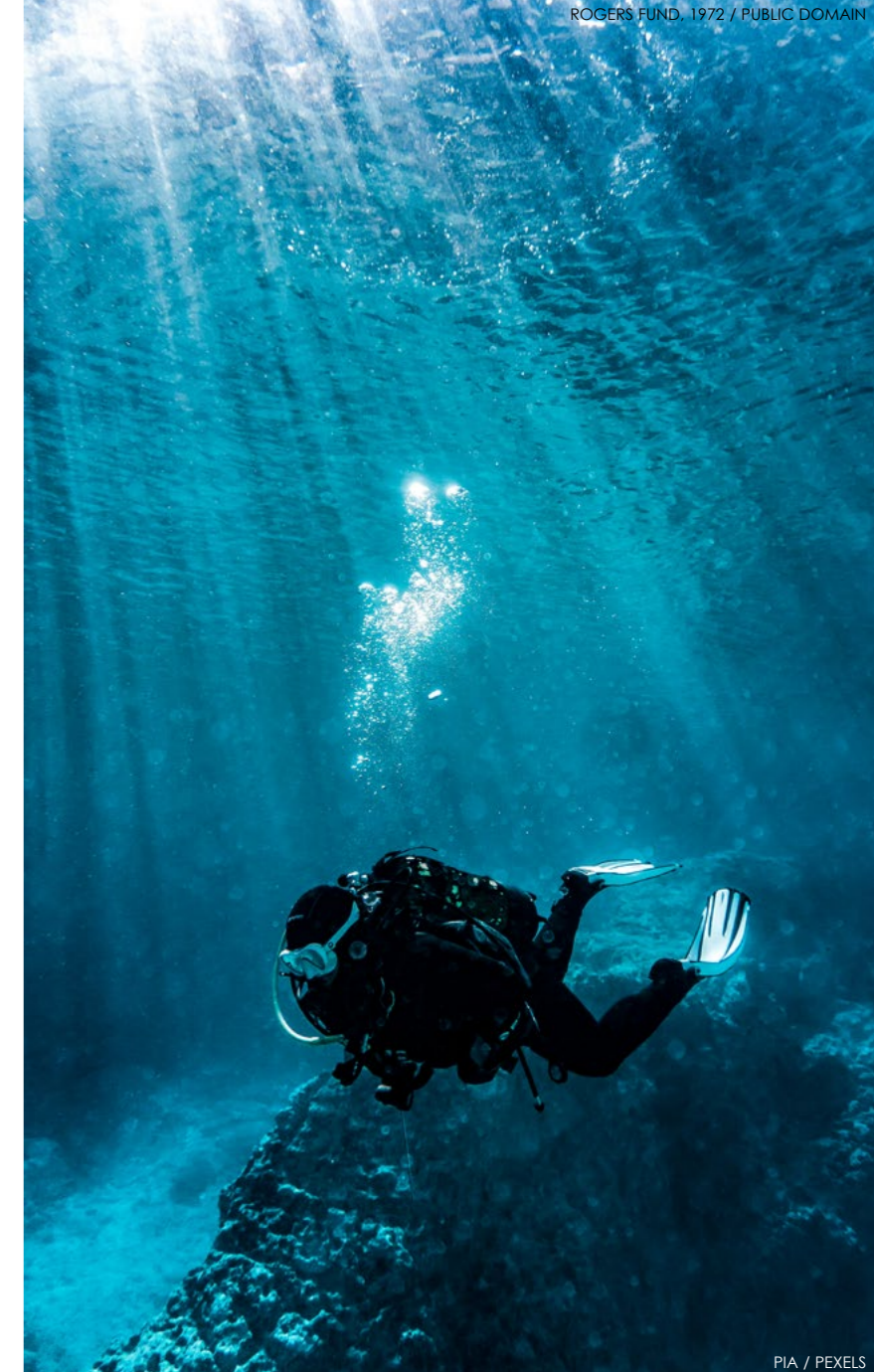
Most of the air in the body is in the airways—the lungs, the windpipe, the larynx (voice box), the throat, mouth and nose. All of these spaces are con-

ected by wide passages, so pressure changes occur everywhere at once in the airway, as a regulator delivers gas at ambient pressure (proportional to depth). It is possible to get a pressure gradient in the lungs—usually due to internal blockages of the air passages or by closing the larynx and holding the breath while ascending. While this is potentially serious, it is also quite rare.

There is also a small amount of air in other spaces in the body—the middle ear, the nasal sinuses, and sometimes the teeth (underneath dental work). These spaces are connected to the



MICHAEL ROTHSCHILD / CANVA



PIA / PEXELS



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airways as well, but by small passages that may be blocked. Therefore, it is possible to build up a big pressure gradient in these spaces during descent and ascent, if a diver is not careful to equalize fully or if there are anatomical issues preventing equalization.



DOMINIC SCAGLIONI / FLICKR / CC BY 2.0

## Equalization techniques and problems

To equalize the ears, the ET must be opened in the presence of a pressure gradient. This can be done by a number of maneuvers taught in basic open water scuba instruction. Pinching the nose and blowing (Valsalva maneuver) or pinching and swallowing (Toynbee maneuver) are common methods for equalization, but many divers learn to open the ET by other approaches, such as moving the jaw, tensing the roof of the mouth, etc.

A failure to equalize on descent can result in a “block”—a situation when the pressure gradient itself makes it harder for the ET to open, which results in a further gradient if descent is continued, leading to a vicious cycle and potential injury. The solution here is to stop the descent (or ascend a bit if necessary) until equalization is possible. If equalization is not possible, the dive must be aborted.

A less common situation may happen on ascent. With a poorly func-

tioning ET, the change in middle ear gas pressure lags the change in ambient pressure. That means that during ascent there is higher pressure in the middle ear than in the airway (the reverse of what happens on descent). Because of this, the pressure gradient may be able to overcome ET dysfunction (ETD) as the air “forces” its way out. Think of how it is easier to squeeze toothpaste out of a tube than to put it back in. If this does not happen, a “reverse block” occurs, with worsening pain on ascent. Of course, even in the unusual case that a diver cannot equalize on the way up, eventually they must surface, no matter what the consequences for the ear.

## Barotrauma

A prolonged or significant middle ear pressure gradient can result in barotrauma, also known as an ear “squeeze.” One common and sudden type of barotrauma is a perforated eardrum. The eardrum acts like the burst disk in the scuba tank—it is the weakest wall of the middle ear,

*A failure to equalize on descent can result in a “block”—a situation when the pressure gradient itself makes it harder for the ET to open, which results in a further gradient if descent is continued, leading to a vicious cycle and potential injury.*

and gives way when subjected to enough of a pressure gradient.

If the eardrum does not perforate, fluid with or without blood can accumulate in the middle ear space. Unlike the middle ear infections that young children get, this fluid is clean with no bacteria. Clear fluid is called an “effusion,” and a bloody effusion is called a “hemotympanum.” The effusion is actually the result of fluid in the bloodstream (plasma) filtering into the middle ear due to the pressure gradient. In very rare cases, middle ear barotrauma can cause weakness of the face, since the facial nerve controlling the muscles runs through the middle ear.

Fluid in the middle ear causes a hearing loss by impeding the normal transmission of sound vibrations through the middle ear from the eardrum to the inner ear. It is a “conductive” hearing loss—the problem is that the mechanism that conducts sound is not working well. The other type of hearing loss is a “sensorineural” hearing loss, which implies a problem with the sensory organ (the cochlea) or the nerves to the brain. Conductive hearing losses are usually temporary, as compared to the almost always permanent sensorineural loss, which we will discuss in the next section.

Some people have more trouble with this than others, due to inherent ETD. Many divers always need a long time

## Ear Problems



TORBEN GREGERSEN / FLICKR / CC BY-NC 2.0

to descend and ascend since their ETs do not work very well at baseline. Other people may have no problem equalizing in general but find it more difficult when a cold or other infection causes congestion of the lining of the ET. This is often oversimplified as the ET being “small” or “narrow”—the true problem is usually more of a technique issue than a structural one.

Another common misconception is that fixing nasal obstruction—for example by straightening a deviated nasal septum—will help the function of the ET. While there is some overlap between nasal blockage due

*For the vast majority of divers who have problems equalizing, the issue is technique and not anatomy. They may eventually address the problem by finding a maneuver that works to allow them to equalize.*

to an upper airway infection and ET function as mentioned above, most of the areas of the nose that require treatment to improve breathing are nowhere near the ET opening.

## Treatment

An eardrum perforation related to barotrauma (without a history of ear disease) usually heals by itself over weeks to months, but no diving is allowed until the eardrum is once again intact. In some cases, surgery will be needed to seal the hole in the drum. Middle ear effusion typically resolves over time, and can be helped to resolve by the same sort of ET opening maneuvers described above. Oral

antibiotics are almost never needed. Many divers swear by the use of decongestants and/or nasal steroid sprays to treat this problem or prevent its development. While these drugs can help prevent barotrauma of the nasal sinuses, there is not much data to suggest that they help middle ear disease any more than time and the ET maneuvers alone. Eardrops have no effect on the middle ear with an intact eardrum—while they can help with outer ear problems, they have no role in the treatment of barotrauma.

Oral steroids can help improve ET function in the days and weeks following



RICHARD LING / FLICKR / CC BY-NC-ND 2.0

## Ear Problems



TORBEN GREGERSEN / FLICKR / CC BY-NC 2.0

a dive injury, draining an effusion, but these drugs have side effects and are not always necessary in this situation. Motrin and other non-steroidal anti-inflammatory drugs may help with the pain but have little effect on ET function. In some cases (when no more diving is planned in the near future), an ENT doctor can make a small hole in the eardrum to drain the effusion if it is causing severe symptoms, such as a hearing loss, or an uncomfortable blocked sensation in the ear.

There is not a lot that can be done directly to treat the underlying ETD. In young children, small tubes can be placed through the eardrum to temporarily ventilate the ears while

awaiting for the ETD to resolve with growth. This is rarely necessary in older patients, although there is a new procedure (balloon dilation of the ET) that may be helpful in selected cases. There has not been a lot of experience using this in scuba divers, but early results seem promising.

For the vast majority of divers who have problems equalizing, the issue is technique and not anatomy. They may eventually address the problem by finding a maneuver that works to allow them to equalize. If the ETD is caused by a temporary problem (like a cold or other infection), then ear ventilation usually returns to baseline when the airway congestion resolves.

## Conclusion

Most ear pain or hearing loss 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, middle ear or inner 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 these types of ear disease. ■

Check this space again to learn more. Next time, Dr Rothschild will discuss diving-related problems of the inner ear and how to manage them. For more information, please visit: [dive.rothschilddesign.com](http://dive.rothschilddesign.com).

Edited by  
Peter Symes

Not all cave diving requires entering tight spaces. Caves and caverns in Gozo Island, Malta, offer wide spaces.

Text by Yvonne Press  
Photos by Audrey Cudel,  
Robin Cuesta and Yvonne Press

**It may be more than four years since the 2018 Thai cave rescue dominated headlines, but the recent movie and miniseries releases have generated highly emotional reactions once again. Are divers being put off cave diving, and why should any diver consider going underground? Yvonne Press takes a closer look, interviewing several divers and technical diving instructors for this report.**

This story started in the summer of 2018. During those fateful weeks, 13 children of a Thai football team and their coach were trapped in a remote cave. The world watched with bated breath as an international team of cave explorers, cave diving instructors, the Royal Thai Navy, and others worked around the clock to find and rescue the team.

Since then, the joint rescue efforts and their protagonists have become the stuff of legends. They have been featured in several documentaries (such as *The Rescue*, directed by Elizabeth Chai Vasarhelyi and Jimmy Chin), films (such as *Thirteen Lives*, directed by Ron Howard) and, most

recently, a limited series on Netflix (*Thai Cave Rescue*, directed by Baz Poonpiriya and Kevin Tancharoen).

Fascinating as the features have been to watch, they have drawn strong emotional reactions from the wider diving community, on social

media and beyond. Some divers said they did not want to cave dive after watching them.

One of the posts that drew considerable attention was initiated by Vicki Kirkley, an SDI Advanced Open Water diver with 70+ dives, which was post-

ed on the private Facebook group "Girls That Scuba" on 18 September 2022. In her post, Kirkley said, "I held my breath [throughout] the whole movie. Now, I really don't want to be a cave diver." That post inspired this article.

*Reactions to Thai Cave Rescue Features*

# Cave Diving? Not for Me!

*& Why Every Diver Should Consider Cave Diving Training*

AUDREY CUDEL



A few weeks later, I interviewed Kirkley. She told me that a personal connection convinced her to watch the movie. "A friend of mine is the sister of Major Hodges, one of the organisers of the rescue," said Kirkley. "I watched the movie because she recommended it, even though his character did not have a main role."

Despite expecting the movie to be full of suspense, Kirkley was not prepared for what she



saw. "I knew that divers did the rescue, [but] I was surprised by the realness of the set. It felt so real," she said. Achieving that degree of authenticity is a compliment to the filmmakers, but it has deterred Kirkley even more from venturing into overhead environments.

What constitutes a tight space tends to change as a diver's experience and comfort zone expand. This swim-through (not a cavern or cave) may look small but offers ample space.

"Caves are absolutely gorgeous, and I love to watch videos and see them that way," said Kirkley. "But I have no desire to actually dive through a true cave . . . The thought of being underground, away from the surface, with no quick way out, terrifies me!"

Scotland-based CCR diver and PADI instructor Claire Simpson felt the same way. "I don't think I would be keen on doing any of the tight stuff," Simpson said, "and the idea of



## Cave Diving

AUDREY CUDEL

sump diving definitely does not appeal [to me] anymore after the films."

Instead, the films reinforced some of Simpson's previous ideas about cave diving. "[The films] may have cemented the idea that some cave diving isn't very glamorous or has lovely architecture," she said. "In fact, it can be downright unpleasant."

### According to the pros

This is where cave diving pros are quick to point out that cave rescues are not the same as "normal" cave dives, which thousands of divers complete every year. Robin Cuesta, who is a cave explorer and cave diving instructor based in Sulawesi, Indonesia, pointed out, "In the movie [*Thirteen Lives*], we're seeing the worst of cave diving—low visibility, narrow passages, high flow and an unknown route."

Cave diving instructor and dive centre owner Alessandra Figari was among those commenting on Kirkley's original post. She highlighted the differences between the caves near her base in Mexico and what we see on screen. "We dive flooded caves where passages lead from big to small, for sure, but nothing as shown in the movie," Figari said.

"While the flow is low in Mexico and constant in Florida pushing you out, what happened in the Thai cave is different," said Figari. "It is a dry cave which filled up with water with a lot of strength. Since our caves in Mexico are usually full of water, there is not a significant change in conditions when it rains."

Whilst the worst possible conditions came together for the



Stalagmite decorations in South Sulawesi, Indonesia



AMAZON STUDIOS



Cave explorer and instructor Robin Cuesta gliding through limestone formations in South Sulawesi.

YVONNE PRESS



## Cave Diving

Thai cave rescue, they couldn't be further from what most cave divers do. "Cave diving doesn't require diving in narrow, silty, zero-vis, tight passages," Cuesta said. "Even though we need to train for conditions like that, you could spend your whole life as a cave diver diving in large openings with crystal-clear visibility."

Malta-based cave diver, explorer and instructor Audrey Cudel agreed that the Thai cave rescue did not resemble "normal" cave diving. "Apart from rare organisations such as the UK Cave Diving Group (CDG) performing cave rescue exercises regularly, I have not heard much about other cave rescue programmes that

develop both a mindset and skillset to face events such as the Thai cave's one," said Cudel. "This is a major difference between what I do, what I teach, and the context of the rescue.

"I train myself and my fellow students to answer the most efficient way, both psychologically and practically, all possible problems they might encounter not to have to be rescued by anyone," continued Cudel. "In other words,

how to avoid putting themselves in a hazardous situation and, worst case, how to rescue themselves. Such training and all subsequent skills involved are the outcome of past accident analysis—Sheck Exley's masterpiece, *Basic Cave Diving: A Blueprint for Survival*, being the foundation of it.

"Cave diving in the context of the Thai event requires that such skillset is already mastered for one to learn how to compose with unparalleled elements and become a rescuer for others, understanding that [one] is putting [one's] own life willingly at risk," said Cudel.

### Perception

Perhaps perception plays a bigger role than previously thought. "I do perceive cave diving as much higher risk than other types of diving," said Simpson. However, she admitted that more recently, several of her beliefs about cave diving have been shifting.

"I have long had this perception—which is recently being challenged—that cave diving is about getting into small spaces," said Simpson. "That's really not something that I would be able to do physically, but I am becoming aware that there are all sorts

of caves that don't have tight squeezes."

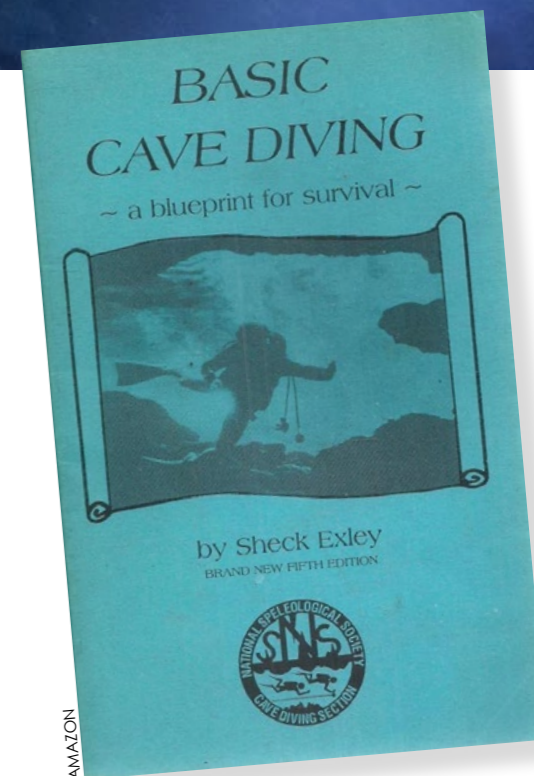
Tight squeezes like the ones we see in the Thai cave rescue documentaries, movies and series are also a dealbreaker for technical diver Eddie Adie, who, like Simpson, spends most of his time in the colder waters around Scotland. "Seeing the cave rescue in documentaries and the movie has given me a respect for the skills and mental fortitude of those who choose to go cave diving," said Adie.

Fellow technical diver and PADI instructor Menno Verschuur



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Cave diving allows divers access to spectacular environments, including sinkholes and cenotes.



*Basic Cave Diving: A Blueprint for Survival*, by Sheck Exley

AMAZON





Many caves offer divers wide open spaces to explore (right); Finding a new passage leading to a new exit is one of the most rewarding moments of cave diving (below).

noted that the movies have shed light on the skillset of cave divers and explorers: "They are bringing together elements of top-level diving, natural explorations, planning and self-discovery—pushing yourself to new limits that you didn't know your mind and body could achieve."

### Medical aspect

For Simpson, who works as a consultant hand surgeon when she is not underwater, the medical aspect of the rescue was the part that kept her on the edge of her seat. "My colleagues know I'm a diver, so they were asking loads of questions about how they did

it," said Simpson. "I think, at the time, I admitted that I wasn't sure how it was done, but the kids would either have had to be taught to dive or be sedated. Neither option seemed possible."

Simpson attended Eurotek 2018 to see the entire Thai cave rescue team recount their experiences on-stage, including Australian anaesthetist and cave diver Richard Harris. "My heart went out to Richard Harris at the thought of the weight of responsibility on his shoulders," said Simpson. "It was his recounting that brought me to tears."



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Cave instructor Figari admitted that some divers may be put off cave diving, thinking it is too much or too scary. But she also believes the movies showed a very positive side of the sport. "Many people are admiring the job done by the cave rescuers and the work carried out by everyone involved," said Figari. "I think it showed organisation, ability to plan and determination. We teach all these things when teaching a cave course."

### Takeaways

Whether the documentaries, the mini-series and the movie inspired respect, instilled fear, or simply provided more information, all the divers I talked to for this article agreed that they could benefit from developing their skills as cave divers do.

Instructor Cuesta agreed that cave diving greatly improves any diver's

foundational skills, but he is also quick to add that cave diving is not for everybody. "It is misleading to think that cave diving is the ultimate goal to accomplish when you start venturing into the technical diving realm," Cuesta said. "You can learn those skills in other courses also, as long as you pick quality training and don't rush into the certifications."

Both Adie and Simpson mentioned how important quality training is for them. For Adie, that meant venturing into overhead environments with an instructor whom he could trust. Simpson admitted that she is coming around to the idea of trying cave diving. "I think I would have to find a good fit of instructor," she said. "Knowing who that is isn't easy without meeting and/or diving with them."

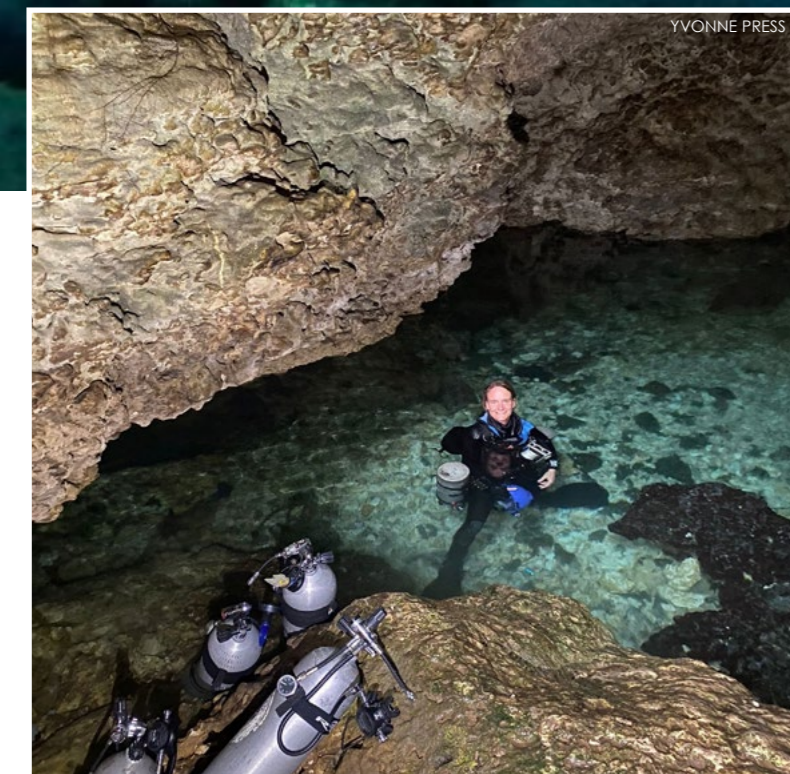
Trust in her instructor is high on Kirkley's list, too. As she is progressing through her rescue diver qualifications, her sights are firmly set on becoming a dive professional. For that goal, expanding skills matters. "As a future instructor, I feel it is important to educate [oneself] as much as possible, in addition to diving—safely and within your limits—as many different profiles as you can," said Kirkley.

Perhaps there is a positive side to the tentative reactions the Thai cave rescue generated. Cuesta believes cave diving is simply not for everyone. "People that are put off by watching the movie were probably not ready to get into cave diving," he said. "In a way, it is good that the movies and documentaries are making them second-guess their choices."



YVONNE PRESS

Diver in a large chamber of a limestone cave in South Sulawesi, Indonesia (above); The author getting ready for a cave dive in South Sulawesi (left)



diving speciality. Cave diving is [not that], nor a sport. It is a privilege," Cudel said. "As such, it holds risks that not even the best training can overcome and shall discourage those who are not will-

ing to pay the cost." Put simply—if you feel cave diving is not for you, then don't do it! ■

The author wishes to thank Audrey Cudel, Robin Cuesta

and Alessandra Figari for their professional input. Thanks go to Vicki Kirkley, Eddie Adie, Claire Simpson and Menno Verschuur for sharing their views.

Yvonne Press is a technical diving IT and CCR instructor. Southeast Asia has been her base for the past eight years. She became a cave diver in Thailand in 2015, but only recently returned to cave diving. She is committed to spending more time in overhead environments in the coming year. Visit: [darkhorizondiving.com](http://darkhorizondiving.com)



## Rebreather Forum 4 to be held on Malta in April

We are pleased to announce that we will be holding **Rebreather Forum 4 (RF4), Thursday through Saturday, 20-22 April 2023 at the old University of Malta campus in Valletta, Malta, sponsored by DAN Europe, DAN, PADI and Heritage Malta.**

The purpose of the scientific and trade-only meeting is to advance the diving community's state of knowledge regarding rebreather technology and its uses, with the goal of improving rebreather diving safety and performance. Proceedings of the meeting will be published and made publicly available.

While we work on organising the event, we have set up a preliminary website with the basic details and a place for you to express your interest and get on our mailing list for updates. We expect to have registration up and running soon. And yes, there will be diving—shipwreck diving to be specific, with the help of our friends at RAID and Heritage Malta!

Please visit **RebreatherForum.tech**, check out our plans and register your interest. If you are interested in being a sponsor, and or exhibiting at RF4, please contact the organiser directly.

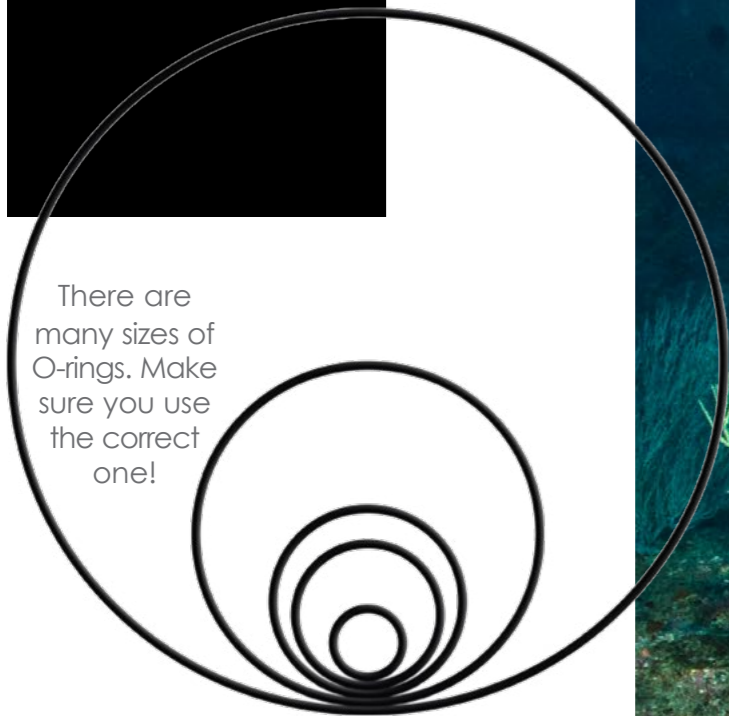
RF4 will actually be the fifth such meeting held by the diving industry. The Rebreather Forum, and Rebreather Forum

2 were held in 1994 and 1996 when rebreathers were just becoming available to our community. Rebreather Forum 3 which was held in 2012 and was followed by the Rebreathers and Scientific Diving Workshop in 2015. Proceedings of these meetings are available as downloads on the RF4 site.

Needless to say, we are hoping to make RF4 a truly epic event that you won't want to miss. Thank you for your interest. I look forward to seeing you in Malta!

— Michael Menduno  
RF4 Organiser/Convener

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Text and photos by Kate Jonker

The lack of proper O-ring care and preparation are two of the main causes of camera housing leaks. Underwater photo pro and photography instructor Kate Jonker offers advice and tips to help avoid these problems, keeping your housing (and hence, your camera) in good shape.

When you prepare your camera housing for diving, follow these important steps to minimise the dreaded housing leak!

**Step 1:** Prepare your housing, unhurried, in a well-lit area, where you will not be disturbed.

### Clean the O-ring

**Step 2:** First, you should remove the O-ring from the door of the housing,

using the O-ring remover provided with your housing. Don't pinch it with anything sharp that may damage it.

**Step 3:** After that, you need to check the O-ring for stray hairs, fluff or sand. These little things can damage your O-ring and prevent it from sealing

your housing properly. Do not hold the O-ring under a warm light to check it, this can heat the O-ring up and cause it to stretch.

**Step 4:** You should then check the O-ring for tears, cuts or damage. Do not use the O-ring if it is damaged in any way. Replace it with a new



# 15 Steps to a Leak-Free Housing



Prepare your housing in a quiet area with good lighting (right); Some housings have double O-rings in their doors (below); Clean the O-ring groove with an earbud covered with a lint-free cloth or tissue (bottom left); Make sure you use the correct O-ring grease and a proper O-ring remover (bottom right).



O-ring specifically made for that part of your housing as not all O-rings are of the same size or diameter. This means that if you use the wrong O-ring, your housing will not seal!



lens-cleaning tissue. You can also use a small, clean, fluff-free make-up sponge instead.

Place the O-ring back in the housing

**Step 5:** Next, you must apply O-ring grease to the O-ring. It is best if you use the one supplied with your housing. To do this, take a small, rice-sized blob and dot it around the O-ring. Do not apply too much as this can make the O-ring swell! Gently run the O-ring between your forefinger and thumb to ensure it is evenly coated. Do not pull or stretch the O-ring when you do this!



**Step 6:** Once the O-ring is clean and evenly coated, you can put it into its groove.

However, before putting the O-ring back, you should clean the groove with a clean earbud covered with lint-free cloth or

**Step 7:** Double-check the groove for stray hairs, fluff or sand that might have found their way there after you cleaned it. Double-check the O-ring and place it into the groove.

**Step 8:** It is important to remember that you should not stretch or twist the O-ring when putting it back. Rather, gently roll it in slowly and make sure it is not twisted. With that in mind, if it is twisted, you can use the O-ring remover to pull it up slightly so that it can untwist itself.

**Step 9:** When you are happy that the O-ring is in place, give it a final once-over to check that no sand,

dust or hair has magicked its way back onto the O-ring.

**Step 10:** You can then place your camera into the housing and check that it is properly lined up in the housing. After that, close the housing and lock the door. As you gently close the door, check that nothing is trapped between the O-ring and the housing / door. Common culprits include housing straps and desiccant packets.

### Do the necessary checks

**Step 11:** After that, you must check that the housing is properly locked. You should also check that the O-ring has not popped out and is



trapped between the door and the housing.

**Step 12:** If you use sync cords for your strobes, double-check that you have screwed them in securely.



**Step 13:** Test that all camera buttons are aligned with the housing buttons, that the zoom or focus gear is working and that your strobes fire at the proper time.

**Step 14:** If your housing comes with a vacuum pump, pull the vacuum, and then press all the buttons, turn all the knobs, and



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Prepare your camera carefully for a stress-free dive.

press the levers. This is to make sure all the O-rings on the buttons and levers are sealing correctly. If your vacuum stays intact for around 20 minutes, you are ready to hit the water!

It is important to remember you would need to repeat these steps every time you open your housing!

### When not using your housing

**Step 15:** When you are not using the camera for a while, remember to remove it from the housing, clean it and give it a bit of O-ring grease.

Additionally, place it inside a clean Ziploc bag and keep it inside your housing. You should ideally store it somewhere safe, cool and dry.

### Bonus tip

For mirrorless or DSLR users: If you want to change the port, you need to repeat Steps 2 to 9 with the O-ring of the port whenever you change it! Also, if your housing door or port has two O-rings, remove, check, clean and replace them one at a time so that they are returned to the right groove.

Follow these 15 steps to a leak-free underwater housing to take your camera underwater without stressing about it getting wet! ■

*Kate Jonker is an underwater photographer and dive writer, underwater photography instructor, dive guide and dive boat skipper based in South Africa who leads dive trips across the globe. For more information regarding diving and underwater photography in Cape Town, divers are welcome to find her at: [katejonker.com](http://katejonker.com).*

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### Housing



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## GoPro HERO11 Black and HERO11 Black Mini

The HERO11 Black and the new HERO11 Black Mini are the new action-cam flagships of GoPro. The most interesting feature appears to be the new sensor, which is capable of capturing 5.3K/60p

10-bit video. This counts for both models. The Black Mini is smaller in size and

lacks front and rear screens but offers the same new powerful sensor that features 27MP of resolution, with a sort of unusual aspect ratio of 8:7. However, this aspect ratio can be cropped in-camera to match ideal aspect ratio requirements of Instagram, TikTok and other social media platforms. Considering the improvement from the former 23 MP resolution to the current 27MP resolution, in-camera cropping would still leave sufficient image material to work with, not just on TikTok. The newest version of HyperSmooth (GoPro's own image stabilization software) and the company's Enduro battery are included as standard. The HERO11 Black is compatible with all accessories that were offered with its predecessor. [gopro.com](https://www.gopro.com)

## Paralenz Vaquita 2nd Gen

The new features included in the 2nd Gen Vaquita comprise an updated Auto-DCC, which stands for Automatic Depth-Controlled Color Correction, that colour corrects footage recorded in blue or green water and adjusts it to be more natural looking. It is also equipped with a new ultra-wide 150° lens, and a newly added integrated GPS sensor, Depth and Temperature Dive Log, which makes it possible for divers to share their dive footage as pins on TheOceanBase interactive map available in the Paralenz App. Waterproof down to 350m (1150ft) without extra housing. All camera settings are fully adjustable underwater. [Paralenz.com](https://www.paralenz.com)



## SanDisk Professional Pro-G40 Rugged SSD

In case you worry about clumsy moments, or you just want to make sure your data and images are safely stored (while in the jungle or desert), the new Pro-G40 rugged SSD by Western Digital could be worth a look. According to the manufacturer, the SanDisk Professional Pro-G40 is the company's most rugged SSD to date, including IP68 standard dust- and water-resistance rating, 3m (9.8ft) drop resistance, and up to 1,800kg (4,000lb) crush resistance. In short, you can throw it from your balcony, allow a small elephant to step on it, and then take it for a dive in the pool in order to clean it up. The SSD offers a dual-mode USB-C port supporting Thunderbolt 3 (40Gbps) as well as USB 3.2 Gen 2 (10Gbps) connections. Read speed goes up to 2700MB/s and write speeds up to 1900MB/s when connected via Thunderbolt 3. The SanDisk Professional Pro-G40 SSD is available in two versions: 1TB and 2TB storage capacities.

[westerndigital.com](https://www.westerndigital.com)



## AOI UCL-09PRO and UCL-90PRO close-up lenses

In order to shoot proper images of the tiniest critters, even a good macro lens can easily reach its limits. When it comes to serious magnification, a close-up lens can deliver. Standard values are usually +5 and +10 diopters, sometimes with the option to stack several close-up lenses. The UCL-90PRO and the UCL-09PRO by AOI are depth-rated to 60m (200ft) and provide a magnification of +18.5 diopters (UCL-90PRO) or +12.5 diopters (UCL-09PRO). Standard 67mm threads allow the lenses to be mounted to most housings, including the new AOI housing for the OM System OM-1. Each lens comes with a pouch as well as front and rear lens caps. [aoi-uw.com](https://www.aoi-uw.com)

## Seacam housing for Leica SL2/SL2-S

Owning a Leica is not just about owning a quality camera, it is living a philosophy only Leica fans can understand. Whilst the high quality is unquestionable, the investment of buying a Leica truly makes keen underwater photographers think twice about how to keep their "baby" safe. Seacam is taking care of such concerns. The Seacam SL2/SL2-S housing is made from a saltwater-proof light metal alloy, which is double-hardened and anodized. The two housing shells (main housing and backplate) are secured with a titanium fastening system. As expected, the housing provides full control over all of the camera functions. The housing can be configured with S6 or N5 bulkheads for strobe cables, with the option of adding an HDMI bulkhead and a vacuum system. Seacam's own leak detector comes standard. As with other Seacam housings it is depth-rated to 80m (260ft), with the option of customisation for operation in deeper waters upon request. [seacam.com](https://www.seacam.com)



# Mariko Kusumoto



P O R T F O L I O

# portfolio

Detail of *Sea Garden 1*,  
by Mariko Kusumoto.  
Polyester and wood,  
13.5 x 24in (right)

*Seabed*, by  
Mariko Kusumoto.  
Polyester, 15 x 20in  
(previous page)

*Sunken Treasure*,  
by Mariko Kusumoto.  
Polyester, 12 x 12in (below)



Interview by Gunild Symes  
Photos courtesy of Mariko Kusumoto

**Originally from Japan, artist Mariko Kusumoto, now based in the United States, creates delicate, translucent, ethereal, textile sculptures and wearable art featuring colorful reef coral forms in beautiful compositions, which have been shown in Europe, Asia and the Americas. X-Ray Mag interviewed the artist to learn more about her creative process and perspectives.**

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

MK: I was born and raised in Japan. Where I grew up in a 400-year-old temple, I was always surrounded by the beauty of nature. As a child, I spent a lot of time outside, especially in the temple's graveyard, playing with dirt, insects, plants, etc. I was pretty much a nature girl. I was always

Mariko Kusumoto



*Grass Glass*, by Mariko Kusumoto. Polyester, 14 x 5in

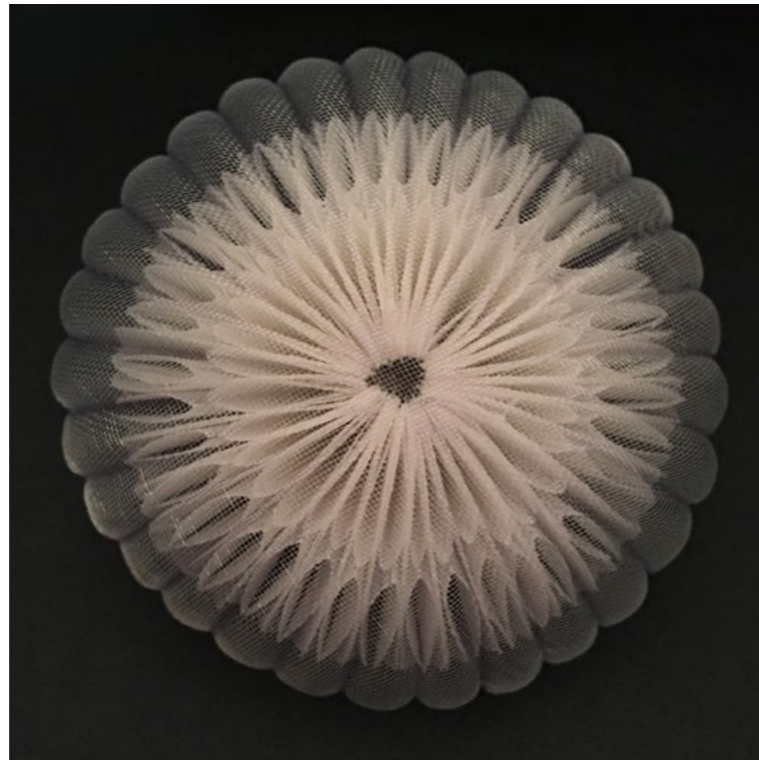




Seascape 1 necklace, by Mariko Kusumoto. Polyester, 12 x 13 x 5in (right). This necklace is in the permanent collection of the Renwick Gallery of the Smithsonian American Art Museum.

Mariko Kusumoto

Jellyfish 1 pin, by Mariko Kusumoto. Polyester and sterling silver, 2 x 1in (right)



Red Coral brooch, by Mariko Kusumoto. Polyester, 5 x 5 x 2in (below)



making things with whatever materials were available, such as my mother's fabrics, paper and plants. I also drew. I have always had a creative inclination.

When I was 15, I decided to become an artist, so I went to a secondary school that offered a fine art major. There, I gained knowledge about several forms of art, including design, sculpture and painting, and I also studied art history. I had a terrific experience there, and after that I attended an art college. So, I was determined to be an artist from an early age.

After I graduated from art college in Japan, I relocated to the United States and attended graduate school at an arts university. Now, I live and work in Massachusetts.

*X-RAY MAG: Why marine life and themes inspired by the sea? How did you come to these themes and how did you develop your style of sculpture?*

MK: I like the translucency and the lightness of the type of fabric I use. The sensibility, subtlety, ethereality, fragil-

ity and ambiguity are the essential parts of my work, and the fabric can achieve these elements.

I am interested in nature in general, but after I looked closer at marine life, I realized that my artistic style totally fitted an ocean theme.

*X-RAY MAG: Who or what has inspired you and your artwork and why?*

MK: Fabric itself is incredibly inspiring to me. In my daily life, encountering various kinds of materials is really important

*Sea Garden 2*, by Mariko Kusumoto. Polyester, 15 x 20 in (right)

Detail of *Anemone*, by Mariko Kusumoto. Polyester and wood, 9 x 19.5in (far right)

*Aqua Mushroom Coral* brooch, by Mariko Kusumoto. Polyester fabric, 3 x 3in (below)



to me. I occasionally come across fabrics that mesmerize me, draw me in, and spark my creativity.

Being commonplace, fabric is a familiar material we see every day. Even while the word "fabric" seems simple enough, there are a wide variety of fabrics, each having distinctive qualities that can elicit a range of experiences or emotions. There are materials that evoke the mysterious or the ethereal, those that inspire tranquillity, those that give one a feeling of cool dampness, those that have a soothing fluffiness, or

hint at fragility, subtlety, etc.

Since metal, the material I previously worked with solely for many years, is fundamentally the opposite of fabric, I create fabric pieces that reflect my intense interest in the material itself. I try to highlight the fabric's natural qualities and attractiveness. I give it a new identity by reshaping it into three-dimensional sculptures, using a heat-setting procedure. For instance, I enjoy the translucent nature of fabric, because it enables me to work with layers, adding or removing components to create fun, enigmatic and

ethereal atmospheres.

In addition to the fabric itself, the creative process inspires and motivates me. I spend half my creative time experimenting with things. At times, there is a breath-taking moment during this process. I take note of these intuitive discoveries, using these happy accidents as the foundation for fresh ideas and build from there. I have not even scratched the surface of what I might do with fabric. So, I continue to explore and discover the limitless potential of the materials I work with.

**X-RAY MAG:** What is your artistic method or creative process?

MK: I use different kinds of techniques, but mainly, I use a heat-setting process. This technique makes the shapes permanent in synthetic fiber when it is heated to a certain temperature. I use different kinds of molds to create those shapes.

First, I wrap the mold with fabric, and then I put it in the oven for 20 minutes.

Then, I remove the mold after it has cooled down, and now the shape of the fabric is permanent. It is a very simple technique.

**X-RAY MAG:** What is your relationship to the underwater world and coral reefs? In your relationship with reefs and the sea, where have you had your favorite experiences?

MK: I have never done scuba diving nor have I had any experiences with under-



water life, unfortunately. Hopefully, I will have the chance to explore and see the underwater world in real life in the future.

The beginning of my interest in marine life was when I by chance watched a documentary film about the deep ocean. I was very shocked that I did not know

anything about what was down there. I could not believe what I was watching—bizarre and very beautiful sea creatures that I had never seen before. I thought they were “artwork” in and of themselves. Not only that, but I was also surprised to learn that there were still so many things

that have not been discovered yet. The ocean is full of mysteries, and I was immediately drawn to that world.

X-RAY MAG: What are your thoughts on coral reef conservation and how does your artwork relate to these issues?



*Uni brooch*, by Mariko Kusumoto. Polyester, brass and gesso, 2.5 x 3.5in (left)

*Seascape*, wall piece by Mariko Kusumoto. Polyester 7 x 7 x 3in (far left). This work is featured on the cover of UK band Low Island's second album, “Life in Miniature.”

*Untitled*, by Mariko Kusumoto. Polyester, 5 x 4 x 3in (below)



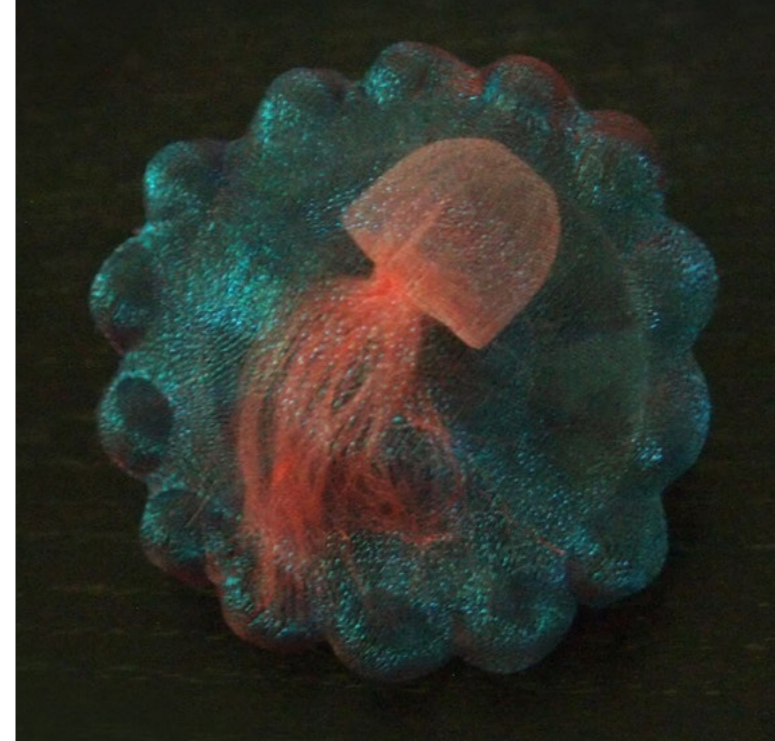


Mariko Kusumoto

*Blue Jewel Tako pin, by Mariko Kusumoto. Polyester and sterling silver, 1 x 1.75in (left)*

*Coral necklace, by Mariko Kusumoto. Polyester fabric, 10in diameter x 3in (far left)*

*Pink Coral with Kurage brooch, by Mariko Kusumoto. Polyester, 4 x 3.5 x 2in (bottom left)*



*Pink Bubble necklace, by Mariko Kusumoto. Polyester, 11 x 9 x 3in (above)*

MK: Some of my pieces are in the permanent collection of art museums. Museums do the best job of preserving artwork in their well-equipped environments. From that point of view, long-lasting materials like plastic might be a good material for preservation purposes, and I often use synthetic fiber such as polyester and nylon fabric, which are essentially plastic. However, when plastic is treated as a disposable material and its waste spreads everywhere, it becomes harmful and a threat to the environment and living things.

While I create a lot of sculptures, I also create wearable pieces that have small components. So, in order to minimize waste, I save all the scraps of fabric left over from larger artworks and use them for creating tiny parts.

To me, synthetic fiber is not a disposable material, in the way I do



## Mariko Kusumoto

*Sea Creature*  
brooch, by Mariko  
Kusumoto. Polyester,  
5.5 x 3 x 5.5in



*Seascape 2* neck-  
lace, by Mariko  
Kusumoto. Polyester,  
12 x 13 x 4.5in (left)



*Sea Breeze* necklace (22in), by Mariko Kusumoto. Polyester, 10 x 10 x 2in



my best to bring plastic to a higher level.

Meanwhile, I try to do what I can for the environment in my daily life. I do not buy take-out food very often because it usually comes in plastic containers. I also use chemical-free products for the yard and laundry, and I compost leftover food, reuse bags, etc.

However, I still have guilt, because I use plastic in my work—it does not matter how minimal it is. And I cannot seem to avoid using plastic, such as the packing tape used to pack and ship my pieces, the face masks worn at work, the polyester-filled cushions and comforters I sleep with, and most of the garbage inside my trash bags is unrecyclable plastic wrapping and packaging from groceries, etc. It seems like our lives cannot exist without some plastic, and it is hard to imagine how people could survive without it in the old days.

I do strive to buy much of my materials from second-hand thrift stores, and not just fabric stores. I love going to thrift shops and flea markets where I look for second-hand fabrics. Usually, they are fabric remnants, curtains, clothes, scarves, etc, and I use them to create my pieces.

*X-RAY MAG:* Would you consider this “upcycling,” and how so?

MK: I add value to these second-hand fabrics, so I would say “upcycling” is accurate. However, sometimes I have a hard time finding what I am looking for, so I end up buying some new fabric.

However, I hope the use of biodegradable materials takes over completely in the future, although it might be a long time before it becomes widespread.

My creations may not directly relate to

ocean and coral reef conservation, but at least what I can do through my work is to show my discoveries and interpretation of the beauty of marine life and promote awareness of this amazing world.

*X-RAY MAG:* What are the challenges or benefits of being an artist in the world today? Any thoughts or advice for aspiring artists in ocean arts?

MK: Before the internet, artists were limited in how much of the world they could expose their work to because they had to rely on galleries, magazines, etc. But now artists can expose audiences, globally, to their work through social media, which is an amazing tool for promotion. There is no reason not to make use of it. So, I encourage aspiring artists to use this tool and expose as many people to their

# portfolio

Seascape necklace,  
by Mariko Kusumoto.  
Polyester and stainless steel,  
11 x 6.5in. Permanent col-  
lection of the Victoria and  
Albert Museum in London  
(right)

Organic Sounds, by Mariko  
Kusumoto. Polyester, 13 x  
15in. Permanent collection  
of the Museum of Fine Arts  
in Boston (far right)



work as they can. There are lots of possibilities in front of us.

**X-RAY MAG:** What is the message or experience you want viewers of your artwork to have or understand? How do people respond to your artworks?

The thing I like about my work is that it is not hard to understand. I want to create something that is simply beautiful, which speaks directly to the viewer, regardless of their age, race, gender, etc. I want the pieces to be able to stand up by themselves, without needing explanation.

"Simply beautiful" may sound straightforward and easy to say, but it is not necessarily easy to do, I think. But, needless to say, it is the most powerful and universal thing. I am always surprised by how strongly people react to my work.

Besides sculpture, I also create wearable pieces. The owners of my work often say that people always talk to them whenever they wear my pieces. It may just be an object, but I like the way that it connects people. It is interesting to see how the object positively affects people's emotions and minds.

**X-RAY MAG:** Several of your beautiful artworks of coral forms are now included in the permanent collections of museums such as the Victoria and Albert Museum in London, the Renwick Gallery of the Smithsonian American Art Museum in Washington, DC, the Museum of Fine Arts in Boston, and the Decorative Arts Museum in Paris. Please tell us how this came about.

**MK:** My marine theme pieces seem to be very popular. One museum curator contacted me directly and requested me to make coral forms, and other museums purchased my work through the galleries. Also, I used to have my production pieces at the Museum of Modern Art store in New York. Jean Paul Gaultier discovered my work and it led to a collaboration for his Spring/Summer 2019 Paris Fashion Week show. I contributed to 18 of the 63 looks in the show, and one of the looks became part of the



## Mariko Kusumoto

permanent collection of Museum of Fine Arts in Boston.

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

**MK:** I will have an exhibition at the Morikami Museum and Japanese Gardens in Florida in the fall of 2023, where I will be showing both sculptures and wearable pieces. ■

For more information, please visit the artist's website at: [marikokusumoto.com](http://marikokusumoto.com) or follow on Facebook [@MarikoKusumotoArt](https://www.facebook.com/MarikoKusumotoArt) or Instagram [@MarikoKusumoto](https://www.instagram.com/MarikoKusumoto).

