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Canary Islands
**Tenerife's
Arona Region**

Wrecks
Friedrich Carl

Wreck Diving
Lithuania

Japan
**Ogasawara
Islands**

Personal
Safety at Sea

UW Photo
Aspect Ratios

MACRO MECCA OF HONSHU

Japan's Kinki
COVER PHOTO BY ANDY MURCH



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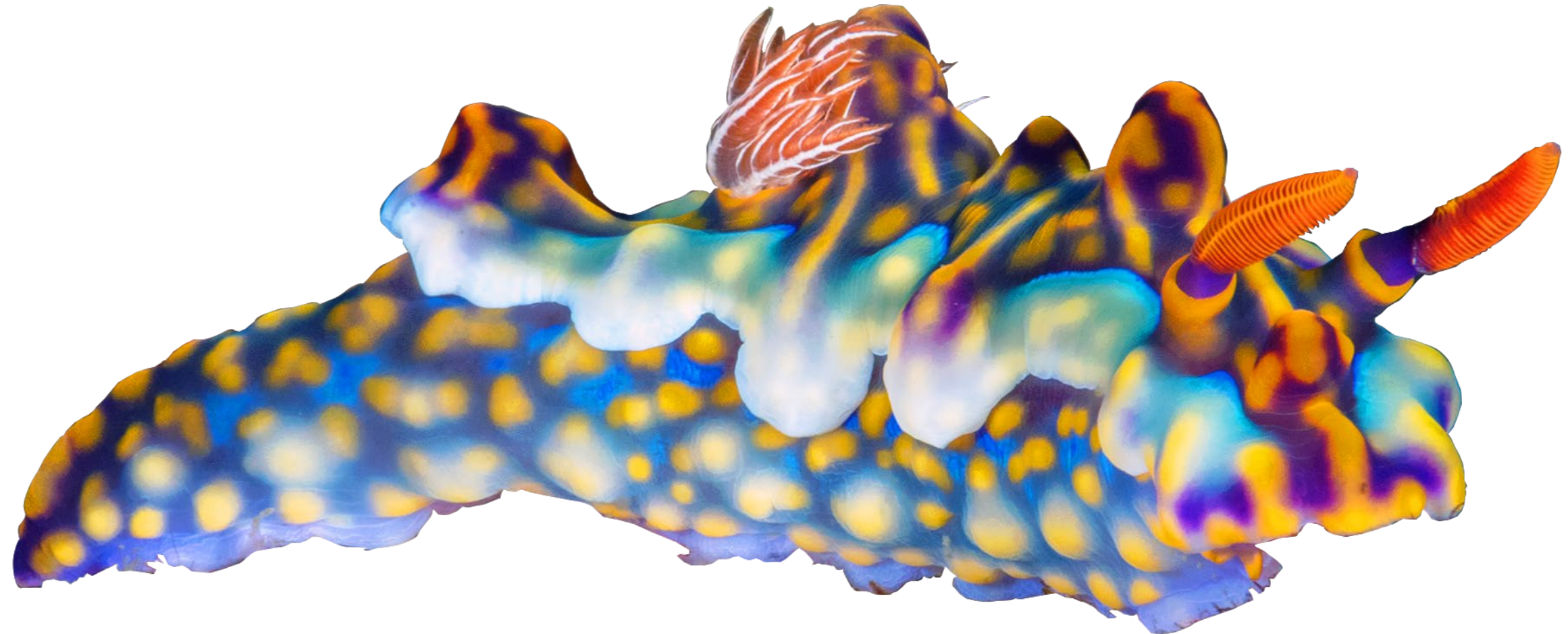
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Miamira magnifica
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Andy Murch

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COVER PHOTO: *Pikachu nudibranch (Thecacera pacifica)*,
Kinki, Japan. Photo by Andy Murch

SCANDINAVIA'S BIGGEST DIVE SHOW

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Lest we forget

Remembrance poppies... Aren't they a bit out of place in March, like Christmas ornaments still hanging about in July?

Remembrance Day—a.k.a. Veterans Day in the United States—is something we observe in November in commemoration of the Armistice, which brought an end to the First World War on 11 Nov 1918, a little over a hundred years ago.

But as both world wars and other brutal conflicts may now seem like distant historical occurrences to many in the developed world, it is more important than ever to keep the lessons learnt alive. Living witnesses who can remind us of the carnage and devastation that followed these bloody conflicts and the years of misery and sacrifice it took to rebuild societies and cities, which were reduced to rubble in many places, are getting up there in age, and there are but a few left already.

As divers, we have sobering reminders of these events when we explore shipwrecks from the great conflicts, such as the two world wars, and get to see for ourselves the evidence of the battle damage inflicted. Some ships exploded from striking a mine, others were hit by a torpedo and sank to the bottom with the stern and bow blown apart. Sections of hulls or decks made of heavy steel were blown open like unfold-

ing petals, or the metal plating was ridden with holes from artillery. One can only wonder, often with a shiver down the spine in my case, what kind of hell on earth it must have been for the crew.

Ships were lost with all souls aboard, often at unknown locations and time, leaving bereaved family members without answers or closure.

My primary interest in diving stems from being a biologist. As such, I am interested in life and the living. But one needs to be pretty thick-skulled not to be affected by shipwrecks, their history and fate—and in what their dead, who now rest in their watery graves, have to tell us.

On my part, I am convinced they were not sacrificing their lives in order for us to steer into new conflicts, but rather to solve them—however complex some of the challenges we may come up against may be—and live on in peace while developing our societies in accordance with the freedoms and liberties for which they fought. We simply owe it to our past generations to heed the painful lessons learnt and never take our freedoms for granted.

While I only wear my remembrance poppies in November, I keep them out on my desk at all other times, as a constant reminder of this responsibility.

Like diving on reefs with large pelagics or other creatures with which we can often interact, wreck diving is about so much more than just getting some exercise and a day out of the house. It puts life in a much bigger perspective if one is open to and appreciative of the wider context.

As divers, we may develop a deeper appreciation of how ecosystems work or the behaviour of other living beings. Or we may become wreck detectives who uncover historical facts in archives or on the seabed, sometimes even bringing closure to the families of those lost at sea.

In any case, and whatever your preferred discipline is, diving is an activity that keeps giving and never gets old.

Stay safe and enjoy yourself.

— Peter Symes
Publisher & Editor-in-Chief





News edited
by Peter Symes

from the deep NEWS



ALEX JORDAN

A cleaner wrasse interacts with its reflection in a mirror. A study, which suggests that fish might possess far higher cognitive powers than previously thought, has ignited an intense debate over how we assess the intelligence of animals.

What are tests indicating fish possess higher cognitive powers really showing?

In this magazine, we have frequently pondered the intelligence, sentience and self-awareness of the creatures we encounter on our ventures into the aquatic environment and reported on various scientific findings and philosophical discussion held in that regard (see references at the end).

Mirror self-recognition test

The standard method for testing whether an animal is self-aware is

placing a mark on its body that cannot be viewed directly and then letting it have a look in a mirror. If the animal responds to its reflection and attempts to remove the mark it is considered evidence that the animal is self-aware.

A new study, just published in *PLOS Biology*, argues that the cleaner wrasse, *Labroides dimidiatus*, shows behavioural responses that can be interpreted as passing the mark (or mirror) test. But the researchers also pose

a question in the title of the paper: "If a fish can pass the mark test, what are the implications for consciousness and self-awareness testing in animals?"

The fish passed the test

The researchers observed that fish attempted to remove the marks by scraping their bodies on hard surfaces after viewing themselves in the mirror. Fish never attempted to remove transparent marks in the presence of a mir-

ror, or coloured marks when no mirror was present—suggesting that marked fish were responding to the visual cue of seeing the mark on themselves in the mirror. In other words, the cleaner wrasse fulfilled the prevailing criterion for being considered self-aware.

The authors then go on to ask whether these behaviours should be taken as evidence that fish are self-aware or whether the test itself needs to be revised. Given that the mark and mirror test was designed for primates and relies on hand gestures towards the marked region as well as changes in facial expression, the researchers also raised the reasonable question of whether it is even possible to interpret the behaviour of divergent taxonomic groups such as fish. Animals that cannot directly touch the marks used in mirror self-recognition tests may therefore be inherently difficult to test regardless of their cognitive abilities.

Healthy debate

We find the debate healthy on so many levels. Firstly, it is always a part of a sound scientific discourse to evaluate both the premise and the findings in a bigger context. That is how we continually move on to higher truths, such as the Earth circling the sun and not the other way round.

As humans, we may also ponder what makes us human and what sets us apart from other living beings, and what we may have in common. As divers, we can only benefit from a better understanding of how and why other creatures we may encounter on our endeavours underwater react the way they do. Haven't we all wondered at some point what may go on in the mind of the animal looking back at us? ■

REFERENCES: PLOS BIOLOGY

Selected related posts:

- "The Remarkable Intelligence of Fish"
- "A Matter of Sentience"
- "Cognition and Self Awareness in Manta Rays"

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Edited by Peter Symes



Wild population of green turtles in the Cayman Islands has recovered as a result of an reintroduction program

Good news! A new genetic study of the wild population of green sea turtles in the Cayman Islands shows that it has recovered, it presents a high genetic diversity and shows no difficulties regarding breeding. The population of reproductive female adults in the Cayman Islands is now estimated to be between 100 and 150.

The decline of green sea turtle nesting populations worldwide led this species to be listed as Endangered in 1975 by IUCN (International Union for Conservation of Nature), and in the 1980s, several studies concluded that the green sea turtle nesting population of the Cayman Islands was extinct; although, the presence of some green sea turtles was reported in the waters surrounding the Island.

To recover this endangered population, a program of reintroduction of the species was launched, with individuals of the Cayman Turtle Farm. Later renamed the Cayman Turtle Centre, it is a conservation facility and tourist attraction located in the West Bay district of the Cayman Islands.

Forty years later, data shows that the nesting population of the Cayman Islands has been restored, but researchers did not know if this was the result of the reintroduction process or the natural recovery of the population for the improvement of threatening factors.

An analysis of genetic markers in the population of the wild green sea turtle show a close genetic relationship with the ones in the Cayman Turtle Centre. Sightings of tagged nesting turtles have also confirmed that some of these nests were laid by turtles released from Cayman Turtle Centre.

Centre under scrutiny

The captive breeding programme at the Cayman Turtle Centre has attracted criticism from conservation groups who claim that the centre runs the risk of introducing infectious diseases into the



File photo from the Cayman Turtle Centre. Captive breeding and reintroduction have become an important conservation tool used to combat biodiversity loss by recovering locally extinct populations.

wild by releasing turtles that have been bred in captive conditions. It has also been claimed that programmes of this kind fail to address the root causes of turtle decline and efforts would be better spent tackling illegal poaching. However, a panel of international turtle experts that inspected the Centre in December 2012 concluded that the Centre had a "positive conservation impact." ■

SOURCE: MOLECULAR ECOLOGY



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University Malaysia Terengganu teams up with Diveheart and Kids Scuba to certify new divers with disabilities

Photos courtesy of UMT

In October 2018, University Malaysia Terengganu (UMT), in collaboration with the non-profit organization Diveheart, trained six persons with disabilities (PWD) from the University Malaya Medical Center (UMMC) for their open water dives, which took place in Pulau Bidong as part of the three-day Diveheart Adaptive Diver course.

UMT Deputy Vice Chancellor (Research and Innovation) Professor Dr Mazlan Abd Ghaffar presided over the event, along with American founder and president of Diveheart, Jim Elliot of Chicago, and Diveheart Malaysia Ambassador, Hj Syed Abd Rahman Syed Hassan, founder of Kids Scuba Malaysia.

Conception & development

It all started in 2016, when the vice chancellor of UMT, Professor Dato' Dr. Nor Aieni Mokhtar, met with Rahman and Elliot to discuss the possibility of training persons with disabilities in the UMT Marine Research Center Facility on Bidong Island. Then, in 2017, two in-house

dive instructors and six divemasters from UMT took on the challenge of learning how to assist persons with disabilities, completing their Diveheart Adaptive Buddy Training with Rahman.

In February 2018, the Deputy Director (Clinical) of UMMC, Associate Professor Nazirah Hasnan, called Rahman to tell him she had selected some new rehabilitation patients as participants for the Diveheart program. "Let's do it!" said Hasnan.

After an evaluation of the participating students in a water environment, their PADI training in the pool took place on the weekends in the months of May through October 2018, at the Kids Scuba PADI Dive Center located at the Recreation Hub in Tropicana Kajang Heights Swimming Pool, just 30 minutes from Kuala Lumpur. Diveheart volunteers from around Kuala Lumpur provided assistance in these sessions.

The fulfillment of a dream

For paraplegic Nurul Fathiah Jamaluddin of Banting, Selangor, 30,

THIS PAGE: Participating persons with disabilities in Malaysia received training in scuba diving from specially trained instructors and volunteers who assisted the disabled divers in the water during a three-day program in Pulau Bidong conducted by the University Malaysia Terengganu in collaboration with the Malaysia chapters of Diveheart and Kids Scuba.

it was a dream come true to participate in the PADI Open Water scuba diving course in the tropical clear blue waters surrounding Pulau Bidong, with UMT Marine Research Center in Terengganu. Paralyzed from the waist down after an accident 15 years ago, Jamaluddin was one of six persons with special needs chosen to participate in the Diveheart program.

"While my movements are somewhat restricted on the ground, I am able to overcome my fears and move freely in water, which is an exhilarating



Diveheart Malaysia Ambassador, Hj Syed Abd Rahman Syed Hassan, founder of Kids Scuba Malaysia, with participant Nurul Fathiah Jamaluddin (left) and leading the Diveheart Adaptive Buddy Training course (above)



Participants, instructors, assistants and volunteers of the UMT/Kids Scuba/Diveheart Adaptive Diver program on Pulau Bidong

experience," she said. "The underwater world provides a weightless wonder in the water column, offering the perfect gravity-free environment for those who might otherwise struggle on land. With water therapy, underwater, we're all equal."

More than 35 scuba divers and volunteers from UMT and the UMMC Rehabilitation Medicine Unit assisted the participants, who underwent the PADI Scuba Diver course under the direct supervision of Rahman, a PADI IDC Staff Instructor at Kids Scuba with 28 years of experience in scuba diving.

A first in Asia

UMT is the first marine research university in Asia to have a university group certified as a Diveheart Adaptive Dive Buddy Team, trained by Rahman. "The selection of this research station is the first of its kind in Malaysia and the Asia region," said manager for the UMT Marine Research Center, Baharim Mustafa. "The two-tier program saw experienced adaptive-trained scuba divers, who were also volunteers, gain experience in assisting PWD divers in and out of the

water to acquire specialty training in the water."

The Diveheart and PADI Adaptive Scuba program brings together volunteer tourism and accessible tourism in Malaysia, drawing volunteer scuba divers from China, India, Austria, Singapore and United States to enjoy the underwater beauty of Terengganu's tropical coral reefs. It provides knowledge and experience to those who are interested in scuba diving and want to enjoy the beauty of the marine environment while on a mission to assist others.

Training for professionals

Rahman said that besides the six PWD participants who had previously attended special PADI Adaptive Scuba pool training, there were professional divers who participated in the PADI Adaptive Techniques specialty course with Diveheart procedures, which ensured that specific skills in handling PWD divers were mastered.

"With the Diveheart and PADI Adaptive Diving procedure, every PWD diver is assisted by a minimum of two or three trained Adaptive divers, including a dive leader with two qualified assistants

on the left and right side of the PWD diver, to ensure the divers are comfortable and safe while in the water," said Rahman.

At the end of the event, the six participating PWD divers completed their PADI Open Water Diver exams and received their PADI Scuba Diver certifications. The program assistants included Diveheart trained instructors from UMT, Kids Scuba, Diveheart Malaysia and the Diveheart Borneo Team.

Interested?

The next Diveheart Malaysia Program with UMT and UMMC will be held 4-6 October 2019 at Bidong Island, Terengganu. Rahman said, "We welcome volunteers from all over the world to assist."

If you are certified as a PWD Adaptive Diver interested in diving the islands of Malaysia's marine parks with qualified assistants, or a certified diver interested in taking the PADI and Diveheart Adaptive Diver Buddy training courses in Malaysia, please contact Hj Syed Abd Rahman, Kids Scuba PADI Dive Center. Telephone +60193176705 or email: syed.rahman@diveheart.org. Learn more at: Diveheart.org. ■



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Recovery of the bell on an unknown wreck, which is later confirmed to be the SS *Edith Bosselman*; Rebreather diver exits the expedition vessel, NZ 55 (below)

Text and photos by Sabine Kerkau

It was pure coincidence that led my expedition team and me to Lithuania for the first time in September 2016. Our goal was to dive the battleship SMS *Friedrich Carl*. What we did not know before this first visit was that we would discover the “El Dorado” of pristine wrecks in Lithuania, which could keep us busy for many years.



Wreck Diving in Lithuania

— SMS *Friedrich Carl*, SS *Edith Bosselman* & SS *Tristan*

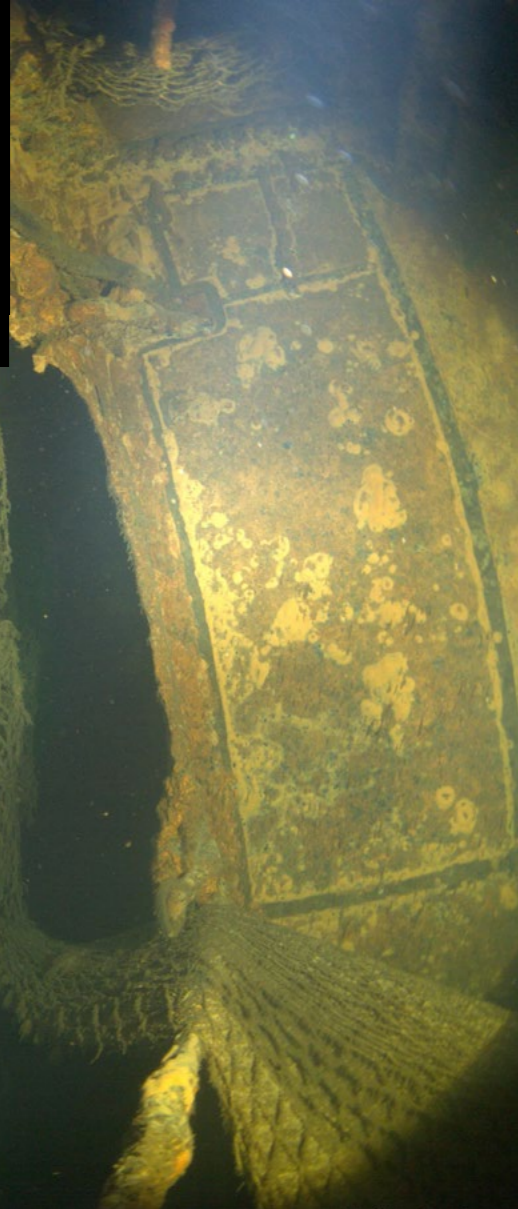
Over the past few years, our group of wreck divers have developed into a specialist team dedicated to finding and identifying shipwrecks. We work with various organizations and muse-

ums, and sometimes also local authorities, government officials, local captains and fishermen.

An important task for our team is to find and identify the documentation of the

objects found at wreck sites. We document the condition of wrecks, account for existing human remains, and note the dangers to which the wrecks are exposed. (In the case of the wrecks we

found in Lithuania, the threats came primarily from illegal trawling, which seriously destroyed the wreck sites.) Our results are then presented in exhibitions, television documentaries, lectures and articles



Technical divers on expedition vessel NZ 55, ready to dive on a wreck off the Klaipėda coast in Lithuania

Canon (above) and fishing nets (left) on the SMS *Friedrich Carl* wreck located about five hours by boat from Klaipėda, Lithuania

in various European journals.

As our team works around cold-water temperatures, currents and other challenges at depths up to 200m, we are very versatile. In addition to shipwrecks, we also investigate and document abandoned mines. Everyone on our team is a specialist in his or her field, and is thus equally responsible for the success of our projects.

With our expedition to Lithuania as part of our Baltic Sea Heritage Rescue Project (see sidebar, right), we went to seek, identify and document wrecks that sank in the minefields off the Klaipėda coast in the period between 1914 and today, including those sunk by mines laid by the sub-

marine *L3* in 1942. In addition, during the project, we removed discarded trawling nets caught on the wrecks.

SMS *Friedrich Carl*

The *Friedrich Carl* is one of the most impressive wrecks I have ever seen. The sinking of this WWI vessel, the second of the Prinz Adalbert class of ships, was a great loss for the German Imperial fleet.

In 1905, the *Friedrich Carl* accompanied Kaiser Wilhelm II several times on his Spanish and Mediterranean journeys. In April of that year, the ship accidentally collided with the British liner HMS *Prince George* in the port of Gibraltar, and the ship's stern was damaged. The *Friedrich Carl* contin-

ued her service as the flagship of the cross-border command until 2 April 1906. From March 1909, the *Friedrich Carl* became a training and torpedo test ship under the commander of the Torpedo Experimental Institute in Kiel.

In the winter of 1911-12, she worked temporarily as an icebreaker in the Baltic. At the end of September 1914, she was assigned to the Baltic fleet, where she participated in various operations against the Russian Navy's Baltic fleet as part of the reconnaissance group of ships in the Baltic Sea. In her attack in the Gulf of Finland, she carried up to four seaplanes, which (as far as the weather allowed) made daily reconnaissance tours.

BALTIC SEA HERITAGE RESCUE PROJECT

The Baltic Sea Heritage Rescue Project (BSHRP) is a non-profit organization founded in July 2018 in Klaipėda, Lithuania, by Rolandas Schön, Sabine Kerkau and Linas Duoblys. Its aim is to make a contribution to the protection of the past and the future of the Baltic Sea by finding and identifying wrecks and removing discarded fishing nets that pose a threat to the wreck sites and marine life.

The group works closely with the University of Klaipėda, the Lithuanian Government, the Ministry of Environment, the Ministry of Culture, and the Ministry of Agriculture and Fisheries. Further cooperation includes partners such as the Historian of Navigation of the Department of History; the Ministry of Transport and Communications; Klaipėda State Seaport Authority; Vytautas Grubliauskas, the mayor of Klaipėda City Municipality; and the World Wildlife Fund (WWF).

Donate

In the last two years, the BSHRP has financed their work privately. But the cost of recovering and disposing of the nets is at least €1,500 (~US\$1,700) per day. These costs include an expedition and salvage ship, salvage materials (gases, cutting equipment, sacks, linen, buoys, lamps, etc.), and environmentally sound disposal of the salvaged nets. Therefore, there is a call for donations, which may be sent to: Vėj "Baltijos paveldas," Debrečeno g. 33-90, LT-94166 Klaipėda, Lithuania (Registration code 304872974; Account: Swedbank IBAN: LT31 7300 0101 5571 8642; SWIFT: HABALT22).

Volunteer

There is also a call for volunteers for the six-week ghost net project in 2019. The goal this year is to free the wreckage of the *Elbing IX* of fishing nets, dispose the salvaged nets properly and create a protection zone around the wreck site to ensure that the wreck remains free of nets in the future. The wreck of the *Elbing IX* lies at a depth of 45m. For more information, visit: bshrp.org



Wooden deck on the the SMS *Friedrich Carl* wreck is still intact

In November 1914, the *Friedrich Carl* participated in an attack on the Russian naval base at Libau. On the morning of 17 November, she ran into two Russian mines, about 30 miles off Klaipėda, and the crew had to evacuate the ship at 6:30 a.m. She capsized and sank at 7:15 a.m. Seven crewmen in the torpedo room in the stern were killed.

It was not until 2009 that the wreck was found by a group of Swedish divers. It lies at a maximum depth of 82m, with the upper edge of the wreck at 72m. The wreck rests on the starboard side and is in incredibly good condition. The

German Imperial Eagle plaque on the SMS *Friedrich Carl* wreck



Lamp on the SS *Edith Bosselman* weck



Steering wheel on the *Elbing IX* wreck

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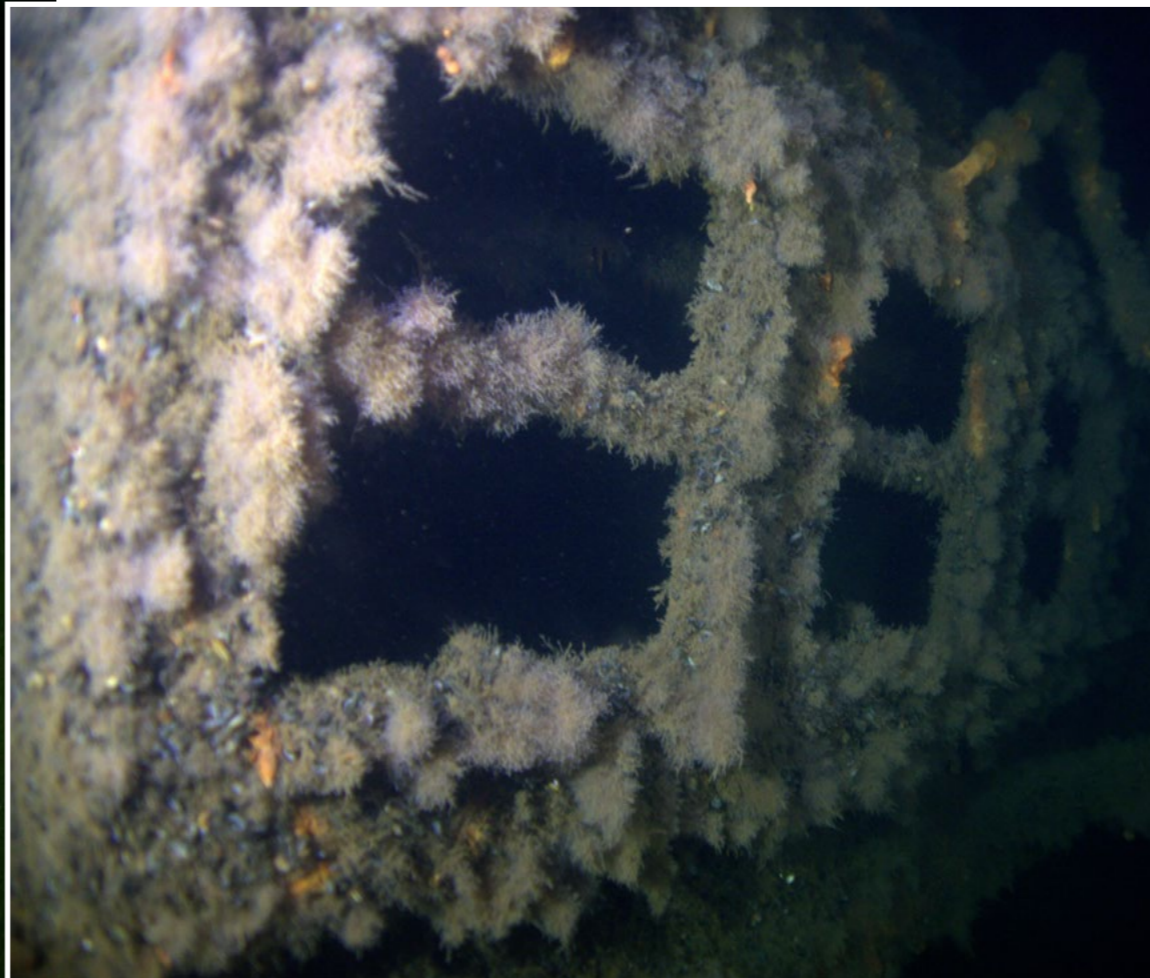


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Bow of the U540 (left); Porcelain pitcher (bottom left) on SS *Edith Bosselman* (above and right); Fish trapped in the discarded fishing nets (also called ghost nets) on the SS *Tristan* wreck (lower left)



first 100m has no damage. Portholes, cannons and even a plaque on the bow with the German Imperial Eagle are still in their original place. The wreck is not overgrown. The last 30m of the former warship is completely destroyed. The seabed on which SMS *Friedrich Carl* is located is so soft that about half of the ship is buried. The *Friedrich Carl* is about five

hours by boat from Klaipėda. The visibility on the wreck is usually very good.

SS *Edith Bosselman*

On our first visit to Lithuania in September 2016, we had the opportunity to dive an unknown wreck. We found a wonderfully intact wreck at a depth of 42 to 52m. The wreck rested on its port side. It was a small freighter with a passenger deck. In our first dive to the wreck, we discovered the ship's bell, the helm and the bathroom in the first-class quarters. The wreck was partially covered with fishing nets. Under one of the nets, we found human remains.

In May 2017, we came back to unlock more secrets about this



The team recovered a bell marked with the name SS *Marsdiep 1920* (above) from a wreck later identified as the SS *Edith Bosselman*.





Portholes (above and left) on the SS *Edith Bosselman* wreck



wreck. First, we wanted to recover the ship's bell. We hoped to find a name on it that would verify the wreck's identity. But before we could tackle this problem, we first had to confirm with the Lithuanian Sea Museum whether we could deliver the bell there after it had been salvaged.

Everything went perfectly. We recovered the bell, finding the name, SS *Marsdiep* 1920, on it. But then things got mysterious. Our research showed that the 1920-built *Marsdiep* was sold to Denmark in 1922. The new owner, AP Møller of the Maersk Shipping Company, changed the name of the

ship to *Jessie Maersk*.

Reportedly, the *Jessie Maersk* was torpedoed by a German submarine in 1942 off the English coast and was sunk. This has now been confirmed without a doubt.

During further dives, we tried to find more evidence of the wreck's identity off the coast of Klaipėda. We found out that the ship was loaded with coal. There were three rooms and a relatively large first-class area. There had been electricity on board; we found the switches. The instruments were probably English. The ship had a steel hull, and the bridge was made of wood. But all this information did not help us identify the

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Cargo on the wreck of the SS *Tristan*



Engine room (above) and first-class quarters (left) on the wreck of the SS *Tristan*

wreck, because it could also have applied to the *Jessie Maersk*.

Next, we measured the wreck. This gave us clear proof that the wreck was not the *Jessie Maersk*, because our wreck was ten meters short. Further investigation and research by a project member brought a determination. Our wreck was almost certainly the SS *Edith Bosselman*.

The *Edith Bosselman* was originally built in 1925 for AP Møller's shipping company, Maersk. It was called the *Rita Maersk* at the time. In August 1939, the *Rita Maersk* was sold to Eduard Bosselman. Bosselman was a merchant from Gdańsk (Danzig), Poland, and the *Rita Maersk* was his only ship.

Due to the current danger of the war, Bosselman could not sail the ship under the German flag. He

gave the ship the name "Edith" and let it continue to sail under the Danish flag. It was only in 1942, a few months before its demise, that the ship was renamed "Edith Bosselman." The *Edith Bosselman* was the first vessel lost in 1942 to the mines laid by the Russian submarine *L3*.

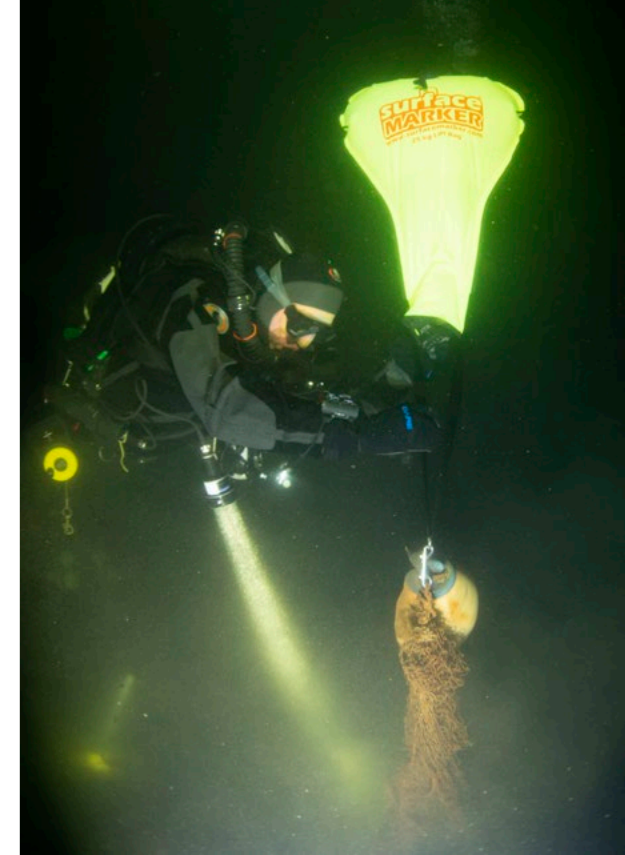
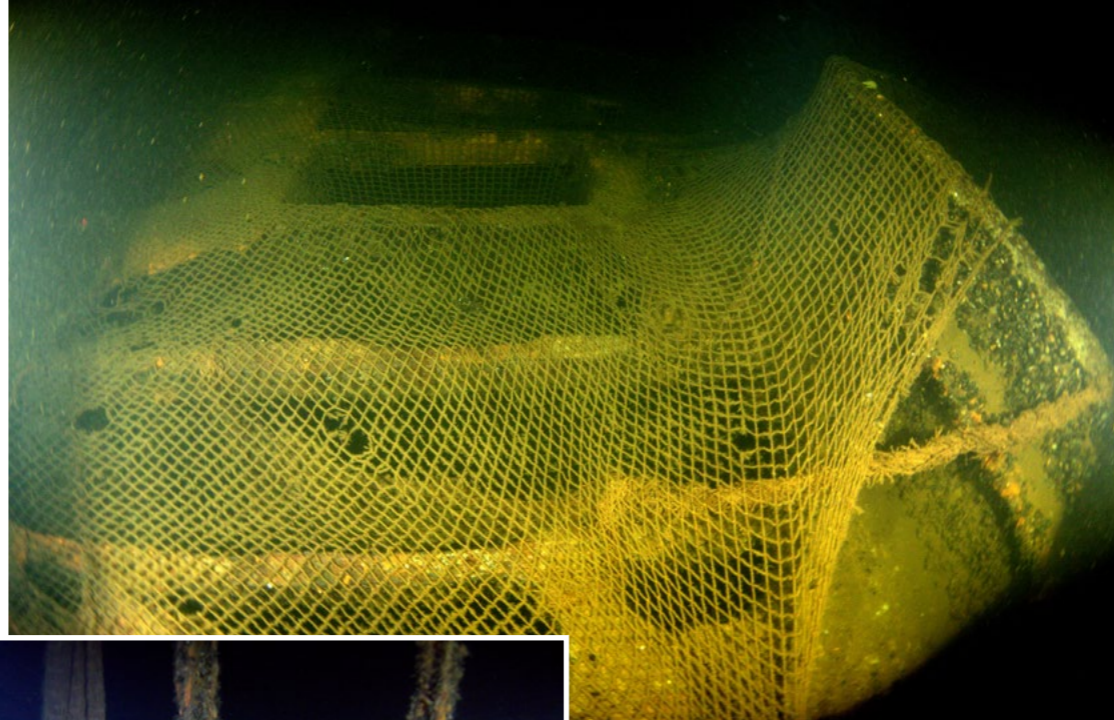
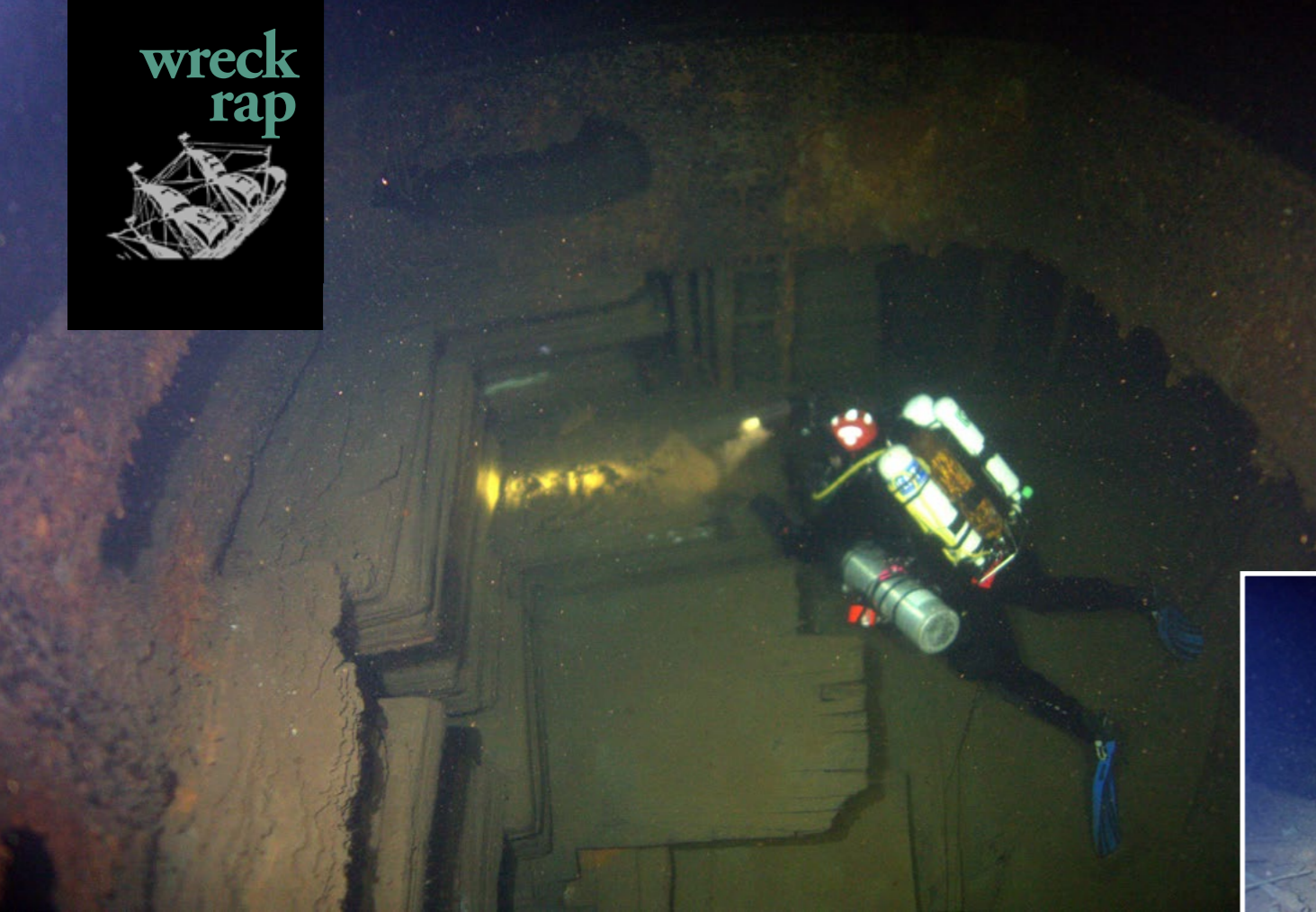
Unfortunately, between our dives in May and August, the wreck was severely damaged. We saw the impact of big fishing trawlers everywhere. Even the human remains we had seen in May were torn away. The bridge was almost completely destroyed.

SS *Tristan*

In August 2017, we went in search of another victim of the mine belt. Our captain, Linas Duoblys, got a position from a local fisherman. He



Porthole (above) and cargo room (top right) on the SS *Tristan* wreck



Discarded fishing nets caught on the the *Elbing IX* wreck (above); The team used inflatable lift bags to lift fishing nets salvaged from wrecks to the surface (right)



Duoblys, the captain of the *NZ 55* (one of the best dive boats in the eastern Baltic), knows countless locations where no one has ever dived.

The wrecks at these locations lie at depths between 20 and 80m. Conditions at these locations are similar to those in the lakes of Austria, Germany and Switzerland. The visibility in the first 20m is usually not good; but then it is dark, yet clear below this depth. Water temperatures at the bottom is around 5°C (41°F); but, depending on the season, it can be between 1°C (34°F) and 20°C (68°F).

If you are interested in exploring pristine wrecks or would like to participate in environmental projects such as the removal of the mountains of ghost nets caught on the wrecks in Lithuania, then put the *NZ 55* on the top of your bucket list. ■

Special thanks go to the sponsors of the project: Fourth Element, Liquid Sports in Kiel, Mola Mola Wear, O2 Rescue, Scubapro, Scurion, Seareq ENOS System, Surface Marker, TS Sidemount, WingsAndMore. For more information, visit: bshrp.org.

SOURCES:



FEDERAL ARCHIVES, FREIBURG (DEPARTMENT OF MILITARY ARCHIVES)
TERRAINE, J. BUSINESS IN GREAT WATERS: THE U-BOAT WARS 1916-1945. PEN & SWORD
UNIVERSITY OF KLAIPEDA
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WRECKSITE.EU



Lumber (top left), Emily Dickinson books (above) and a toilet (center inset) were found on the *SS Tristan* wreck

suspected there might be a wreck at that location.

Arriving at the dive site, Duoblys found the wreck almost immediately. Our dive team was ready for the descent into the unknown.

At 50m depth, the conditions were perfect; there was good visibility and no current, when we saw the wreck of a cargo ship with a passenger deck. The approximately 80m long and 10m wide wreck stood upright on the seabed at a depth of 56m.

The wreck was in good condition; however, the bridge was missing. Maybe it was torn down by trawlers. At the bow, one could still admire the huge anchor. In the dining room, there was a toilet, and the kitchen looked as if it had been burnt.

There were many details to discover on the wreck. The three holds were full of freight, mainly wood. We also found boxes of books. These were books by Emily Dickinson in Russian.

We made two dives on the wreck and collected as much information as possible to identify it. Back on land, our colleague Thomas Weyer used this information to research the vessel online.

At present, we assume that the wreck is the *SS Tristan* because of its cargo and its location. Final confirmation is still pending. It was on 5 February 1943 that the German carrier *Tristan* was sunk by a mine on her way back from Tallinn.

More to discover

These two wrecks, *SS Edith Bosselman* and *SS Tristan*, have seen few divers so far, and there are so many more wrecks to investigate in the area. Technical divers can fulfill their dreams exploring the waters off Lithuania.



Text and photos by Vic Verlinden

The armored cruiser *Friedrich Carl* was constructed in the year 1902 at the well-known shipyard of Blohm & Voss in Hamburg, Germany. The armored cruiser had a length of 126m and was equipped with an impressive array of guns and torpedo launchers. She was the second ship of the Prinz Adalbert class when she was commissioned by the Imperial German Navy on the 12 December 1903.



Historical photo of SMS *Friedrich Carl*



SMS Friedrich Carl

— *Diving the Flagship of Admiral Ehler Behring*

In the early years, she served as a torpedo training ship. Because of her three engines, she could reach a top speed of 20 knots. During the outbreak of the First World War, she served as the flag-

ship of Rear Admiral Ehler Behring. At this time, she was converted to carry two seaplanes. She was the first ship of the Imperial Navy able to carry and launch seaplanes.

At the start of the war, Behring was ordered to actively monitor the activities and movements of the Russian fleet in the Baltic Sea. To execute this mission, the *Friedrich Carl* was accompanied by sev-

eral light cruisers and four destroyers. The squadron was operating from the port of Danzig but was not able to sail due to the bad weather.



Canon (left and bottom right) on the wreck of the *Friedrich Carl*; Discarded fishing nets cover parts of the wreck (below)



An unexpected explosion

Despite the bad weather, the Russian minelayers had not been idle and had laid various minefields in the operating area of the *Friedrich Carl*. On 17 November, Behring ordered the continuation of the mission and the vessels left the port.

When the vessel was 30 miles away from the port of Memel (Klaipėda), it was struck by a heavy explosion. Immediately, the admiral gave the order to try all means to save the ship. Every possible measure to keep the ship afloat was taken; however, in the end, the abandon-ship order was given, and all sailors and officers left the ship. There were only eight deaths among the 557 crew members and officers, most of whom were taken on board the light cruiser *Augsburg*. A while later, the *Friedrich Carl* disappeared under the waves and sank to the bottom of the Baltic Sea. The loss of

the beautiful warship was a heavy blow to the German navy, as the vessel could not be replaced immediately.

Dive operation in Lithuania

As early as 2017, I had decided to dive the wreck of the SMS *Friedrich Carl*, but due to circumstances, this trip was postponed. However, a new date was set for June 2018. On 23 June 2018, I was with my dive buddy, Karl Van Der Auwera, on the way to the port of Kiel in Germany. From Belgium, this was only a good 650km drive.

We embarked on a DFDS Seaways ferry that would deliver us the next day to the port city of Klaipėda in Lithuania. From there, it was only a 10-minute drive to our expedition ship, NZ 55. The owner of the ship is Linus Duoblys, and our dive team consisted of five divers from three different countries. My dive buddy and I would dive with closed-circuit rebreath-



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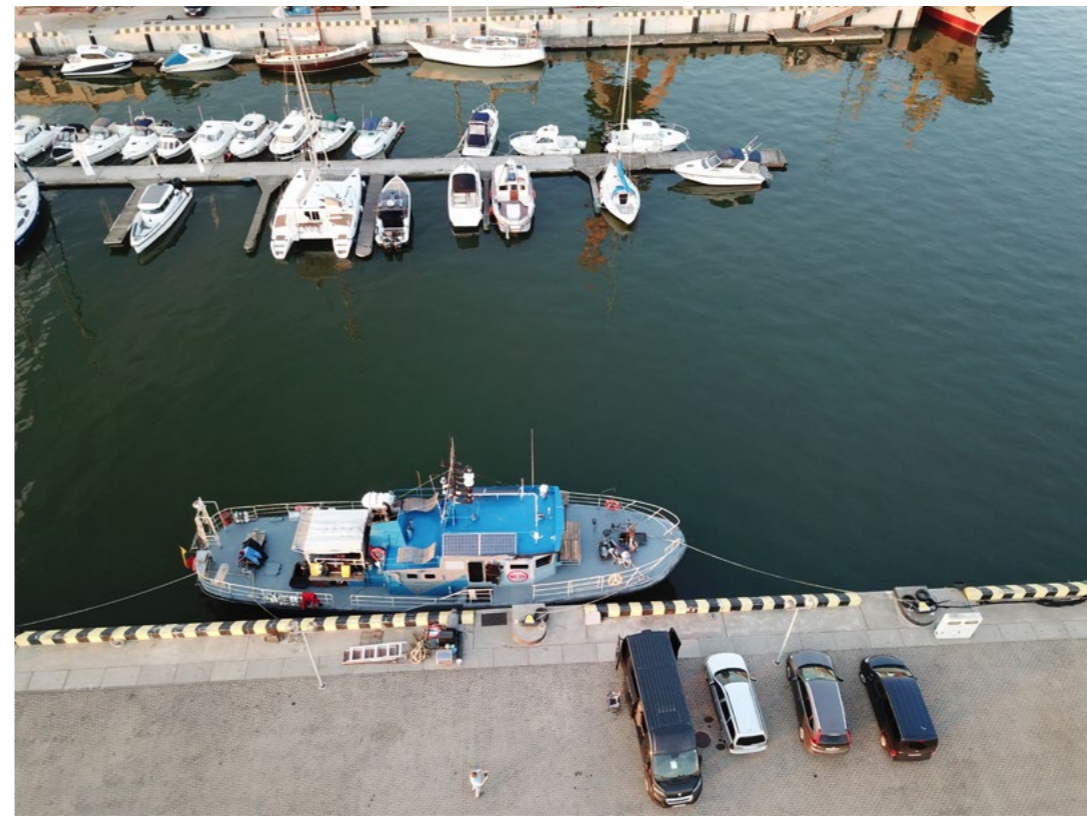
Direct



wreck rap



Diver at one of the canons of the *Friedrich Carl* (left); The expedition ship, *NZ55*, docked at the port city of Klaipeda in Lithuania (below); Lamp on the wreck of the *Friedrich Carl* (bottom right)



ers, but there were also team members who would make the dives with open-circuit systems.

The maximum depth we would reach on the wreck would be 82m. However, the water temperature at that depth was only 3°C. The good news was that the temperature at the stage depth was 15°C. The plan was to dive the next day on another wreck, which was 40m away, so that we were able to test our equipment.

The weather reports looked good for the next few days. This was important because the *Friedrich Carl* was 40 miles from the harbor.

Test dive

The wreck of the *SS Edith Bosselmann* could be reached after two hours' sailing from the port of Klaipeda. Luckily, the weather was as predicted—calm—and there was hardly a

wave to be seen on the sea.

This wreck upon which we would do our test dive was discovered two years ago and was located at a depth of 51m. The *Edith Bosselmann* was a cargo ship loaded with coal that sank on 9 December 1942 after a collision with a mine, which was laid by the Russian submarine L3.

When I started the dive on the *Edith Bosselmann* with my buddy, the visibility was not so good in the first 15m. But down on the wreck, visibility was about 12m. However, at 3°C, it was freezing cold at the bottom.

The wreck itself was positioned on its port side and partially covered by fishing gear. At the bottom, the lower part of the ship's compass was clearly recognizable. After a short reconnoitre of the cargo holds, we swam towards the stern and noticed the propellers and

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The 3°C water at 82m depth of the *Friedrich Carl* keeps pile worms away, so the wood on the deck looks like new.

rudder. The dive on the *Edith Bosselmann* was a good warm-up for our dive on the SMS *Friedrich Carl* the next day.

Underwater museum

After our dive on the *Edith Bosselman*, we prepared the rebreathers again, as we had to leave early the next day. The boat trip to the wreck took more than five hours for the one-way journey. Including the diving, we would certainly be on the move for 13 to 15 hours. However, we were lucky again with the weather, and the trip went smoothly.

The dive plan was such that Auwera and I would be the first team to launch. We did a final inspection of the equipment

and jumped into the water to start our descent. At a depth of 15m, I started to feel the cold temperature of the water. But because it was our second dive, we were already a bit adapted to the cold, so it was not so bad.

The wreck was at a maximum depth of 82m, but when we landed on the bottom, we could not distinguish the wreck in the dark. We swam around to try and find it, because the downline could not be far from the wreck. After swimming around for 10 minutes, we decided to ascend. When we had risen about 15m, we suddenly saw the wreck and swam across the port side to the midship section. Here, we immediately saw the large guns

that were turned outwards. It was a beautiful sight in the light of the camera lights, because the wreck was almost clear of marine growth.

Even pile worms cannot tolerate this cold water, and that was the reason why the wood, which was still on the deck, appeared like new. All the details, such as the ship's lights, were clearly visible on this wreck, which made it unique for a ship from the First World War.

We had a maximum bottom time of 25 minutes, and these were now used up, so we had to start our ascent. For the next two days, we went back to the wreck.

Our second dive was the best of all the dives because we managed to swim towards the

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The highlight of the expedition was finding the bronze German Imperial Eagle coat of arms on the *Friedrich Carl*.

bow of the wreck where we found a bronze plate with an eagle on it. On our way towards the bow, we filmed the bollards and various other parts; however, the view of the beautiful bronze eagle on the plate was the highlight of all the dives to the wreck. This alone made the trip to Lithuania more than worth it!

In search of the stern

During the last dive, we wanted to explore the stern and the bridge. The visibility was a lot less this time when we descended. The many fishing nets on the wreck made it a dangerous business, if one did not pay attention. We had landed back

at the big guns, but a few meters farther on, we could see one of the smaller guns that was placed on the side of the ship.

We swam away from the sea bottom as there was a big silt cloud that reduced the visibility to almost zero. Here, we found various grenades, which were scattered over this part of the seabed. However, there was no sign of the propellers and some other parts of the ship. The part where the bridge was supposed to be was probably under a layer of mud, which was regrettable. In the future, an expedition will be undertaken to remove the fishing nets from the wrecks in Lithuania. ■

Having dived over 400 wrecks, Vic Verlinden is an avid, pioneering wreck diver, award-winning underwater photographer and dive guide from Belgium. His work has been published in dive magazines and technical diving publications in the United States, Russia, France, Germany, Belgium, United Kingdom and the Netherlands. He is the organizer of the tekDive-Europe technical dive show. See: tekdiver-europe.com.

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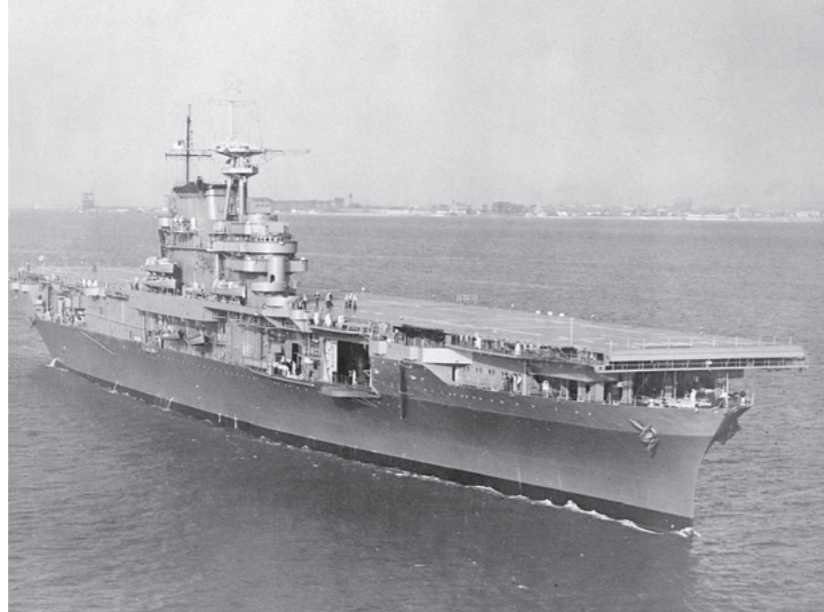
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The wreckage of the USS *Hornet* has been found near the Solomon Islands 76 years after the aircraft carrier was sunk during a World War II naval battle.



US NAVY PHOTO 80-G-463613 / PUBLIC DOMAIN

Wreckage of WWII aircraft carrier USS *Hornet* discovered

More than 75 years after the aircraft carrier USS *Hornet* sank in a Second World War battle, Paul Allen's *Petrel* research vessel has uncovered its wreckage three miles under the South Pacific Ocean.

The USS *Hornet* was involved in many key events of the war, including launching the famed Doolittle Raid on Tokyo—the first airborne attack on the Japanese home islands after Pearl Harbor and the United States' entry into the war. It also played a major part in the Battle of Midway. After a fierce battle off Santa Cruz Island in October 1942, which has been described as one of the more bloody and vicious at-sea battles of the war, the USS *Hornet* was attacked by a wave of Japanese dive bombers, torpedo planes and destroyers, hitting the ship with torpedoes.

Located at 5,400m

But now, after years of searching, the wreckage of the USS *Hornet* was discovered in late January 2019, by the expedition crew of the research vessel RV *Petrel*. The *Hornet* was found 5,400m (about 17,700ft) below the surface, resting on the floor of the South Pacific Ocean. The *Petrel* made history in 2017 when it discov-

ered the wreck of the USS *Indianapolis*, which was sunk in 1945 by a Japanese submarine in one of America's worst naval disasters. The *Petrel* took on the search for the *Hornet* as part of its mission to investigate scientific phenomena and historical mysteries in the South Pacific. The 250ft research vessel's previous shipwreck finds include the USS *Lexington*, the USS *Juneau* and the USS *Helena*.

The 10-person expedition team on the 250ft RV *Petrel* were able to locate the *Hornet's* position by piecing together data from national and naval archives, which included official deck logs and action reports from other ships engaged in the battle. Positions and sightings from nine other US warships in the area were plotted on a chart to generate the starting point for the search grid. In the case of the *Hornet*, she was discovered on the first dive mission of the *Petrel's* autonomous underwater vehicle and confirmed by video footage from the remotely operated vehicle, both pieces of equipment depth-rated to 6,000m.

Proud to find the ship's remains, the expedition team said the find was an homage to Paul Allen, who passed away in December 2018 from complications related to non-Hodgkin lymphoma. ■

WWII Japanese Battleship IJN *Hiei* also found by Paul Allen's research vessel *Petrel*

One of the first Japanese battleships sunk by US forces during World War II has been found by the exploration ship RV *Petrel*. It lies upside down in 900m of water, north-west of Savo Island in the Solomon Islands.

IJN *Hiei* was a warship of the Imperial Japanese Navy during World War I and World War II. As the second of four Kongō-class battlecruisers, it was among the most heavily armed ships of any navy at the time. In 1942, *Hiei* took part in many Imperial Japanese Navy missions, like the invasion of the Dutch East Indies (now Indonesia), the Indian Ocean raid of April 1942, as well as the Battle of Midway. Subsequently, it was redeployed to the Solomon Islands, bound for the Naval Battle of Guadalcanal. This was a series of naval battles between Allied (mainly American) and Imperial Japanese forces during the Guadalcanal Campaign in the Solomon Islands on 12 to 15 November 1942.

Combat and loss

In the First Naval Battle of Guadalcanal, *Hiei* inflicted much damage on American cruisers and destroyers before its steering machinery was damaged by enemy vessels and shells from USS *San*

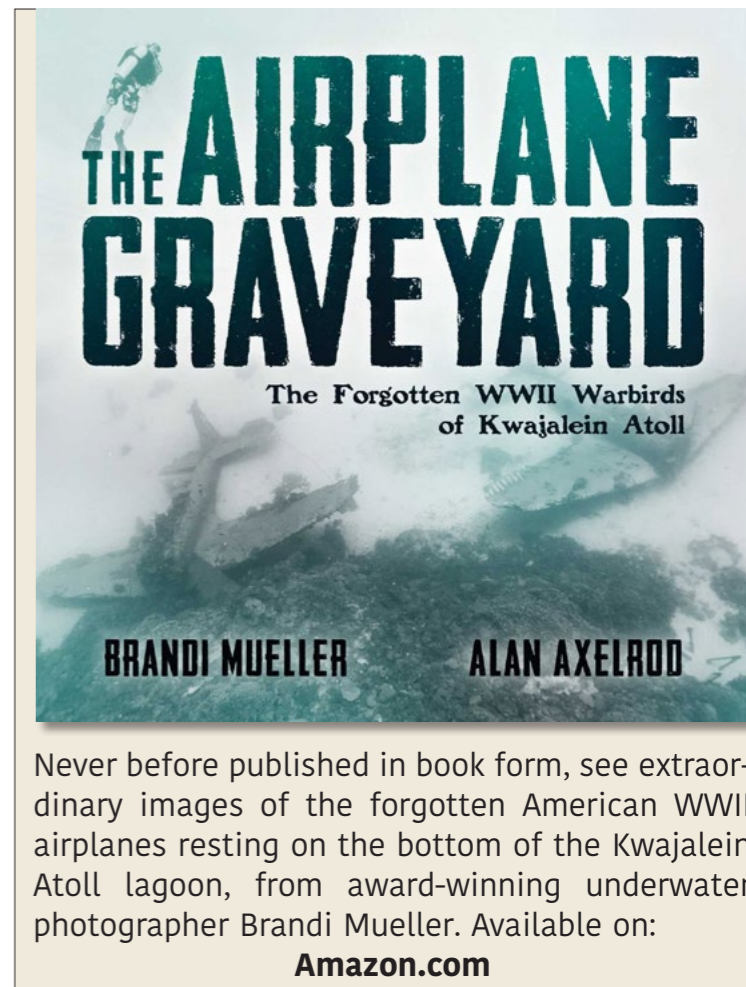
Francisco. *Hiei's* sister ship, *Kirishima*, attempted to tow *Hiei* to safety, but water had flooded *Hiei's* steering compartments, jamming the rudder to the starboard; this caused the ship to steer in circles. After suffering more torpedo and dive-bomber attacks throughout the day, the crew was ordered to abandon ship, and escorting destroyers scuttled *Hiei* with torpedoes. In the evening of 14 November, *Hiei* succumbed to the waves. 188 of the crew perished. It was the first battleship lost by Japan during World War II.

Finding the wreck

Researchers in Japan picked up *Hiei's* sonar signature off the Solomon Islands in early 2018, prompting the RV *Petrel* to investigate the site and capture the first underwater views on location. Images posted to Facebook from the expedition



IJN *Hiei* in Tokyo Bay, 11 July 1942. During the battle of Guadalcanal, *Hiei* became the target of most of the American fire, with American 5" guns inflicting severe damage on *Hiei's* superstructure at close range.



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show the *Hiei's* 127mm guns scattered in the debris field, a crate of 25mm anti-aircraft shells resting on the capsized hull, a hole ripped in the hull during its final battle, and portholes dotting the remains. *Petrel* also posted sonar images of the battleship and her debris field on the seafloor. *Hiei* is the fourth Japanese battleship found by *Petrel's* crew.

"It is highly likely that an ammunition room on the battleship's bow side exploded for some reason," said Kazushige Todaka, director of the Kure Maritime Museum in Hiroshima Prefecture, after viewing the footage taken by *Petrel's* research team. ■





Wreck Festival 2019

University of Warsaw, 9 February 2019

Text and photos by Peter Symes

It was frosty and sunny—quite a pretty day—when I walked through the empty streets of Warsaw one quiet Saturday morning in February. As I was heading from my hotel to the eighth edition of the International Shipwreck Festival, which was held in the University of Warsaw’s library, only a couple of morning joggers and some drowsy walkers seemed to be out walking their shivering dogs.

The festival is a one-day event, but with four concurrent sets of presentations, it could easily be held over a full weekend. In which case, attendees would still be left with the agony of choosing between the various presentations—and yet, perhaps not so much for the international attendees and non-Polish speakers, as just about half of the presentations were held in English, the rest in Polish. That limitation went some way to make picking a presentation easier; but still, some of the topics of the presentations

that were only held in Polish looked frustratingly interesting. Ah, well. I understood I should count my blessings, and there were still plenty of interesting topics among the English presentations.

Among the first set of presentations, I had the choice of Immi Wallin’s presentation about the shipwrecks of Tallinn, or one about the wrecks of Messina Strait (between mainland Italy and Sicily) by Dr Gianmichele Iaria. As I had already heard Wallin’s presentation at Eurotek 2018, I was left with an easy choice. Iaria’s presentation on the Ar.Bio.Me project was accompanied by some good 3D visualisations, which clearly illustrated the bottom profiles and locations of wrecks under investigation. His talk was translated into Polish, which made for a stop-and-go manner of presentation, but I found that it was actually a benefit, as it made room for reflection and digestion of the information before moving on.

Dr Peter Campbell of the RPM Nautical Foundation gave a talk about Aegean wrecks, which was fluid, fast-paced and substantial, turning my frantic note-taking into some sort of made-up, hard-to-decipher shorthand. He

described how the organisation’s survey covered wrecks that were both Greek and Roman, spanning many centuries, and how these finds showed the



The venue was formerly a library but is now converted into lecture or presentation halls.





Wreck hunter David Mearns (right) found the HMS Hood, HMAS Sydney and the German raider Kormoran; The logo of the University of Warsaw (left)



cultural evolution, which took part over these centuries. The cargo these vessels were carrying was local merchandise, but some parts were clearly being transported over long distances, showing trade routes connecting the Black Sea to North Africa and Egypt. Find more information at: korseai.com.

The next presentation I attended had the intriguing title, "Wrecks of Submarines and Sunken Churches," by the Russian team Ivan Borovikov and Konstantin Bogdanov. The bit on the sunken churches concerned a hydroelectric project stemming the flow of the Volga River, which resulted in towns becoming submerged. See: uwex.org/en/media.

Moving on to a different continent and climate, Captain Mark "Sharky" Alexander spoke about recreational and technical wreck dives in the US state of Florida—off Pompano Beach, the Keys and Pensacola—where he now runs a liveaboard called *Ultimate Getaway*. He gave a brief overview of the most well-known artificial wrecks, such as the *Spiegel Grove*, *USS Duane*, *USS Vandenburg* and others, before moving on to the deeper, more technical wrecks, making a more detailed mention of the *USS Wilkes-Barre* and *HMCS Canada / MV Queen of Nassau*. In regards to wreck sites off Pensacola, the former aircraft carrier *USS Oriskany*, which was turned into an artificial reef, got most of the attention for obvious reasons.

David Mearns—the wreck hunter who once located the wreck of the *HMS Hood*, which was sunk in the Denmark Strait while giving chase to the German battleship *Bismarck* during WWII—gave a lengthy and very captivating narration of how they, in 2008, found the *HMAS Sydney* after first locating the German raider *Kormoran*, which sank her off Western Australia on 19 November 1941. These finds have been reported earlier in our magazine and on our website where the details are still available. He also described how they analysed the wreck, and armed with thousands of photos, were able to stitch together how the battle, in all likelihood, unfolded.

Richie Kohler gave a cool presentation on German U-boats in the Mexican Gulf, and how one of them was found only about a mile away from the passenger ship *Robert E. Lee*, which it sank. The images taken by an ROV from Robert Ballard's vessel *Nautilus* were really stunning, and the wreck appeared to be in amazing condition, with little corrosion or marine growth due to the anoxic conditions on the bottom of the Mexican Gulf. Otherwise, it was very much intact. Kohler made a salient point about "fixing broken history" as being the best thing we could do with diving.

The final presentation of the day was by Chris Jewell, who was part

of the team that rescued the boys trapped in the Thai cave in 2018. This rescue has been detailed in a previous report in the magazine, so I will not go into further details here.

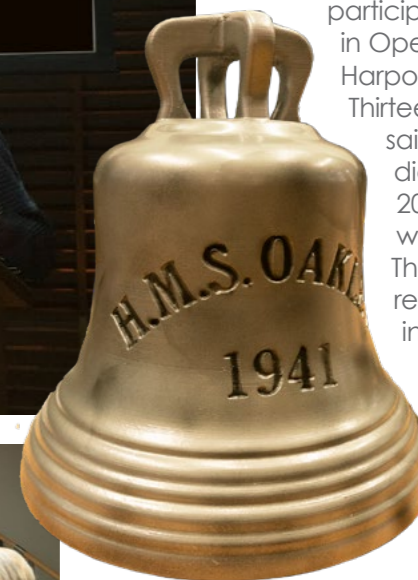
Cocktails and a banquet dinner was held directly afterwards, at 9 p.m., in the gorgeous columned hall of the university, which rounded off a productive but very long day in the best possible manner. Falling asleep late that evening was not a problem.

On a concluding but slightly different note, I found Warsaw to be an intriguing and interesting city, which impressed me in many ways. The city was pretty much obliterated during WWII, but the Poles decided to reconstruct the city as it used to look before the war. Hence, it has the immediate appearance of an old European city, with a compact centre of centuries-old buildings. Only, almost all of these buildings were recreated after the war. It would have fooled me if I had not read up on its history before I came. Seeing where the Jewish ghetto once stood and where several hundred thousand Jews were transported to concentration camps during the Holocaust left an indelible impression, which keeps coming back to me. War is evil! ■



Richie Kohler giving his presentation

In June 1941, a ship launched as *HMS Oakley* was transferred to Poland and renamed *ORP Kujawiak*. It was sunk on 16 June 1942 after running into a mine near Malta while participating in Operation Harpoon. Thirteen Polish sailors died and 20 were wounded. The bell was recovered in 2017.



"Say cheese." The presenters line up for a group photo.



The banquet dinner was held in the beautiful columned hall of the university.

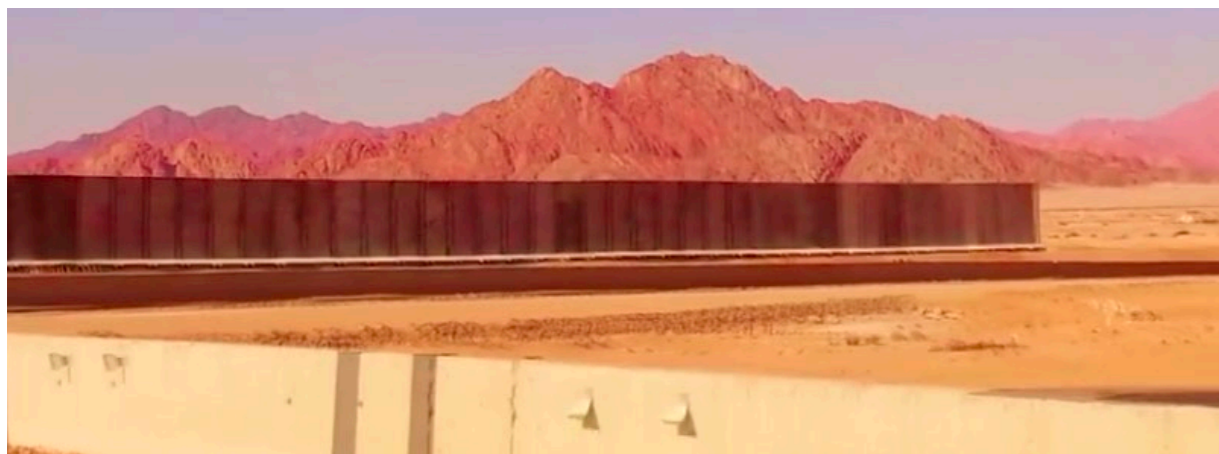


Dr Peter Campbell's presentation on the Aegean shipwrecks





Edited by
Peter Symes



Screenshot of **video** posted on Facebook by SSBC (Sharm el-Sheikh Broadcasting Corporation)

Are Egyptian authorities about to erect a wall around Sharm el-Sheikh?

Reports are coming in that the Egyptian authorities have started work on a concrete barrier around Sharm el-Sheikh. The popular dive resort town on the Red Sea has struggled to attract tourists since a Russian passenger jet crashed in the region in a terrorism-related attack in 2015, resulting in the deaths of 224 people.

Wall or barrier?

The Guardian reported that despite photographic evidence to the contrary, General Khaled Fouda, the governor of South Sinai, has stated, "It's not a wall, who told you it's a wall. We don't have a wall." Photos and video show the construction of a concrete barrier which appeared to be up to six metres high.

According to Fouda, a mix of high concrete barriers and at least 37km (23 mi) of

razor-wire fence, with "four very beautiful doors" to access the town, will "beautify and secure Sharm el-Sheikh."

"Beautiful doors" or an eyesore?

It is feared that the six-metre concrete barrier will destroy the views of Sharm's mountains and desert, and send out the wrong message to tourists.

Locals are apprehensive that once it is completed, the barrier will encircle the town. A resident commented, "For us residents, it's ridiculous. [...] This security barrier isn't going to make a difference, it will just annoy people more and it won't stop terrorism. It's a joke. Any tourist coming out of the city will be worried they're not safe—this will affect tourism." ■

SOURCES: THE GUARDIAN, SSBC

Maldives issues warning after spate of drownings

A number of foreign nationals drown each year in the seas around the Maldives, which can have strong tidal currents. The islands' police have appealed for caution from visitors when swimming, snorkelling or taking part in watersports. It said efforts were under way to improve safety measures at resorts.

Tourism officials have told all resorts to monitor their

guests more closely and have announced a full review of all accommodation on the islands to ensure they meet operating standards.

One recommendation under consideration is the creation of safe swimming areas around the 26 atolls, which make up the nation, as well as the deployment of tourist police on each island. ■

Malta to regulate wreck diving with new laws aimed at protecting underwater heritage

Access to underwater heritage sites such as wrecks has so far not been specifically regulated. New regulations will allow Heritage Malta to offer Maltese and foreign divers regulated access to a significant number of underwater wrecks going back to the two world wars.

Besides protecting such sites, the new system is expected to offer local diving schools the opportunity to register with Heritage Malta, against a fee, in order to be able to take divers down to the listed zones. Boats transporting divers to a close proximity of the sites will also be required to register.

Enforcing these new regulations is going to be a joint effort between all the authorities involved, including the university, Heritage Malta and patrol boats.

"As soon as a boat moors off the wreck, its registration will be confirmed or other-

wise against our database. Registered diving schools are also encouraged to inform us if they spot unauthorised divers around these wrecks. It is in their interest to make sure the system works smoothly—it is in the interest of everyone who values our cultural heritage, actually," marine archaeologist Dr Timmy Gambin told Times of Malta.

Gambin is a senior lecturer in the Department of Classics and Archaeology at the University of Malta, and recently made presentations at EuroTek 2018 and the Wreck Festival in Warsaw on a Phoenician shipwreck off Xlendi Bay of Gozo Island, which we featured in issue #40.

This wreck has been deemed to be the oldest shipwreck in the central Mediterranean. Gambin's explorations has yielded a number of historically significant results and artefacts, such as amphorae from North Africa and western Sicily and grinding stones made of lava, which originated in Pantelleria. ■

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Dr Timmy Gambin presenting at EuroTek 2018

Ogasawara Islands

— *Japan's Galapagos*

Text and photos by Don Silcock

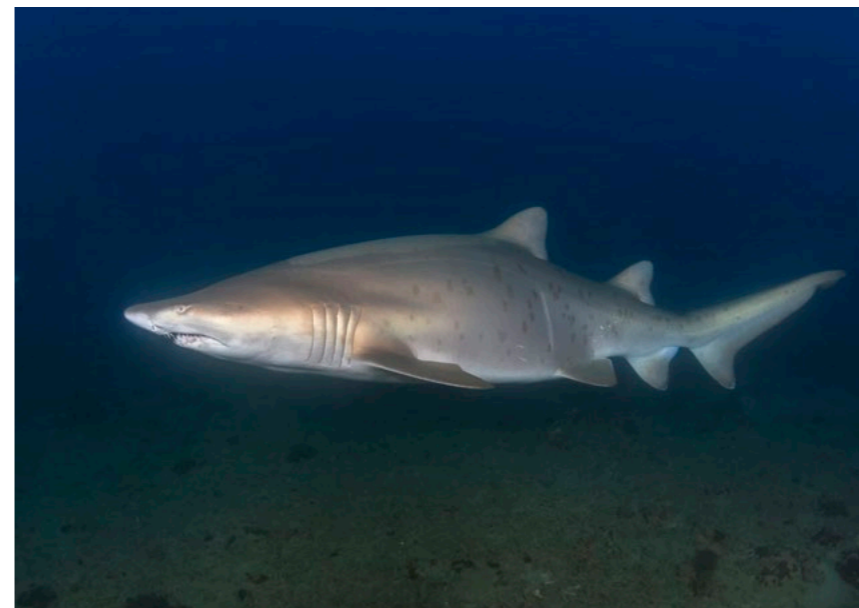




Often referred to as the **Oriental Galapagos**, the **Ogasawara Archipelago** is located in the northwestern Pacific Ocean, about 1,000km south of Tokyo and is one of the most isolated and remote parts of Japan. The isolation of the archipelago, combined with the fact that the islands have never been connected to a continent, is said to have produced a “Galapagos effect” with flora and fauna that is unique to the islands. Plus, because they comprise some of the very few significant land masses in the northwestern Pacific, they provide a much-needed safe refuge for many endangered species.

Volcanic in nature, visually the islands are quite remarkable and rise spectacularly out of the surrounding deep waters and oceanic trenches. The archipelago is on a similar geographical latitude to the more well-known Okinawa Islands and share the same subtropical climate, with warm temperatures all year-round.

Similarly, the reefs around the Ogasawara Islands are rich in coral and fish, but it is the larger creatures of the underwater world that convinced me to make that long journey. This is because every year, the archipelago is visited by northern humpback whales and has a resident population of sperm whales.



Getting there

Despite their distance from Tokyo, the 30-plus Ogasawara Islands are administered from the Japanese capital, and the only way to get there is also from Tokyo—on the weekly ferry service, as there are no airports on any of the islands.

THE OGASAWARA ISLANDS

Also known as the Bonin Islands, the Ogasawara archipelago consists of over 30 subtropical and tropical islands, some 1,000km directly south of Tokyo. The only way to reach the islands is by a weekly 24-hour ferry ride from Tokyo.

The Bonin Islands name derives from the Japanese word “bunin,” which means “uninhabited” or “no people.” Even today, only two of the islands are inhabited—the main island of Chichijima (Father Island), which is also the seat of the municipal government and home to about 2,500 people; and the island of Hahajima (Mother Island), which includes Ogasawara Village, and has about 450 residents.

The Ogasawara Islands were discovered in 1593 by Ogasawara Sadayori, who claimed them for the Tokugawa Shogunate. But they remained largely uninhabited until 1830 when a small group of Westerners and Pacific Islanders established a colony on Chichijima.

The islands officially became Japanese territory in 1875, and later served as military bases during the Second World War—after which they were occupied by the United States until 1968 when they were returned to Japan.

Chichijima Island, the largest of the Ogasawara Islands, is mountainous and covered in rich subtropical forest with white sandy beaches and steep rocky cliffs. It is a popular destination for domestic Japanese tourists and is known for whale and dolphin watching.

Hahajima Island is 40km south of Chichijima but is smaller, less developed and is accessible only by the regular ferry service between the two islands. ■

Wreck in Futami Port (above); Aerial view of the Ogasawara Islands (top); Sand tiger shark at wreck in Futami Port (right). PREVIOUS PAGE: Mother humpback whale with her calf at the Ogasawara Islands



Futami Port (above) on the island of Chichijima (left); The *Ogasawaru Maru* departs (below)

departs from Takeshiba Pier, in the harbour area close to Tokyo Bay, which means one can use the excellent, if initially mind-boggling, Tokyo rail system to get between the two. Boarding the actual ferry, the *Ogawasara Maru*, is done with true Japanese courtesy and efficiency, but you quickly realise that foreigners are few and far between on this journey.

Simply travelling to the Ogasawara Islands is an adventure—one that will quickly immerse you in an interesting mix of Japanese culture, protocol and the country's amazing infrastructure. My journey involved getting from Bali to Tokyo's Haneda Airport, which is built on reclaimed land in Tokyo Bay. So, it is effectively "down-town," as opposed

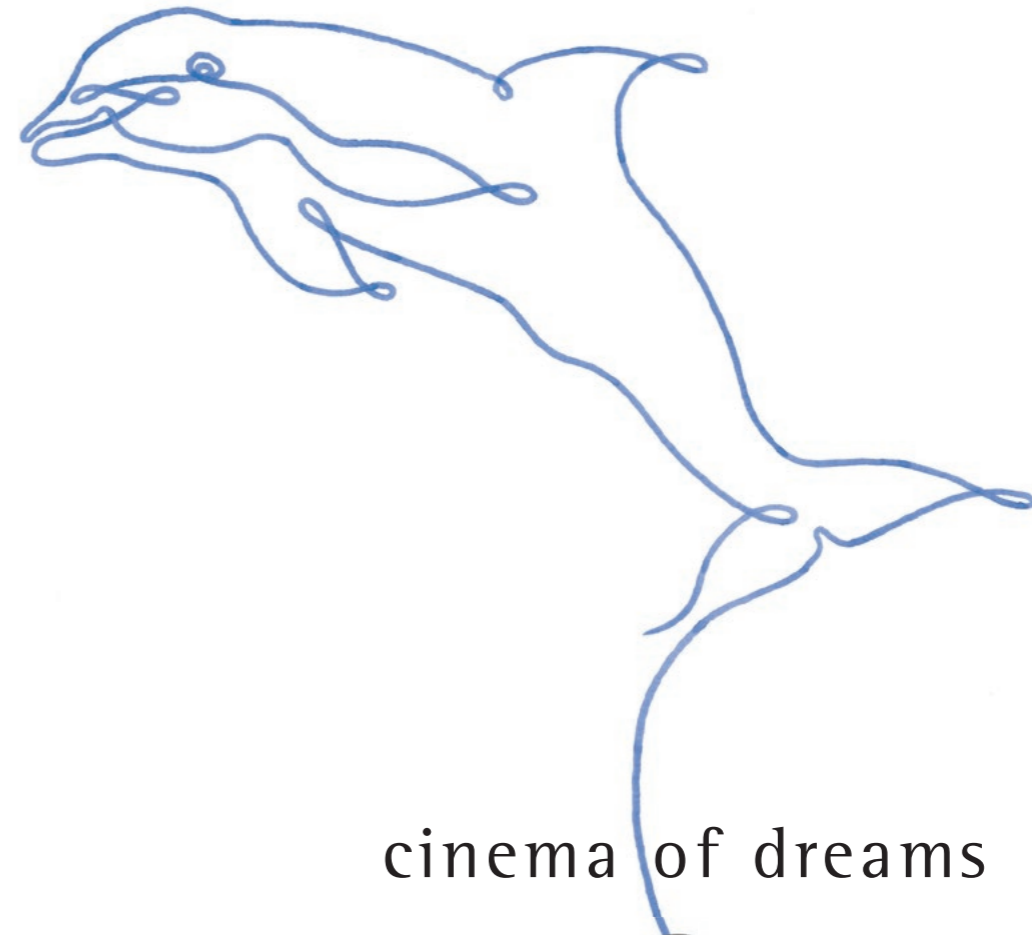
to Narita Airport, which is 40km outside of the city. The Ogasawara weekly ferry



The ship itself is excellent, with restaurants and vending machines for everything you might possibly require for the 24 hours it takes to get to Futami Port on the main island of Chichijima. Overall, it is an interesting and immersive journey with the hardest part being getting your diving and photographic equipment from Haneda to Takeshiba Pier.



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Ogasawara

Bottlenose dolphins at Chichijima

Underwater

The reef systems around the main island of Chichijima are generally in excellent condition with healthy hard coral growth. There is a wide variety of tropical reef fish, including the wrought-iron butterflyfish (*Chaetodon daedalma*)—a species native to southern Japan and relatively common around the Ogasawara Islands.

There is also a healthy population of sand tiger sharks, which congregate in Futami Port around a wreck on the eastern side of the large bay at the entrance to the main harbour. Interestingly, the sand tigers enter the main harbour at night to hunt and can easily be seen in the lights from the pontoons.

Overall, the diving around Chichijima is very pleasant, but not spectac-



School of wrought-iron butterflyfish, which are native to southern Japan




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ular—until the local stars of the show make an appearance. There is a significant population of both spinner and bottlenose dolphins in and around Chichijima, so there is a strong possibility of an underwater encounter with a pod of these wonderful creatures.

The whales

Northern hemisphere humpback whales visit the Ogasawara Islands between February and April each year. They are a common sight around Chichijima and a major tourist attraction. But in-water encounters are not allowed as such, with a mandatory exclusion zone of 100m around any humpback whale. However, if you are in the water and the

whale swims towards you, then the encounter happens on their terms and all is well in the world.

The archipelago has a resident population of sperm whales; however, they are typically only seen in August and September, when the weather is at its best and the seas are calm. They rarely come into the coastal waters around either Chichijima or Hahajima. Instead, they prefer the deep waters, some 10km off the coast of Tatsumizaki Island, to the southeast of Chichijima. In-water encounters with the sperm whales are also not allowed and a 50m exclusion zone applies. But again, if they swim towards you, that is also OK.

THIS PAGE: Northern humpback whales visit the Ogasawara Islands between February and April; Bottlenose dolphin at Chichijima (left)



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Ogasawara



CLOCKWISE: Divers on reef at Chichijima; Guest house cuisine; Restaurant in Chichijima; Location of Ogasawara Islands on satellite map of Japan

The general area around the archipelago was known as the “Japan grounds” during the early 19th century when whaling was at its peak. And because Japan was closed to foreigners at that time, the Ogasawara Islands were used as safe harbours to replenish supplies.

Immersion therapy

It is a long journey to get to the Ogasawara Islands, one that typically will take at least two days each way—one day to get to Tokyo and another 24 hours on the ferry to Chichijima. The diving is good, but not fantastic, and the

whale encounters are somewhat hit-or-miss. But as an overall experience, it is terrific!

Japan is one of my favourite countries and never ceases to amaze me with its incredible culture, history and possibly the nicest, most polite people in the world. The cities in Japan are truly amazing, but they are a completely different experience to what the small towns and villages offer. And the Ogasawara Islands take that even further, as there are simply no big hotels in which to stay and insulate yourself from the locals. Instead, you

stay in pensions and guesthouses, which means you are right in the thick of how the locals live, eat and socialise—the highlight of the overall experience! ■

Asia correspondent Don Silcock is based in Bali, Indonesia. For extensive location guides, articles and images on some of the best diving locations in the Indo-Pacific region, visit his website at: Indopacificimages.com.

SOURCE:
JAPAN NATIONAL TOURISM ORGANIZATION



Japan's **Kinki**

— *Macro Mecca of Honshu*

Text and photos by Andy Murch



Kinki is a ruggedly beautiful peninsula in the southwest of Honshu, Japan. The area is best known for the Shinto shrines of Kumano, which sit atop forested mountains in the center of the region. Each year, thousands of tourists and devotees undertake a pilgrimage through the mountains to reach the tranquil sanctuary, which is said to be a place of physical healing. Japanese divers also flock to Kinki to enjoy the region's fabulous abundance of endemic marine life.



Kinki's southernmost dive spots are draped in lush soft corals, reminiscent of the tropical reefs of Southeast Asia, but Kinki is only "tropical" for half of the year. During the winter months, cold water creeps southward from the eastern coast of Russia, lowering ocean temperatures from a

toasty 26°C to a rather chilly 10°C. Unperturbed, local divers switch from thin neoprene suits to thick drysuits and continue to enjoy the region's underwater beauty throughout the year.

Winter is a particularly good season to look for Kinki's amazing diversity of nudibranchs, which



The strange formations of Hashigui-iwa Rocks, Kinki, Japan (above); Clown frogfish (top left); Diver on Owase artificial reef (top right). PREVIOUS PAGE: *Goniobranchus* sp. (*Goniobranchus* sp.)



Deep-water neon-yellow anemones at Tanabe (above); Goby on reef (right)

the peninsula is famous for. Specific species differ from one town to the next, so the best way to experience as many nudibranchs as possible is to rent a car and drive around the coast, stopping for a day or two in each location. The locals are extremely passionate about diving so there is no shortage of dive shops, and the dive guides (some of whom speak English) are experts at spotting tiny critters that visiting divers would likely miss.

Intrigued by the prospect of ticking off numerous new species on a single trip, my wife and I made the necessary arrangements and flew to Shirahama, which offers easy access to some of the best diving in the region.



Tanabe

Our first stop was Tanabe, a quaint little town known among Honshu divers for its deep-water neon-

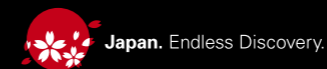
yellow anemones, and of course its abundant sea slugs. In other areas, the anemones only occur below 150m, but in Tanabe, you can



Underwater Adventures in Kinki

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One of the brilliant advantages of diving in the Kinki region in western Japan is access to tropical diving with a huge range of marine life — even in the winter months. The quality of diving in Japanese waters simply cannot be disputed. In fact, nutrient-rich waters off the coast of Kinki mixed with the warm current called “Kuroshio” or “Black Current” from the south, make this region one of the absolute best diving spots in Asia.



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Japanese Chromodoris (left inset), just 2cm long, are endemic to Japan and very common in Tanabe. In contrast, the many-lobed *Ceratosoma* (above) is 12cm long! The multi-colored *Miamira magnifica* (top right)

that local “branchers” don’t pay them a second thought. But as a first time visitor to the region, I could not help pausing now and then to admire

their royal blue mantles, edged in lemon yellow and topped by rusty orange gills and rhinophores. behind its gills, which it uses as a defensive weapon to scare off any potential predators foolish enough to give it a nibble.

encounter them within recreational diving limits. To protect the fragile anemones from habitat destruction, the Japanese government has listed them as a national monument.

After a bounce dive to see the anemones for ourselves, we worked our way up the reef slope, ticking off nudibranchs every few meters. The most common nudis in Tanabe (and in all of Kinki) are 2cm long Japanese Chromodoris (*Hypselodoris festiva*), an endemic species that is so prolific

that local “branchers” don’t pay them a second thought. But as a first time visitor to the region, I could not help pausing now and then to admire

Another species that we bumped into, both here and later in the trip, was a many-lobed *Ceratosoma* (*Ceratosoma tenue*), a whopper of a nudibranch that reaches 12cm long and ranges all the way from Japan to tropical Africa. This variably-colored species can be identified by the wide lobes on its mantle and a poisonous, chemical-filled horn positioned just

In Tanabe, we also ran into a spectacularly colorful nudibranch—the lovely *Miamira magnifica*. This flamboyant animal is highly variable in color, but the one we found lived up to its name—magnificent!

On our second day, the wind picked up, but we were still able to do shore dives in one of Tanabe’s protected bays. After adding several more nudibranchs to the trip list, I went looking for clouded salamanders in a muddy pond close to the dive site. Underwater shots were impossible in the murky water, but we



Endemic to Japan, clouded salamanders living close to the sea in Kinki have evolved to tolerate saltwater.





Pikachu nudibranch (left), nicknamed for its resemblance to the Pokémon character, and rare deep-water nudibranch (above) (*Kalinga ornate*) at Shirahama



managed to get some nice portraits on the bank. Clouded salamanders are endemic to Japan, and the ones in Kinki are particularly noteworthy because they live so close to the ocean that they have evolved to become somewhat tolerant of saltwater. Perhaps one day, this meek little animal will be the ancestor of the first marine amphibians!

Shirahama

Before following the coast westwards, we zipped back to Shirahama for a day of diving. First up, we dropped in on one of Kinki's few accessible wrecks—a small tugboat crawling with more nudibranchs, including *Thecacera*

pacifica, a cute little slug that the locals call "Pikachu" because of its resemblance to the Pokémon character of the same name. The wreck was also home to a handful of beautiful dragon morays that were more than happy to pose for the camera.

Between dives in Shirahama, we ran into a friendly researcher who was carrying a jar containing a large, rarely seen, deep-water nudibranch. The captive mollusc was destined for a local university for study. After an animated conversation in Japanese with our divemaster, the researcher smiled and handed over the jar, which we took with us on the following dive. When we reached the sea



Long-nosed hawkfishes are abundant on Kinki's reefs (above); Dragon moray eel at Shirahama (left)





Okenia hiroi nudibranch (above), painted frogfish (right) and pea-sized clown frogfish (left) at Kushimoto

floor, our divemaster released it so that we could get a few shots of a species that would otherwise be impossible to see. The blobby-looking nudibranch was a sand-dweller, which immediately tried to dig its way to freedom, but the luckless mollusc was soon recaptured and returned to its owner as intended.

The concept of a canned nudibranch shoot was rather comical but what impressed me about the experience was how willing everyone was to go out of their way for us. Everywhere we went, we were treated like royalty. This rang true at every dive shop, every hotel and every restaurant that we visited. Apparently, Japanese hospitality knows no bounds!

Kushimoto

Our next stop was at a small fishing village on the southern coast of Kinki called Kushimoto. Here, the reef was relatively rocky, but the dive sites were packed with schooling fish, which I would have loved to photograph if only I had enough time to squeeze in a wide-angle dive or two. Not surprisingly, the macro life was also excellent. Noteworthy nudibranchs included *Okenia japonica* and *Okenia hiroi*—both endemic to Japan and each smaller than a grain of sushi rice.

Kushimoto turned out to be an excellent place to photograph frogfishes. We stumbled upon at least three species on a single dive, but my favorite was a miniscule, orange and white clown frogfish about the



Okenia japonica nudibranch with eggs at Kushimoto



Diver with large John Dory fish (left) at Owase artificial reef (above); Crinoid squat lobster in feather star at Kushimoto (right)

size of a pea.

Kushimoto also delivered numerous crinoid squat lobsters that one would normally expect to see in the tropics. I guess that in the summer, they would not seem so out of place, but it is a strange feeling shooting tropical species while wearing a drysuit, hood and bulky neoprene gloves.

Owase

By our fifth day, my tired eyes needed a rest from the wonderful world of Japanese super-macro life, so we headed to a renowned wide-angle dive site near a town called Owase.

On the way, we stopped at Hashigui-
iwa Rocks where the coastline has

eroded into a series of dramatic spires said to resemble bridge pillars. Legend has it that a Buddhist teacher named Kobodaishi created the spires in a single night in order to win a bet with a fallen angel.

The dive site at Owase is actually an artificial reef made of metal beams that are dripping with hard and soft corals of every shape and color. None of the locals remember exactly how long ago the reef was created but they estimate it was erected in the late 1960s. The sheer biomass of growth on the manmade reef



has rendered the underlying structure completely unrecognizable—a shining example of the ocean's ability to flour-



DIVE OPERATORS

There are lots of dive shops along the coast of Kinki. These are the ones we dove with. Some speak a little English but the easiest way to arrange your dives is to use Japan Diving Experience, which (for a small fee) can arrange all of your diving and accommodation before arrival and be available by phone in case you have any communication problems while on the ground.

BOOKING ASSISTANCE
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japan-diving-experience.com

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Shirahama El-mar
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OWASE AREA
Sea Dream OWASE
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48 different sea slugs in 12 dives and seen countless more, which were either too miniscule or too awkwardly positioned to photograph, plus a great selection of endemic fishes and crustaceans. For macro fans, Kinki clearly deserves to be on the international diver's bucket list, especially for nudibranch geeks like us! ■

Andy Murch is an award-winning photographer, marine conservationist, author, journalist, explorer, dive instructor and submarine pilot based in British Columbia, Canada. He is the founder and a trip leader of Big Fish Expeditions at: bigfishexpeditions.com.

Blue dragon nudibranch (above) at Shima; Herman's Bornella (top right); Ornate Cadlinella (right); Cute little Japanese lumpfish (left) at Shima

Shima

After Owase, we had just enough time to squeeze in one more dive destination. For the sake of diversity, we headed to Shima in the extreme northeast of Kinki where corals give way to gently swaying kelp beds. Many of the fishes and invertebrates at Shima are close cousins of species that occur in Western Canada and Alaska, but with a subtly different Japanese flair.

We picked Shima in particular, because we had heard that it is a great place to photograph Japanese lumpfish, and we were not disappointed. Lumpfish (or lump-suckers, as they are sometimes called) are tiny balls of cuteness. Their fins are so small in comparison to their bodies that they are terrible swimmers, but their modified pectoral fins form a suction cup that helps them stick to rocks or kelp fronds when the surge tries to push them around.

Lumpfish come in many colors depending on their environment. We saw a number of different flavors, but the prettiest ones were a deep pink that stood out against the kelpy background.

Like elsewhere, there was no shortage of gorgeous little sea slugs. Many were species one can see throughout the Indo-Pacific, but there were a few rarities too.

I spent my final minutes trying to photograph a blue dragon nudibranch (*Pteraeolidia cf semperi*). It was challenging shooting macro nudibranchs in the surge, but I eventually nailed some relatively sharp pictures and retired to the dive boat for the short ride back to land.

Afterthoughts

After a final tally, we had photographed



ish with some help from forward-thinking humans.

Large groupers and spiny-looking John Dories swam confidently in and out of the open spaces as if they owned the place, which of course they did. I have always wanted to photograph some John Dories, so these extremely tame ones were a nice addition to an already impressive dive spot.



LEFT TO RIGHT – ROW ONE:
 Three lobed t-bar nudibranch (*Ceratosoma trilobatum*);
 Collingwood's Chromodoris (*Chromodoris collingwoodi*);
 Geometric Chromodoris (*Chromodoris geometrica*);
 Yellow-edged Dendrodoris (*Dendrodoris arborescens*)

ROW TWO:
 Denison's Dendrodoris (*Dendrodoris denisoni*);
 Dark Margin Doriprismatica (*Doriprismatica atromarginata*);
 Ornate sap-sucking slug (*Elysia ornata*);
 Flabellina sp. (*Flabellina sp.*)

KINKI – COMMON NUDIBRANCHS:

Herman's Bornella
 — *Bornella hermanni*
 Ornate Cadlinella
 — *Cadlinella ornatissima*
 White-edged Ceratosoma
 — *Ceratosoma sp.*
 Many-lobed Ceratosoma
 — *Ceratosoma tenue*
 Three lobed t-bar nudibranch
 — *Ceratosoma trilobatum*

Collingwood's Chromodoris
 — *Chromodoris collingwoodi*
 Geometric Chromodoris
 — *Chromodoris geometrica*
 Yellow-edged Dendrodoris
 — *Dendrodoris arborescens*
 Denison's Dendrodoris
 — *Dendrodoris denisoni*
 Dark Margin Doriprismatica
 — *Doriprismatica atromarginata*
 Ornate sap-sucking slug
 — *Elysia ornata*

Flabellina sp.2
 — *Flabellina sp.2*
 Alder's Doris
 — *Goniobranchus alderi*
 Gold and purple Goniobranchus
 — *Goniobranchus aureopurpureus*
 Oriental Goniobranchus
 — *Goniobranchus orientalis*
 Goniobranchus sp.
 — *Goniobranchus sp.*
 Brown-lined paper bubble
 — *Hydatina physis*

LEFT TO RIGHT - ROW THREE:
 Alder's Doris (*Goniobranchus alderi*);
 Gold and purple Goniobranchus
 (*Goniobranchus aureopurpureus*);
 Oriental Goniobranchus
 (*Goniobranchus orientalis*);
 Brown-lined paper bubble
 (*Hydatina physis*)





KINKI – COMMON NUDIBRANCHS:

Robe hem Hypselodoris — <i>Hypselodoris apolegma</i>	Ornate Kalinga — <i>Kalinga ornata</i>	Cherry blossom nudibranch — <i>Sakuraeolis sakuracea</i>
Japanese Chromodoris — <i>Hypselodoris festiva</i>	Magnificent Miamira — <i>Miamira magnifica</i>	Kava's Tambja — <i>Tambja kava</i>
Spotted Hypselodoris — <i>Hypselodoris maculosa</i>	Hiroi's Okenia — <i>Okenia hiroi</i>	Gloomy nudibranch — <i>Tambja morosa</i>
Triton's Hypselodoris — <i>Hypselodoris tritoni</i>	Japanese Okenia — <i>Okenia japonica</i>	Variable Tenellia — <i>Tenellia diversicolor</i>
White's Hypselodoris — <i>Hypselodoris whitei</i>	Painted Phyllidia — <i>Phyllidia picta</i>	Pikachu nudibranch — <i>Thecacera pacifica</i>
Purple-tipped Janolus — <i>Janolus toyamensis</i>	Protæolidiella atra — <i>Protæolidiella atra</i>	Black-spotted Thecacera — <i>Thecacera sp.1</i>
	Blue dragon nudibranch — <i>Pteraeolidia cf semperi</i>	Splendid sap-sucking slug — <i>Thuridilla splendens</i>
	Ornate batwing slug — <i>Sagaminopteron ornatum</i>	Purple sap-sucking slug — <i>Thuridilla vataae</i>

LEFT TO RIGHT – ROW ONE:

Robe hem Hypselodoris (*Hypselodoris apolegma*);
Spotted Hypselodoris (*Hypselodoris maculosa*);
White's Hypselodoris (*Hypselodoris whitei*)
Purple-tipped Janolus (*Janolus toyamensis*)

ROW TWO:

Painted Phyllidia (*Phyllidia picta*);
Protæolidiella atra (*Protæolidiella atra*);
Ornate batwing slug (*Sagaminopteron ornatum*);
Cherry blossom nudibranch (*Sakuraeolis sakuracea*)

LEFT TO RIGHT – ROW THREE:

Gloomy nudibranch (*Tambja morosa*);
Variable Tenellia (*Tenellia diversicolor*);
Splendid sap-sucking slug (*Thuridilla splendens*);
Black-spotted Thecacera (*Thecacera sp.1*)

An underwater photograph of three whales swimming in clear blue water. The whales are dark grey with lighter patches on their sides. They are swimming towards the right of the frame. The water is very clear, and the sunlight creates a shimmering effect on the surface.

Canary Island's Tenerife

— *Where the Highest Mountain
Meets the Deepest Sea*

Text by Claudia Weber-Gebert
Photos by Sergio Hanquet



CLAUDIA WEBER-GEBERT



CLAUDIA WEBER-GEBERT



CLAUDIA WEBER-GEBERT

Los Cristianos on Tenerife, Cayman Islands (above); The island has strange volcanic shapes (top right) and a rugged, rocky coast with dramatic surf (right). PREVIOUS PAGE: Pilot whales at Tenerife

Spain's highest mountain lies off the continent of Africa and is surrounded by the deepest chasms of the Atlantic Ocean—what a unique place! And the islands where the mountain is located are just as special. We are talking about the Canary Islands, which lie in the Atlantic off the coast of Morocco.

They are of volcanic origin, the evidence of which is still clearly visible and often bizarre. Spain's highest peak, Teide-Pico Viejo stratovolcano, reaches 3,718m (12,198ft) and is found on the island of Tenerife. It attracts a lot of tourists, nature lovers, rest seekers and

folks on weekend getaways. Varied landscapes also offer the best conditions for other sports. For many Europeans, the island is also the ideal place to spend the cold winter months. The mild climate in the winter here draws one straight to it.

And precisely because of the climate, Tenerife is also becoming more interesting to divers. While the political situation in various popular diving destinations in other parts of the world is scaring off a lot of dive travelers, the friendly Canary Islands can be reached from Germany (where I am based) in four to five hours with airlines offering cheap fares. So for many, this destination is suitable for short breaks throughout the year.

Arona

The Arona region is located in southwes-



CLAUDIA WEBER-GEBERT

tern Tenerife. In February 2018, I was invited by the Arona Son Atlántico ocean festival to take a closer look at this area. Accompanied by underwater photograp-

her Sergio Hanquet, I spent some exciting days on the island.

One of the most interesting areas, where most of the dive centers in the Canary



SERGIO HANQUET

Large school of silvery yellow bastard grunt fish (called *roncadores* by the locals)

Islands are found, is the southern part of the island, especially near the port of Los Cristianos and the Marina de Las Galletas. In particular, the area of Punta de la Rasca is recommended, because in this area, about 30 different dive sites can be found. Here, you can dive by boat or from the shore.

Sergio is Belgian but has been living in Tenerife for over 30 years. He knows the dive sites like the back of his hand and has published two books on them (which are only available in Spanish): *Bucear en Canarias 1* and *Bucear en Canarias 2*. These books detail 400 dive sites as well as the flora and fauna that can be found in this region.

Atlantic location

The exposed location of the island of Tenerife in the Atlantic Ocean brings with it a lot of unique aspects. Because the coasts of the islands drop steeply—up to 4,000m (13,123ft)—many marine creatures from the deep and pelagic species from the open ocean can be sighted here. Ocean currents in the Atlantic ensure that water temperatures do not drop below 18°C in the winter months. As a result, the fauna is a mix of Mediterranean and subtropical. The main characters are the large stingrays (called *chuchos* by the locals) as well as angelsharks, sea turtles and huge swarms of silvery yellow bastard



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Large stingrays at Tenerife are called *chuchos* by the locals.

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 An advertisement for Buddy Dive. At the top left is the Buddy Dive logo. Below it is a photo of three divers in wetsuits and gear walking on a sandy beach towards the ocean. The text reads: "Your Buddies Spring Fling". Below that, it says: "Get excited and book your spring break to Bonaire! Pick your favorite resort and enjoy the best specials. Check www.buddydive.com/springfling for details." At the bottom, there are logos for Buddy Dive Bonaire, Caribbean Club Bonaire, and TLMAR Bonaire. Contact information is provided: "International Reservations: +599 717 5080", "Call Toll Free US/Canada: 1-866-GO-BUDDY", and "WWW.BUDDYDIVE.COM/SPRINGFLING".


SERGIO HANQUET

grunts (called *roncadores*).

Even in bad weather, there is always a chance to do shore dives in one of the sheltered bays and marvel at the island's macro world. The waters in the

Arona region invite you to dive into a diverse underwater landscape at various sites.

Punta de la Rasca is the most popular diving area of Las Galletas, Playa de Las Américas

and Los Cristianos. In general, the dive centers do two dives a day, and there is also the option of doing a night dive.

The most well-known dive sites include El Bufadero (15-26m), the wrecks of El Condesito (18m) and El Meridian (30m), La Cueva de las Morenas (18-31m), Los Roncadores del Faro (15-21m), La Cueva de Ali Baba (25-42m) and El Arco de Coral (25-40+m). The rocks slope steeply, reaching nearly 50m in depth just a few meters from shore, and visibility in the water is usually around 30m. The diversity of habitats brings forth a great variety of fauna, including an infinite number of invertebrates, bottom-dwelling fish (individually or in schools), or large fish that suddenly emerge from the deep blue sea. At a depth of 35m, there are beautiful black corals, which can be found protruding upward like branches from the

ground and rocky outcrops or hanging in caves.

In addition to the many species of fish, lovers of invertebrate animals will also find sponges, anemones, fireworms and squid as well as various types of shrimp, crabs, colorful nudibranchs and starfish. And for the experts who like to explore with a magnifying glass, there are scary-movie aliens—ghost crabs that hide in the algae!

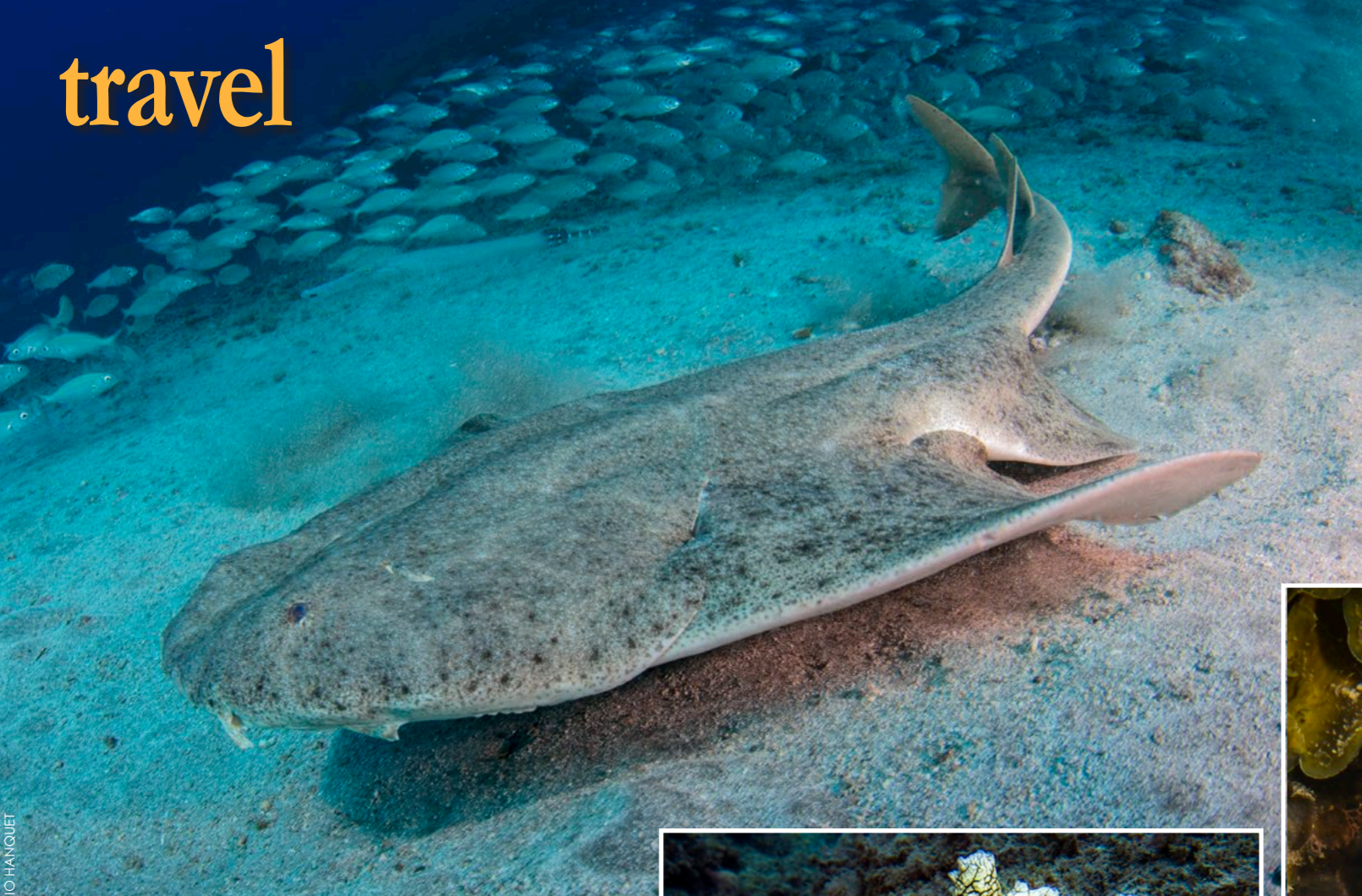
Practical information

Tenerife is a tourist destination and divers come from many European countries. The staff of various dive centers speak a variety of languages, including Spanish, English, German, French and other European languages. The average price for a dive is about EU€30 (US\$34), or EU€25 (US\$28) with the purchase of a package of six dives. There are excellent conditions for all types



SERGIO HANQUET

Diver on reef covered in black coral (top left); Close-up of a fireworm (top center); Close-up portrait of an eagle ray (above); Pair of green sea turtles (left) at Tenerife



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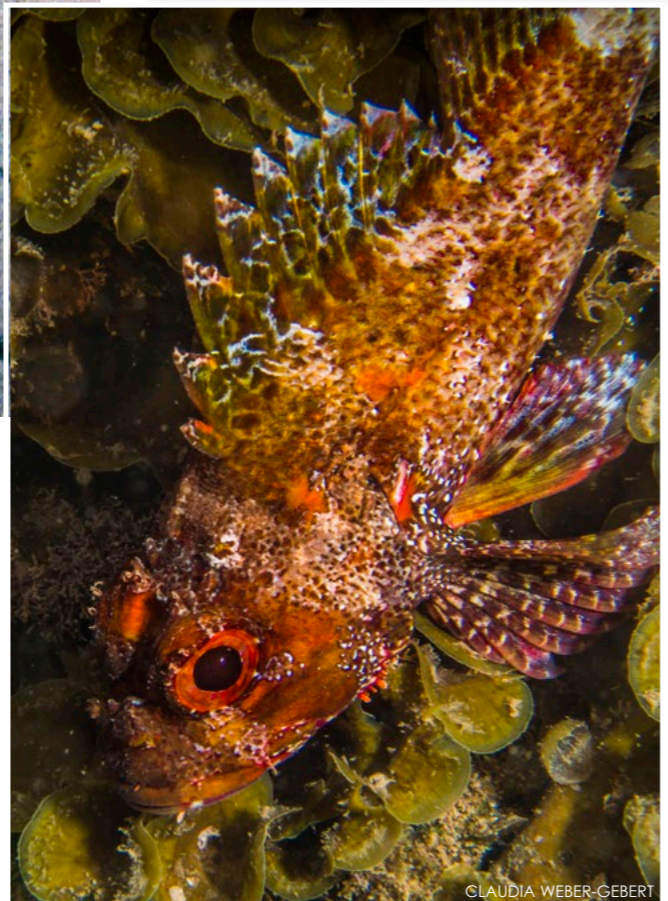
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Angelshark (top left); Nudibranch (above); Sculpin fish (right) is a bottom-dwelling fish; Black moray eel at La Cueva de las Morenas (far right)

of underwater photography. As for accommodation, dive centers can organize your lodging in advance. There are many types of accommodation, including hotels, apartments and rooms in cottages. As for transportation, one can easily and cheaply rent a car at the airport upon arrival.

Diving takes place all year

round. The trade winds are the prevailing winds. The south of the island is protected, which is conducive for diving and navigation. There are several dive centers in Los Cristianos and Las Galletas. We dived with Rincón de Arona.

A unique dive

La Cueva de las Morenas (The

Cave of the Moray Eels) is a dive on a 30m long hill and is home to a large population of moray eels. In this place, one can observe the three most common species in the area—brown moray eels, black moray eels and tiger moray eels—all of which may sometimes share the same hole. The fauna is rich here and many species allow one

to approach them with ease. In fact, many fish have made it a habit to accompany their human visitors during the dive.

In the spring and summer, it is common to see some pelagic species like the yellowtail horse mackerel, the blue triggerfish or the peto fish. We paid a little attention to the cracks and crevasses of the rocky

reef, discovering a myriad of small invertebrates—especially shrimps, anemones, sea squirts and slugs. On the sandy bottom, which is 32m deep, there is an significant colony of sand eels. It is also an excellent place to watch rays.

The journey to the dive site takes 10 minutes from the port of Los Cristianos and 25 minutes

Tiger moray eel at La Cueva de las Morenas





SERGIO HANQUET



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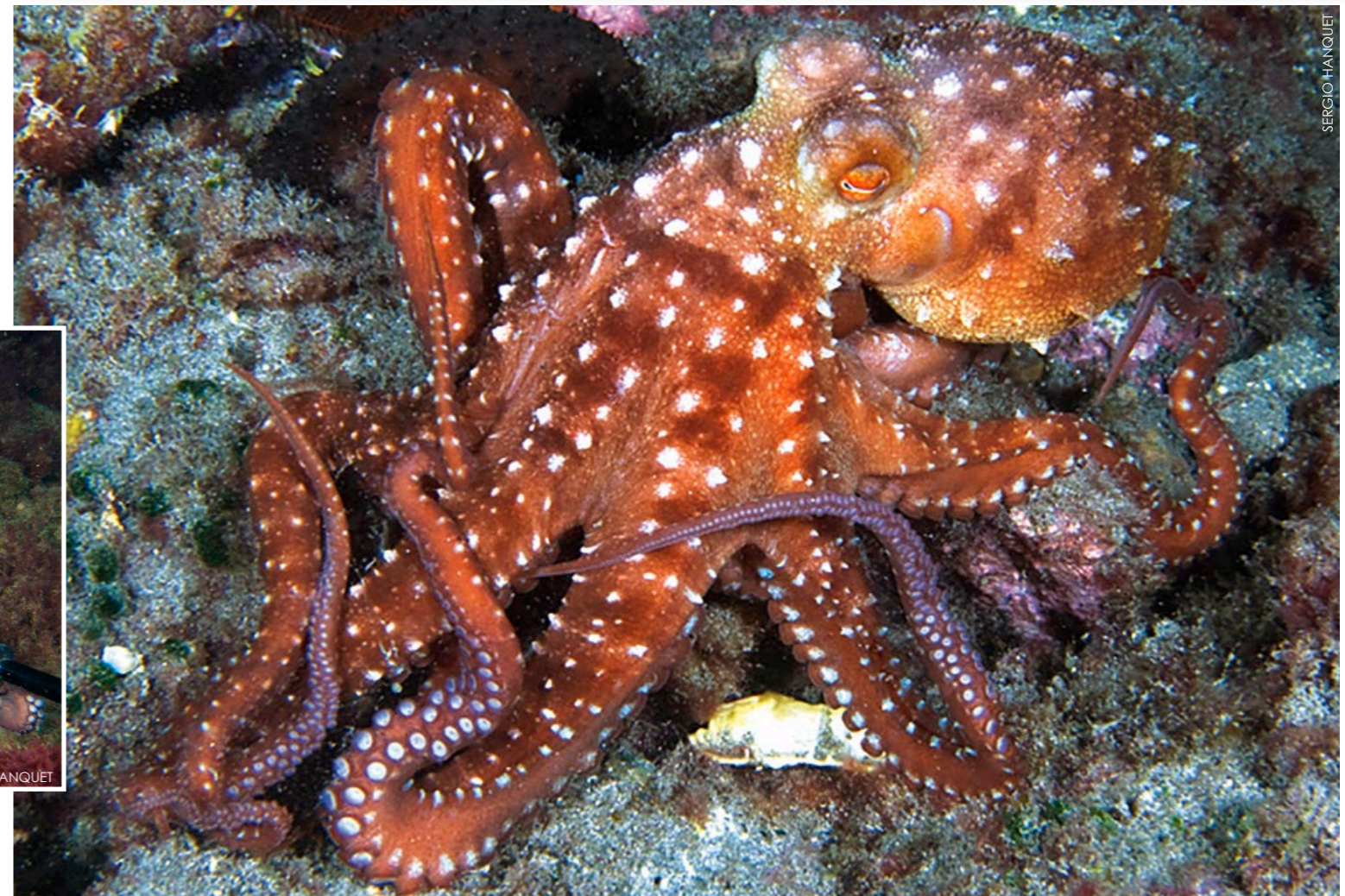


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THIS PAGE: Octopuses and frogfish (left) are common but difficult to spot due to their clever camouflage; Cheeky octopus grabs a camera from a diver (above).

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from Las Galletas or Puerto Colón. The dive time is 30 minutes, the difficulty level is zero and currents are normally absent.

Octopuses and frogfishes

On my first dive together with Sergio and a Spanish photogra-

pher from Madrid, Fernando de la Torre, we discovered an octopus that had decorated its cave entrance with many beautiful shells. One after the other, we photographed the little fellow, which actually did not want to get out of its hole. Finally,

Fernando approached the octopus with his action camera. This rig aroused the interest of the octopus, and with a quick movement, it clasped the camera with its arms. In this moment, one could easily underestimate the power that such an animal has—

but it really did not want to let go. Incredibly, the octopus turned the camera around and began to pan the area. We all laughed until our masks were full of water.

Spotfin frogfish (*Antennatus nummifer*) are common but hard to find here due to their small

size and excellent camouflage. They live in caves, cracks and under cornices—usually in reverse position. Frogfish are very bad swimmers and move with small jumps. Their coloring varies greatly, depending on the environment in which they are located.

The white-spotted octopus (*Callistoctopus macropus*) can be found in the warmer waters of the Atlantic Ocean and the Mediterranean Sea. As a master of camouflage, it can also be difficult to find.





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Marine mammals

Due to its location in the open Atlantic Ocean, whales and dolphins can be seen in the seas around Tenerife. These marine mammals hunt in the deep waters surrounding the island or just pass through the area during their migrations. Fin whales are seen more often than humpback whales or orcas.

On a boat trip, one always gets to see a variety of dolphin species, especially the resident species known as pilot whales. Around Tenerife, there is a population of about 400 of them, which dive to depths of 600 to 800m to hunt for squids and sardines.

In the Canary Islands, whales are protected, and there are rules for responsible observation so as not to disturb them. These

rules prohibit approaches less than 60m from the whales, and swimming or diving with them is not permitted (Royal Decree 1727/2007).

That is why whale watching is offered to tourists. Whale-watching tour operators are specially trained and require state approval before providing services. Diving and swimming with whales and dolphins is only possible with special permits from the Spanish government.

Whale-watching

It is definitely worth it to book a whale-watching excursion! One should definitely choose a provider with state approval. This certification can be verified by a blue sticker. There are a lot of "pirates" who do not follow the whale-watching rules and end-

anger the animals.

These rules require, for example, that boats and people stay at least 60m away from the animals; only a maximum of three boats may approach a group of whales; and one should behave calmly and avoid making

noise in their presence. There is a good reason for these rules. The animals hunt for food at great depths and may sprint up to 40 km/h during their hunts. When they return to the surface, the pilot whales need rest breaks to decompress.

As divers, we are familiar with this principle. After a difficult deep dive, we have to rest, and no one thinks about running a marathon. The same applies to the pilot whales. They should therefore not be disturbed nor startled.

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The volcano, Teide-Pico Viejo, towers over Tenerife (above); Rocky reefscape of underwater Tenerife (left); Location of Tenerife on regional map (lower left)

make up the Canary archipelago, Tenerife stands out for the ubiquitous presence of Teide. The volcano Teide reaches 3,718m, rising 7,500m

sight of the volcano. Rather, it is the opposite feeling that overcomes us—an overwhelming awe of its magnificence. If you go there, please do not forget that it is a high mountain of considerable altitude with the associated risks. Fans of adventure sports will enjoy plenty of recreational activities here, such as climbing, mountaineering, caving in volcanic tubes and canyoning. ■

Claudia Weber-Gebert is an advanced diver, underwater photographer and dive writer based in Germany.

from the seabed. It is the roof of Spain and the largest peak of the Atlantic Ocean. It is also a national park and was declared a World Heritage Site by UNESCO in 2007. It owes its name to a Guanche word, *Echeyde*, with which the indigenous people of the Canary Islands identified the presence of evil gods or hell.

But this has nothing to do with the feeling that seizes us today at the

boats and delighting boat guests with acrobatics in the bow wave. Dolphins do this voluntarily and are therefore not disturbed by the presence of humans. But even so, boats must not chase after the dolphins if the animals want to swim away from the boat.

Sometimes, you can see the very shy beaked whales, which live in the waters of the Canary Islands throughout the year, especially near the small neighboring island

of El Hierro. And with luck, you might also see the great whales, such as the humpback whale, fin whale, minke whale or sperm whale, which travel north in the spring and towards the Equator in the fall.

A final highlight

The volcano, Teide-Pico Viejo, is definitely worth a visit! Of the seven islands that



CLAUDIA WEBER-GEBERT

Pilot whales are often seen on whale-watching excursions

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Edited by
Rosemary E. Lunn

Equipment



FE Gulper

This capacious canteen holds 1.5 (imperial) pints or 32 oz of liquid. Fourth Element states that this pro-grade stainless steel vacuum flask will keep iced drinks cool for up to 24 hours, and hot drinks suitably toasty for up to 12 hours. Thought has gone into the screw-on/screw-off BPA-free lid. Once you remove the lid, the canteen has a large opening that makes filling or pouring a doddle (you will not need to worry about accidental spills). The gulper mouth is designed so you can also sip fluids from the open canteen. The screw thread is rounded-off and kind to the lips. There is a second alternative for taking on fluids. The lid has a twist-and-sip valve with such a wide aperture you can fill your flask with rustic soup and not worry about the drinking stem getting bunged up. It also means that washing and cleaning the lid is very easy too. FourthElement.com

TUSA HyFlex fins



TUSA has considered the travelling diver and designed its HyFlex Switch Pro fins so that you can remove the "20% stiffer blade" from the foot pocket with a 3mm Hex or Allen key. It will make packing easier, but let's hope that TUSA used 316 marine-grade stainless steel for the screws, otherwise it could

be a rust issue. The blade is made from a polyurethane material (which is softer than rubber or plastic); therefore, it should respond faster. This fin comes with a one-size-fits-all bungee fin strap. Available in three colours (Black, Transparent / Orange, Transparent / Yellow) and two sizes (M, L - XL). Tusa.com

Anchor Dive Light 189

This modular light has been designed to work with existing Anchor Dive Light canisters and video lights. It has seven functions—an intense 8° spot beam, wide "cool" beam, wide "warm" beam, Red, UV, strobe and SOS. Five of the main functions have three different power settings (25%, 50%, and 100%). The rechargeable Lithium battery torch has a six-hour charge time, and a maximum burn time of 240 minutes at the 25% power level. (You have the option of buying additional batteries for liveaboard diving). The aviation-grade aluminium body is lightweight (approximately 300g / 10.5oz), durable and has a 100m (328ft) depth rating.

Anchordivelights.com

Horizon SCR

rEvo unveiled its latest rebreather—the Horizon—at the 2019 Boot Show. This recreational, semi-closed nitrox rebreather uses electronic technology to deliver a constant flow of nitrox (EANx 30 - 99%, minimum flow rate: 5 lt/min, maximum flow rate: 25 lt/min). The Horizon looks as though it will be very travel-friendly because it is compact and weighs in at just 14.8kg. More importantly, it does not require a bespoke-sized cylinder, unlike the Dolphin, Ray and Explorer. Instead, the compact unit has been designed to be dived with standard side-slung or stage cylinders, and the two 1kg scrubber canisters use 797 sorb, which is available in most places. A gag strap for the mouthpiece also comes standard.

Mares.com



UK Aqualite PRO S

In 2012 Underwater Kinetics launched a compact video light called the Aqualite eLED. This rechargeable (USB or mains) torch has now had a bit of a make-over and the burn time had been improved. Whilst the burn time duration has not changed much on full and half power, you do get an extra five hours on the low setting. (From 8 to 13 hours). Like its predecessor, this torch also delivers 600 Lumens on high power. What is new is the 20° spot beam, therefore the 181 g / 6.4oz Aqualite PRO S can also be used as a spot focusing light too. 100m / 328ft depth rating.

UWKDive.com



Brace yourself

A Bracenet is made from recovered ghost fishing gear. There is clear provenance as to where the net came from, because the manufacturer works with the NGO Healthy Seas. The creative team picks over the raw recovered net, and selects what can be used for bracelets. (The remaining raw net is sent to Slovenia to be processed and regenerated into reusable ECONYL yarn). Ten percent of the money from each bracelet sale goes back to Healthy Seas to fund future ghost-fishing projects. Currently there are eight different bracelets, representing eight seas: Adriatic, Atlantic, Baltic, Bering, Black, North Pacific and Red Sea. Each bracelet is fastened by a magnetic clasp. Bracenet.net





Don't get Lost at sea

Diving brings many joys but it also comes with a few risk factors, which we can mitigate by adopting safety protocols and mind-sets. In this extended feature, we take a closer look at measures that can be taken to avoid being lost at sea.

Getting lost at sea is a basic fear most divers can relate to. There is a whole genre of movies about being lost at sea in some shape or form, including the really bad film, *Open Water*—the 2003 drama loosely based on the much-publicised case of the American couple, Tom and Eileen Lonergan, whom most divers active around the turn of the century have heard of. The couple disappeared off the Great Barrier Reef after their dive boat accidentally left them behind in open water, because the crew failed to take an accurate headcount. It was not until two days later that the pair was discovered to be missing, after a bag containing their belongings was found on board the dive boat. The skipper of the dive boat was charged with unlawful killing but later found not guilty. However, the operator was fined after pleading guilty to negligence and went out of business.

There can be no doubt that the operator neglected its duty of care, with tragic consequences.

While the Lonergan case prompted authorities, in Australia and elsewhere, to introduce much tighter regulations, including the requirement that both the captain and another crew member must independently confirm each headcount. But no system is infallible, and even the most diligent human is prone to making a mistake. The responsibility for our own safety always rests with ourselves, and we should never assume that others will step to cover our shortcomings in that regard. We should always be safety-conscious and take reasonable measures to prevent ending up in a precarious situation.

Being at the mercy of a strong current, which may pick up with little or no prior notice under water or on the surface, can be a quite discomforting, if not an

outright terrifying experience. Even on a shore dive, you can get swept up by a current, which is too strong to fight, and end up being swept along, unable to make it back on your own. So, now what do you do? Has somebody been keeping an eye on you from the beach (or boat) who can provide some assistance, or raise the alarm? Did you bring a SMB (a.k.a. safety sausage), which you can deploy?

And in particular, if you are diving at night in hazy or foggy weather where there are currents or tides, or in remote areas, what means of communicating with your dive boat and relaying your position are you equipped with in case you get lost or cannot make it back on your own?

Thanks to the ingenuity of various entrepreneurs, a range of affordable and small personal electronic devices have been on the market for some years, and still more refined models are being developed. Some are simply VHF radios or satellite phones in a waterproof housing depth-rated for diving. More dedicated devices comprise AIS or DCS transmitters, which send a message or distress alert to vessels within range. But these units have no voice transmission or personal locator beacon (PLB) that alerts search and rescue services by transmitting a coded message via the COSPAS-SARSAT global satellite system to the nearest rescue co-ordination centre.

The use of some systems require a radio license, some do not. Some systems are free, while others require an annual subscription to private companies. Some systems are only legal in some parts of the world, or have varying local restrictions imposed, limiting their functionality.

Confused? You are not alone.



Text by Christiane Linkenbach
Translated by Peter Symes

As a diver, how does one rescue oneself when in distress? Call rescue services? How do the different emergency frequencies work? Which one is the most efficient for divers?

Diver in distress?

Yes, divers get into sticky situations too, and more frequently than one might think or read in the media. In particular, it happens whenever divers surface too far away from the dive boat, because they got caught in a current. Adrift alone, or with a buddy, divers find themselves in the same life-threatening predicament as sailors falling overboard from a boat that just keeps sailing away.

It has been the sailing industry that has long since looked into safety measures and devices and come up with what is known as “MOB transmitters” (MOB: man-over-board), some of which are also now being made as depth-rated models for divers.

DISCLOSURE: Christiane Linkenbach is the deputy director of Seareq, who manufactures the Enos personal safety devices. This background article endorses no specific brand of equipment or product. There exists no financial arrangements between the magazine and Seareq.



CHRISTIANE LINKENBACH

Emergency Transmitters for Divers

— *What You Know Could Save Your Life*

Old wine in new bottles?

These transmitters provide divers with some degree of peace of mind, because what is good for sailors must also be useful for divers, and one need not be concerned with obtaining a licence and undergo a lot of training to operate them. After all, these devices have been in use for

years. It is just that divers are not usually given any training or much insight into sea rescue procedures and the use of marine radios. A maritime radio licence is not required to go diving. But ignorance can kill here too.

Imagine an average diver, Joe, who visits some dive expo looking for inspiration for his next dive

trip. He sees all these seductive presentations of paradisiacal resorts and alluring waters when he suddenly finds himself in front of a poster depicting a diver lost at sea. The advert cleverly targets a latent fear, and Joe is drawn to take a closer look at the advertised rescue system.

The gadget is labelled with vari-

ous known certification markings such as CE, FCC and EMV, along with some other more or less familiar symbols, which is comforting. It looks trustworthy. It is handy, small, well-built and capable. The sales representative comes up to Joe, all smiles, and relates how he once resurfaced far from the boat himself and understood the fear.

But because he had this gadget, he was soon safely back on the boat—and Joe should always wear one too. Joe is not quite sure what to make of the technical specifications but feels reassured that it would be good insurance against being lost at sea, and his worries are put to rest.

This is, of course, a made-up



PIXABAY

Dangerous presumption

Every vessel? Not quite. Let us have a closer look at what really happens when a personal device is activated and how a captain of a commercial vessel, which may be transiting beyond the horizon, in all likelihood, would react. Is it safe to assume that such a vessel would receive the distress call and turn around? Are they obliged to respond to any MOB alarm raised by leisure crafts, sailors, wind- or kite-surfers and divers? The notion that “they are obliged to come to your rescue” may suggest this is the case, underpinned by the fact that coming to the rescue at sea is mandatory. Under international maritime law, a skipper is obliged to provide immediate assistance within his or her means when he or she becomes aware of an emergency. This obligation is also stipulated in the International Convention on Maritime Search and Rescue.

But what does “within his or her means” imply?

While sales reps and customers may have their discussions

of what triggers an emergency response, they rarely consider the position of the rescuer who may have to provide assistance. First of all, the captain of a large ship—perhaps up to several hundred metres long—is primarily responsible for the safety of his or her crew and any passengers aboard, the vessel and its cargo, as well as his or her own life. Is it reasonable to assume that such a captain can just stop, turn around and provide assistance?

No, it is not. Considering the momentum of a heavy ship travelling at speed, it is quite unlikely the captain is able to assist most leisure water-sportsmen in distress. With a stopping distance of several nautical miles, it takes a good long while before a big vessel—say, a passenger liner, cargo ship or tanker—comes to a halt. Around busy or constricted shipping lanes, it may also be impossible for a big vessel to alter course due to risk of collision with other traffic. That is also why most other ships cannot easily stop either.

If the emergency takes place in less-frequented waters—say, south of Brothers Islands in the Red

Sea—a change in course may represent a rather low risk for the ship. However, it still takes considerable time before a freighter can turn about and make it to the drifting diver, because it must be slowed down early in order not to overshoot the diver. You never hear of such spectacular manoeuvres because they do not occur in reality.

Fuel versus rescue

Often, the captain is unable to turn around even if he or she wanted to. In many cases, ships are only carrying a precisely calculated amount of fuel, which does not allow for such a turning manoeuvre. Without required reserves, it could leave the ship short of fuel to reach the next port. Shipping has become highly competitive, and time constraints are tight. In order to carry as many containers as possible, the amount of fuel carried is precisely calculated and will only include a small “storm reserve.” These calculations are so finely tuned that they even consider the different water densities of the various seas. The Mediterranean and

stereotypical scenario but one that often plays out in some shape or form—depending on the product, its operating principle and distress frequencies used, and of course, the competence of the seller as well as the previous knowledge of the diver. Being unfamiliar with some topic is something we can all relate to, so what do most of us do? We seek advice, which is all good, provided the guidance is trustworthy, accurate and relevant—and when it helps us to make the right decision and purchases that suit our needs. But how do we make heads or tails out of sometimes conflicting information and recommendations? And how do we see though the sales and marketing babble?

“They have to save you!”

So, the smooth-talking sales rep has managed to build a rapport with Joe by relating to him that

he too has experienced surfacing far from the boat. “Been there, done that!” he says and proceeds to describe his product in more technical terms. Some of the lingo Joe has heard before, but he does not quite understand how this gadget is the solution to the problem. Joe does not want to come across as ignorant, so he does not raise many questions. In between being lost in the technical jargon and mentions of AIS, DSC 70, EPIRB, Channel 16, PLB and 406 MHz, he also hears two reassuring sentences: “Everybody welcomes you here” and “They must save you.”

Cost

Next up is the question of price. What does such a device cost? Typically, prices are in the 150 to 400 USD/EUR/GBP range, which stings a little, but not a big price for a potential life-saver. And since sailors also use this device,

as the sales rep keeps emphasising, it is fair to presume Joe would be oblivious that his intended use of the device may not always be legal. That is too absurd to contemplate. Who cares about formalities when lives can be saved? Who would not rather commit an offence than die?

Saving lives and responding to distress always takes precedence over adherence to formalities and procedures, the sales rep reassures Joe, who ends up making a purchase. He leaves the booth feeling good and resumes looking at travel destinations, convinced that he now has a transmitter that will alert every vessel within X nautical miles about his predicament, in case he ever ends up in distress and needs to be rescued.

Are commercial shipping vessels obliged to respond to any MOB alarm raised by leisure crafts, sailors, wind- or kite-surfers and divers?



CHRISTIANE LINKENBACH

equipment



PIXABAY

the Red Sea are particularly popular with shipping companies, because the higher salt content provides more buoyancy, allowing for more cargo.

If a cargo ship south of Brothers Islands receives the distress call from a drifting diver, the captain may well be left with no choice but to carry on, as any action could deplete designated fuel reserves. Accordingly, it would thus not be “within the means” of the captain to provide direct assistance.

Rather, the captain would notify the nearest Maritime Rescue Coordination Centre (MRCC) of the emergency—in this case, the MRCC in Jeddah. The centre in Jeddah would most likely forward the alert to the Egyptian MRCC in Alexandria, which will coordinate the mission. Next, Alexandria would alert the Egyptian SAR (Search and Rescue) in Marsa Alam or El Quseir from where a boat would be dispatched. It sounds complicated, but it is the quickest way, because Jeddah is a lot farther from the scene of the accident than the two Egyptian cities (whose ports are too small for the largest vessels to approach). In any case, it goes to show how many unknown factors and how many elements are involved in a rescue operation.

In 2003, a Danish diver who aborted a dive on the *Thistlegorm* wreck was accidentally spotted some 20 nautical miles away by the crew of a freighter, after being adrift for 20 hours. Instead of stopping and turning, the captain radioed the

SAR in Sharm el-Sheikh, which immediately went to the designated location and rescued the diver. Thanks to the SAR station being relatively nearby, the rescue could be carried out in a targeted manner. The diver was in many ways unbelievably lucky: Not only was he spotted by chance but survived the ordeal unscathed, after drifting across the busy shipping route between Sinai and Shadwan Island at night without being hit by any of the many passing vessels.

Channel 16 and proper protocol

Often, captains are merely unable to assist in a rescue. But at other times, they are not obliged to—for example, when an emergency call is not placed according to protocol. It may sound unbelievable, but it is so and for a good reason: More than 90 percent of distress calls on various maritime radio frequencies are false alarms. It puts captains and rescue services in a dilemma when leisure craft skippers are simply testing emergency calls to see if they work. Others are simply misusing Channel 16, which is the marine VHF channel designated as an international distress frequency (156.8 MHz). Primarily intended for distress, urgency and safety priority calls, this frequency may also carry routine calls to establish communication before switching to another working channel, blocking the channel and preventing real emergency calls in the process.

The consequences of not following pro-



Emergency calls over Channel 16 only have to be responded to when the emergency call is issued in accordance with the prescribed protocol form—in other words, when the emergency caller knows and uses proper “radio language.”

protocol can be dire, because emergency calls on Channel 16 only have to be reacted to if the caller is unequivocally recognised as an “authorised user.” This happens automatically when the emergency call is issued in accordance with the prescribed protocol form—in other words, when the emergency caller knows and uses proper “radio language.”

Although communication is conducted in English, command of the language is not enough. In order to effectively broadcast on Channel 16, one is required to have at least an SRC (Short Range Certificate)—a licence for leisure crafts and water sports. Professionals must have an LRC (Long Range Certificate). During the course, the correct procedures and emergency call protocol regarding Channel 16 are taught.

If average diver Joe ever finds himself adrift at sea and calls a passing ship on Channel 16, without following protocol, he may find that the ship just continues on its course.

Depending on the incident, a distinction is made between an emergency report, an emergency message or a safety message. Even calling off a (false) alarm must be made following a specific protocol.

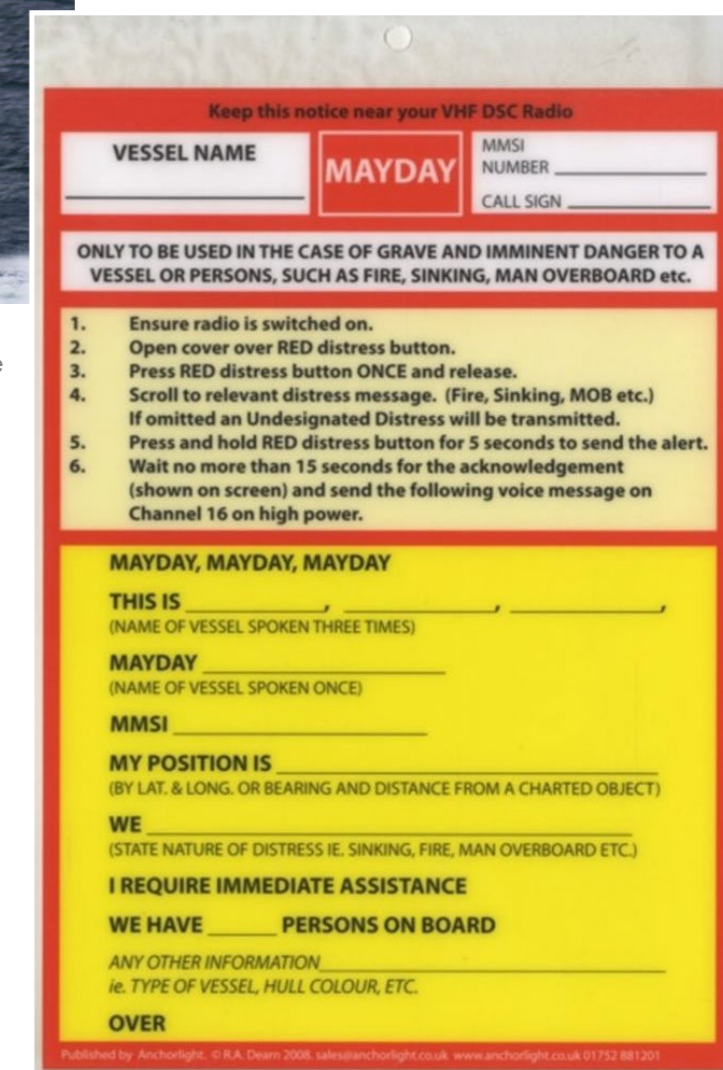
Just calling “Mayday, Mayday, Mayday” is not enough

Protocols dictate how an emergency is declared, how the caller presents him or herself and how the emergency is described. The call must include the

Transmitters

placing maritime radio emergency calls can be kept on or beside the radio. These aids also allow crew members without SRC to call for help. Having a radio licence does not matter. Placing the call correctly does, and just yelling “Mayday, Mayday, Mayday” into the ether will not help.

So, if Joe ever finds himself adrift at sea and calls a passing ship on Channel 16, without following protocol, he may find that the ship just continues on its course. The captain will likely consider him yet another prankster who clogs Channel 16 worldwide, and as a result, the nearest MRCC will not be notified. That a diver could be lost at sea for real is probably the last thing on the captain's mind, and



Stickers and cards listing the procedures for correctly placing maritime radio emergency calls can be purchased for a few bucks, euros or quid.





CHRISTIANE LINKENBACH

never be presumed they have one installed. For example, many dive centres work with different day boats, which are hired locally, such as dhonis, Philippine outriggers, or inflatable boats—none of which have an MMSI.

In order to fully appreciate the advantages and limitations of using DSC 70, it is therefore necessary for our average diver Joe to gain a deeper understanding of how the technology works and its limitations. Only, few divers do.

Our friend Joe has done his homework, and on his next dive trip, he arrives on location with his newly purchased transmitter with a DSC 70 button for closed loop function. Once aboard the dive boat, he asks the crew about their MMSI, and to his chagrin, finds that nobody has any idea about it—or worse, that there is no DSC 70 receiver on board.

AIS

Such scenarios apply equally to Automatic Identification System (AIS) frequency emergency trans-

mitters, which require special on-board receivers to receive the AIS signals. Originally, the AIS was developed as an “anti-collision system” for commercial shipping. Using the AIS frequency, vessels exchange information on their position, ship’s name, weight, load, speed and so on. Since 2000, the system has been mandatory for commercial shipping worldwide.

In order to receive information from other vessels, an AIS receiver is required. This is connected to a plotter (screen) on which a digital nautical chart is displayed. On this chart, every vessel is displayed in relation to other ships and constantly updated. Thanks to stationary terrestrial antennas, it is even possible to detect ships when they are still behind headlands or cliffs and not yet visible. Since the implementation of this system, the number of collisions at sea has fallen sharply worldwide.

The AIS industry is happy to suggest that AIS receivers are now installed on every ship. In doing

so, it relies on the International Maritime Organization’s (IMO’s) regulation that every commercial vessel must have AIS on board. In reality, that is not the case in every region of the world, because the IMO allows its member states so-called “national exemptions,” of which some popular dive destinations such as Egypt and the Maldives make use.

In the Maldives, cargo ships approach the port of Malé in a large arc and not through the atolls, and there are no terrestrial AIS antennas there. As a result, the Maldives government does not require AIS equipment aboard dive boats and dhonis. In Egypt, the government is protecting the fishermen, who operate as micro-entrepreneurs but cannot afford AIS. Therefore, in Egyptian territorial waters, AIS is allowed but not compulsory. Consequently, many dive vessels there are not equipped with an AIS system either.

AIS as an MOB alarm

Since AIS became compulsory

Uh-oh... where is the boat?

for commercial shipping, the AIS industry requested the IMO to also authorise the frequency for personal maritime rescuers, so the improved safety in seafaring could find its way into personal rescue. AIS MOB transmitters hit the market in 2010 and caused some hype among sailors. The royalty-free AIS frequency does not require an SRC, so sailors were able to equip their life jackets with an AIS transmitter. As the stations sold very well, the AIS industry was obviously quite pleased.

Much less happy were search-and-rescue teams, coast guards and commercial shipping, which soon experienced a firework of alarms on their plotters. Although each AIS-MOB transmitter has a “test button” to simulate and train emergencies, most of the MOB training was unfortunately done with the “sharp” alarm button. In areas with heavy traffic such as the bay of Kiel in the southwestern Baltic Sea—which is rife with ports, marinas, wharfs, a naval base, busy ferry crossings and lots of leisure boats—the plotters became swamped.

Transmitter Classes A and B

To differentiate between commer-

The AIS was originally developed as an “anti-collision system” for commercial shipping but was later adopted for personal transmitters too. Use of AIS transmitters does not require a radio licence.

cial shipping and leisure craft, two classes of transmitters were defined: “SART Class A” and “SART Class B” (SART: Search And Rescue Transponder).

SART A transmitters for commercial shipping send data in intervals between 30 seconds and six minutes. In order for each signal to be seen by the other subscribers in the AIS system, the devices reserve time slots in the system. Meanwhile, SART B transmitters used by recreational sailing must wait until a free time slot is available for the transmission of the radio signal, which works reliably if enough time slots are available. But in regions with heavy traffic such as the English Channel, the SART B signals of recreational boating may not get through and will not appear on the plotters of the surrounding ships. This has prompted some entrepreneurs to develop some special class A transponders for pleasure craft,

Transmitters

which cost over 2,000 Euros, in order to increase their chances of being spotted.

AIS MOB Transmitter Class A

Personal AIS channels are categorised under class A, so they are given high priority since they are (in theory) only activated in the case of an emergency. However, since they are just battery-powered, they have the weakest power of all AIS broadcasters—just one watt. Thus, the signal would stand little chance of getting through in regions where all time slots are occupied.

Another restriction is that plotters built before 2010 do not recognise the MOB icon in the AIS system (an X in a circle). On these older screens, the received signal would display as a triangular icon, which is the symbol for a ship, which may obfuscate the true nature of the emergency.



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Dive instructors should possess knowledge of how present-day sea rescue works, how it is structured, and which safeguards have been implemented to keep thoughtless individuals from messing about with this crucial system.

Waves absorb radio signals

Many AIS handheld units also require an antenna to be unfolded, or unrolled, prior to use. As a result, they may not be deployed vertically but in some other position, which is not optimal for transmission. It is already a significant challenge that water absorbs radio signals, and sea waves block the transmission. One must therefore also understand the physical circumstances at play and how they may affect the transmission of an emergency signal.

Such complications do not exactly make it any easier for our average diver Joe to make heads or tails of the technical information. One brochure may, for example, state that the transmitter has a range of 55km—which, in a strict sense, may be true. However, this may only apply when the transmitter is mounted high up on top of a wheelhouse of a big ship and connected to a tall antenna. It should therefore never be presumed that the stated range and other performance data also apply to

personal units handheld by a drifting sailor or diver—except where explicitly specified.

Factors influencing transmission quality and range

Water absorbs all radio frequencies used for emergency signals, so waves of any significant height will block most of the transmission. On top of this, AIS alarms will be further attenuated if the antenna is not held vertically but at a slant. The biggest limitation, however, is the low transmission power of

only up to one watt maximum for battery-powered handhelds.

Even in areas with low traffic, AIS-MOB transmitters cannot be expected to reach their stated maximum transmission range of up to eight nautical miles (15km). In reality, most will only cover 1.2 to 3 nautical miles (2 to 5.5km), which various reviews have demonstrated.

It is quite important how high up the receiving antenna is mounted—the higher it is, the better the range! Dive boats rigged with sails are able to mount their receivers high up on the mast where it can pick up alarms from longer distances. But when it is mounted on the roof of a small cutter, the diver better not have been drifting far, the sea better be smooth and there should only be a few ships around, for the AIS distress signal to go through. On a side note, it should be added that the density of the atmosphere, the curvature of the earth and even solar storms also affect the range of a radio transmission wave. In any case, there are so many factors, which come together in a

complex manner, that it is impossible to put it in a simple formula. Any statements to the contrary are either unscrupulous or incompetent (or both), and can have dire consequences for users who do not know otherwise.

It would thus be a welcome change if dive training organisations would provide some basic knowledge of how sea rescue works, given the fact that distress rescue stations are increasingly pushing into the diving market. It does not mean that divers or even instructors should necessarily have an SRC. But they should at least possess knowledge of how present-day sea rescue works, how it is structured, and which safeguards have been implemented to keep thoughtless individuals from messing about with this crucial system.

EPIRB

It was during the 1970s when the United States, Canada, France and the Soviet Union came together and jointly developed a global rescue system for commercial shipping, despite all the politi-

cal tensions following the Cold War. At the time, nobody envisaged how many different functions it would eventually comprise. The effort going into technological development today is small in comparison to what it took to set up the first international emergency call frequency 406 MHz.

This frequency was initially available only to ships, because the emergency transmitters were large beacons mounted on the ship's deck. These beacons are called EPIRBs (Emergency Position Indicating Radio Beacons) and are triggered by water contact such as when a ship is listing or sinking. Initially, these beacons were connected to GPS (which was permitted for civilian use in the 1980s), but sent their emergency calls with MMSI to dedicated satellites, which were launched into space for this very purpose. From these satellites, the distress calls were forwarded to one of the more than 40 receiving stations, called LUTs (Local User Terminals), which are spread out over the globe. The LUT then forwards the emergency call to the



Transmitters



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nearest MRCC, of which more than 40 stations also exist worldwide. From here, whatever RCC (Rescue Coordination Station) was closest to the scene of the accident and where the SAR initiated the rescue was alerted.

This is a rather complex chain, but even for ships that find themselves in distress alone on the high seas, this is the only system, even today. As horizontal radio transmission is limited by the many aforementioned factors, emergency calls must be routed via satellites in order to reach over the horizon. In the open ocean, the signal may have to travel several thousand kilometres.

PLB

Over the years, the EPIRB has become smaller. Today, such transmitters can be

mounted on the wall and are no longer installed on the deck. Personal emergency transmitters, which were attached to life jackets and clothing, were introduced. They are called PLBs (Personal Locator Beacons) and also work on the 406 MHz frequency, on the same principle as the EPIRB. For divers, there are depth-rated models in underwater housings, which first have to be opened at the water's surface in order to raise the alarm in the case of an emergency.

For decades, 406 MHz was the only rescue frequency for ships, and MOB, the only chance of rescue. Right from the onset, this system was also plagued by false alarms, both due to technical problems and to improper handling.

In order not to block rescuers and to

quickly establish whether the alarm is real or false, two additional steps have been built into the rescue chain. First, each PLB is kept in a database, with the name of the owner and the contact details of another person who knows the owner (emergency contact). Second, in case of an emergency, this designated person will be contacted by the MCC to confirm that the sender is actually at sea.

This protocol should ensure that genuine emergencies are verified as such and passed immediately on to the RCC and SAR. It may appear a bit complicated, but it only adds a few minutes to the response time, which is worth the while in order to prevent initiating unnecessary rescue operations in the case of false alarms.

A blessing and a curse

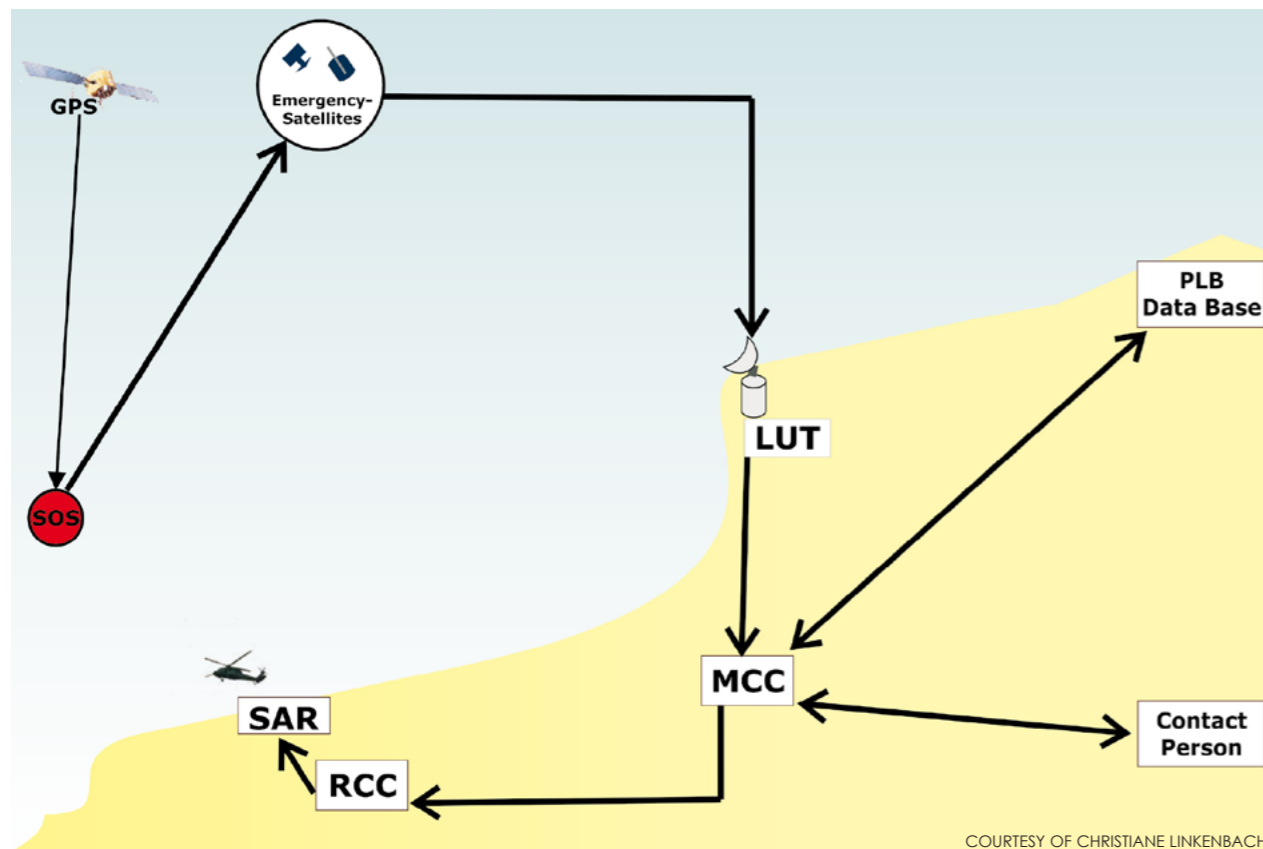
It is a blessing we now have technology that makes it possible to respond to and rescue people in distress even over long distances. Large thanks are owed in particular to the sea rescue services and their members, many of which are volunteers, who often risk their own lives to help others. Their heroic attitudes cannot be commended often enough.

A salient point must therefore be made that personal safety at sea cannot be viewed as just yet another product category of equipment, which can be purchased and some of which are produced primarily

for the sake of making a profit. There are some real issues and limitations to consider as well as the occasional misleading information or overreaching marketing pitches to weed out, which is not easy considering the complexity of the matter.

As divers, we just seek to safeguard ourselves from being lost at sea. Fair enough. But in doing so, we still have the primary responsibility for our own safety. First of all, that means taking every reasonable precaution to ensure we do not end up in such a predicament in the first place, and not relying on having a personal safety device to call in a ride home to safety.

It is basic, sound principle that we should never rely on delegating any degree of responsibility for our own safety to other people—it is plainly wrong, and dangerous. And this goes for the purchase and use of safety devices too. Any distress calls made will, to various degrees, either inconvenience other people or put them at risk. We owe it them—and to our loved ones—to make sure we understand the design, technical features and proper use of these devices, as well as the implications if we do not. Should we one day have to raise the alarm for real because we, despite our best efforts, end up in a perilous situation, we should be able to correctly use and rely on a system that has been created to save our lives. ■



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Rescue Operation, International Emergency Frequency / 406 Mhz

TESTING FOR LED INTERFERENCE

LED lights may interfere with VHF radiotelephone, AIS and DSC devices. The US Coast Guard has issued a "Marine Safety Alert" regarding the potential interference of VHF-FM radio and AIS reception from LED lighting. It has quite recently been found that LED bulbs may emit interference in the same frequency of the aforementioned radios. Although the jury is still out and there is no solid scientific results yet, skipper are urged to conduct a test to find out if their on-board radios are also compromised.

Nonetheless, it may be possible to test for the presence of LED interference by using the following procedures:

1. Turn off LED light(s).
2. Tune the VHF radio to a quiet channel (e.g. Ch. 13).
3. Adjust the VHF radio's squelch control until the radio outputs audio noise.
4. Re-adjust the VHF radio's squelch control until the audio noise is quiet, only slightly above the noise threshold.
5. Turn on the LED light(s). If the radio now outputs audio noise, then the LED lights have raised the noise floor. (The noise floor is generally the amount of interfering signals or static received beyond the specific signal or channel being monitored.)
6. If the radio does not output audio noise, then the LED lights have not raised the noise floor.

If the noise floor is found to have been raised, then it is likely that both shipboard VHF marine radio and AIS reception are being degraded by LED lighting. ■



Text by Pete Mesley

One of the things close to everyone's thoughts is diver safety. We spend good money on quality dive gear and prudently have it frequently serviced and maintained, as this equipment will be sustaining our lives while underwater. But what about when we are on the surface? Just how many of us really do think about getting lost at sea? We assume that the dive boat will be there when we surface but do not really think much about the consequences if it is not.

Here's just a small story to put things into perspective:

I was heading a trip to New Zealand's Kermadec Islands, which is an arc of subtropical islands some 800 to 1,000km northeast of New Zealand's North Island. It is one of the world's largest marine reserves, spanning over 20 thousand square miles. It

is so remote that if someone had a medical emergency (e.g. DCI), two rescue helicopters would have to be despatched from Auckland. It would take them to the limits of their fuel reserves to make it to a barren rock, known as L'Esperance Rock. This rock—which lies about halfway to Raoul Island, the largest of the

Kermadec Islands—was stocked with aviation fuel by the New Zealand Navy for such emergencies. But there was only enough fuel for one emergency. So, when you think of remote diving, this place is first on the list!

We were diving a small island called Nugent Rock. A small group of divers in our group swam

quite close to the point where they got sucked around the corner by a swift current. Luckily, the divers had no decompression obligations, and after a short time, they surfaced.

Ocean conditions was about two to three metres of swell, and the divers were now downwind of the safety tender. The surface

support boat was, however, waiting for the divers in an alcove where they had planned to surface. While the divers deployed their surface marker buoys (SMBs) once at the surface, they were out of sight, as they drifted farther and farther away from the surface support vessel.

One of the guys then deployed

his Nautilus Lifeline (part of the trip mandate was to have one). Meanwhile, on the mothership (which was about 500m away), the captain heard a crackling and muffled, garbled transmission. Not being able to make anything out of the message, the captain notified the surface support vessel, which found and retrieved the

Personal Safety at Sea

Communicating with the Dive Boat

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drifting group of divers.

Everyone made it back in one piece. The lesson here was without the device, they would not have been able to make any contact with the vessel. Even though no one was able to make out one word of the message, an alert was made nonetheless.

This event got me thinking. I have a couple of these devices myself, and I decided to do some tests. The concept was really good but may not have been as effective as intended in real life situations, as the above example showed. If you are bobbing about at the surface in rough seas, equipped with a 1 watt VHF radio with a 6 to 8cm antenna, its range is going to be short distance—and certainly much less than advertised. I wondered what would constitute a more effective and safer system.

A three-tiered safety system

I believe in a three-tiered safety system, comprising the ability to communicate with your dive vessel, knowing your posi-

tion and, when everything else fails, activating an EPIRB (Emergency Position Indicating Radio Beacon).

1. Communication with the dive vessel

Support vessels and the mothership are going to be the nearest vessels to you, so the ability to immediately establish contact with them when problems arise is paramount. Bear in mind that when you are at the surface—that is, low down—in a large ocean, your options with a small antenna are limited, so having the strongest handheld VHF radio possible is the better option. The ability to contact the vessel on any channel is also important.

2. You also need to know your position, so the support team can easily locate you.

Ok, so you have raised the alarm, informed the support vessel or mothership that you are lost. If you relay your exact GPS position, the support boat can come and pick you straight up. Having a VHF radio with GPS location is a massive advantage. In either case, deploying a

brightly coloured SMB will greatly facilitate being spotted by the surface support, as they go downwind or down-current to search for you. There are also extendable flags you can take with you to increase the height of your marker. But realistically, you need to know your position.

If it is difficult to communicate with the vessel, the next option is using Digital Selective Calling (DSC). DSC is a standard for sending pre-defined digital messages and a core part of the Global Maritime Distress Safety System (GMDSS). DSC is basically a paging system that is used to automate distress alerts sent over non-satellite VHF, MF and HF marine radio systems.

The DSC system's digital processing techniques, combined with the relatively narrow receiver bandwidths used, makes DSC signals more resistant to noise and fading, which provides a better range compared with radiotelephone transmissions. Unfortunately, DSC remains one of the GMDSS' least understood sub-systems. This lack of understanding

is reflected in the very high rate of false DSC alarms.

In a nutshell, this system is confused by many as being an EPIRB, which it obviously is not. EPIRBs signal maritime distress and can both detect and locate distressed boats, aircraft and people.

When DSC is activated, all VHF radios within range will be alerted and sent your GPS position. But this is only effective insofar as people are aware of this feature. If your dive vessel has this feature on their VHF and they monitor the radio all the time, this would be a great feature.

3. Activate EPIRB!

The last ditch attempt is to activate your PLB (Personal Locator Beacon).

PLBs work in exactly the same way as EPIRBs, by sending a coded message on the 406 MHz distress frequency, which is relayed via the Cospas-Sarsat global satellite system.

However, there are a number of differences between them. PLBs are designed to be carried on a person, so they are much smaller. Some, such as the "Fast

Find," are not much larger than the size of a mobile phone. PLBs are designed to be used anywhere in the world, both at sea and on land. Some do not float but may come with an additional floatation sleeve, in which they should be carried.

Once activated, PLBs transmit for a minimum of 24 hours, whereas an EPIRB will have a battery life of minimum 48 hours. The other difference is that an EPIRB is registered to a vessel, whereas a PLB is registered to a person. This means that if you are crewing a yacht and you switch to a new yacht, the PLB is still correctly registered; however, if you have an EPIRB and buy a new yacht, you will need to re-register it when installing it in your new boat.

What happens when you activate a PLB or EPIRB?

When I bought my RescueME PLB, one of my first actions was to call the Rescue Response Centre in Wellington (New Zealand) to find out exactly what their protocol was—in case you activated it, for instance. Every country has such a



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The Iridium Extreme lets one send an SMS text message, at set time intervals, with exact location coordinates to anyone, from anywhere on the planet.



centre, and I would strongly recommend you contact them if you purchase a PLB. It will really give you peace of mind.

You have to register and get an MMSI (Maritime Mobile Service Identity) number, which is a nine-digit number used by maritime DSC, automatic identification systems (AIS) and certain other equipment to uniquely identify the sender.

When you activate your PLB, an alarm goes off at the Rescue Response Centre with which you are registered. Now you may ask, what is a Rescue Response Centre located (in my case) in

New Zealand able to do if I am diving Bikini Atoll in the Marshall Islands and get lost at sea all the way over there?

The first step the Rescue Response Centre takes is to get in contact with your immediate next of kin, which you have listed on the form you have submitted. This is also why leaving behind all the details of where you are going, the name of the dive vessel with which you are diving, satellite phone numbers, call signs, etc, is important.

The Rescue Response Centre will then attempt to contact the vessel. If successful, they will pass on your latitude and longitude, so you can be located and picked up. If they are unable to communicate with the dive vessel, the next step is to alert the local national rescue services.

This is a rather roundabout procedure, but at least someone, somewhere, will be aware of your exact location. Bobbing around in the ocean for hours on end is not the best thing to do, so early communication with your dive boat is key to survival.

The ultimate rescue tool

All of this really got me thinking. What would be the "ultimate" tool to initiate a rescue if you are lost at sea?

It has got to be the best possible way to contact your dive vessel with which you are diving. They are the ones looking for you and the closest to you.

One immediate idea is to have a waterproof housing rated for the depths you are diving. In that housing, you would carry a 6-watt VHF radio with DSC function and GPS position data. I would also carry a registered PLB. This is the combo I would use diving all over the world at this point.

The more I thought about this, another idea came into mind. Would it be possible to take a satellite phone in the waterproof housing? I did a bit more digging. The satellite phones you can get these days are really clever. Most of them are IP65- and 66-rated, which means that they can stand

being submerged underwater up to 1.5m for long periods of time. Once you deploy them at the surface, they will still function even when wet. They also have a very clever emergency button, which allows you to rapidly make a call to a recipient, send an alert text message or email to one or more recipients.

The Iridium Extreme even allows you to send an SMS text message with your exact location coordinates to anyone, from anywhere on the surface of the planet at set time intervals. In this case, you would not only have a phone with which you can call anyone, anywhere, but also your GPS location displayed onscreen, and a feature that sends a text or email of your location at one-minute intervals.

All you would need to do is obtain the vessel's satellite phone number or email and have it stored in the phone book beforehand—assuming the boat has a satellite phone, which they really should. In any case, it is always good practice to also save the contact details of related local services, so that they can be alerted if necessary.

Food for thought

The importance of having such safety devices are not restricted to those who venture out to remote diving locations. With a growing number of rebreather divers and extended-range diving going on, using scooters and spending longer times in the water, covering a lot of large areas, it has gotten much easier

to find oneself in a lot of trouble. I would strongly recommend carrying a means of raising alert, if you are ever going to be swimming, diving or scooting in places where the dive vessel cannot maintain linear visual contact with you or see an SMB you deploy.

If you are indeed diving in challenging or remote locations, a small and functional device that could possibly save your life is really worth the investment. ■

Pete Mesley owns and operates Lust4Rust and Shock&Awe Diving Excursions. He frequently dives in remote locations globally, diving some of the best wreck and big animal encounters. For more info, contact Pete at pete@lust4rust.co or visit his site at: Lust4Rust.co.



Housing with 6-watt VHF radio (with DSC function and GPS data) and PLB

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Nautilus lifeline

The Nautilus Marine Rescue GPS is less than half the size of its original radio and is simple to use. Simply undo the latch and open, turn on, remove the

antenna retainer, and press the red button. Your GPS position accurate to 1.5 metres and a man-overboard distress message will be broadcast to all AIS equipped ships within range—up to 34 miles, according to Nautilus—as well as a special DSC message to the marine radio on your own vessel. No MMSI, licences or registration required. The Nautilus GPS is depth-rated to 130m (425ft) with dive cap closed, and splash-proof with dive cap open. It should be noted that this second-generation Nautilus device works in a profoundly different way than Nautilus' original radio, which is still on sale as a refurbished unit, as long as stocks lasts. The original Nautilus lifeline was also a two-way radio, which required a radio license in various regions as described elsewhere in this feature. **Watch video**

PLBs

Personal Locator Beacons (PLB) alerts search-and-rescue services by transmitting a coded message (406 MHz) via the COSPAS-SARSAT global satellite system. PLBs are subscription-free devices but need to be registered to a person. However, most PLBs are not designed to be dived with, and only a few manufacturers offer an underwater housing or have water/pressure-resistant PLBs.



Seareq Enos

The Enos system is self-contained and self-dependent and does not depend on the aid of other rescue institutions and services. It consists of two units: beacons, shown on the right, which are carried by the divers; and a receiver on the boat, which enables the support crew to precisely locate the divers at any given time. After surfacing, divers simply activate their ENOS-Beacon, which sends an alert and the divers' precise GPS position to the dive boat. The position of the beacon, its distance and direction towards the receiver, are shown on the display of the receiver. **Seareq.de**

Dye markers

Ampoules with dye can colour the water brightly green or yellow-green, significantly increasing the chances of being spotted by a rescue boat or plane. The shown ampoule with fluorescein is marketed by Divesoft. It is waterproof and can be permanently kept in the pocket of a BCD or drysuit. Each package is tested to a pressure corresponding to a depth of 100m. **Divesoft.cz**



Bright colours and reflectors

Fluorescent green (green-yellow) and fluorescent orange are the most visible colors. These as well as bright yellow, green and orange, will increase your visibility and safety, making it easier to become spotted on the surface, and to some degree, underwater too. The use of (SOLAS) reflectors also increases visibility, and some manufacturers already have reflector stripes incorporated in BCDs, diving hoods or dive suits. The suit shown is **Waterproof's R7 Rescue suit**, which, granted, has been designed for search-and-rescue workers, but what is the deal with all the black suits we see around these days, anyway?



Surface Marker Buoys

Having a smaller buoy deployed at all times was, once upon a time, a standard practice, which has since largely been abandoned. The advantage was both showing boaters where you were diving, but also enabled a dive crew to keep an eye on your whereabouts from at the surface. The limitation is that nobody really fancies dragging a buoy around, and it does not stick out of the surface enough to be visible over a long distance. The other options are bigger marker buoys, or "delayed SMBs," which are inflated at depth and sent to the surface prior to ascent as a signal to surface crew and/or to aid divers' ascent and safety, or decompression stops. These buoys have more buoyancy, which can support some weight, and they stand taller above the surface. The buoy shown is from **Surface Marker**. It has SOLAS reflective tape for increased night and daytime visibility as well as a holder for light sticks. Some models even have a small safety kit inside with, for example, a whistle, light stick or signaling mirror.



Glow sticks

Dive glow sticks are small and cheap, and are easily attached to a tank valve or BCD. The light does go some way to help locate a diver on the surface or underwater in the dark but only a close range. Opt for battery powered glow sticks, not the chemical disposable ones, as they are more environmentally friendly. The model shown is from **XScuba.com**



Signalling mirror

A stainless steel mirror used to reflect the sunlight can attract the attention of persons on a boat, shore, airplane or helicopter, even over several kilometres. Instructions for how to properly aim the mirror is printed on the back. **Divesoft.cz**

Rescue Streamer

Basically, it is a long and wide, bright orange, high-density, polyethylene foil that is unfolded from a small pouch. It floats on the surface and can be seen by aircraft from a long distance. Some versions have SOLAS-grade reflectors and are equipped with chemical lights, making them also useful at night. **Seerescuestreamer.com**





opinion

Text by Simon Pridmore

At some point, many keen divers entertain the notion of giving up their 9-to-5 job and following the dream of becoming a professional scuba diver, making a living from their hobby and combining work with passion. After all, the advertisements for instructor courses in the dive magazines make it sound easy. All you have to do is sign up, fork out the dough and take the plunge. What could possibly go wrong?

If you have a similar dream, then this is for you. If you find that this short story brings you down to earth with a bump, then that is only because your feet were off the ground to begin with.

Some do succeed in living the dream, but not many. And for those few that do, it often does not last for long. The story below points out one of the reasons why this is the case.

The job opportunity

I shall begin with the thing that sparked off this article. The following was posted on a Facebook page called Dive Jobs Worldwide. I reproduce here in full, verbatim:

Selling Yourself Short

— *Your Skills Are Worth Nothing & You Work For Free*

Looking for young, enthusiastic, newly certified PADI instructors to volunteer at our dive centre.

We are a small dive operation with a main objective: catering

to a diver's specific needs while operating in an environmentally friendly manner. For this reason, it is VITAL to have a passion for marine ecology. As a volunteer instructor, we give you the opportunity to

gain experience and build up your number of certifications.

Successful applicants must be:

- Available for a one to three-month commitment

- Single – please note that couples need not apply

- At least Open Water Scuba Instructor and specialties

PIXABAY





PIXABAY

- Able to speak English fluently. Spanish and French are a plus.
- Professional, friendly and helpful. An open and approachable personality is important to be successful in this role.
- Excellent guest focus and safety is paramount.

This position is available from September 2018 and volunteers are entitled to:

- Accommodation on a 4-share basis, 2 bedrooms, 2 bathrooms (swimming pool, wi-fi, TV, air-conditioning, utilities, drinking water and laundry)
- Weekly food allowance of US\$35

- Airport / Ferry pick up and drop off
- 1 day off a week

If you'd like to work in a nice and friendly environment, please submit your diving CV along with a recent photo of yourself.

In not so many words

So, just to summarise, this is a job for multilingual (ideally) and passionate new scuba diving instructors, who have just spent several thousand dollars on acquiring their professional qualification. The successful applicant is expected to work six days a week for a "food allowance" of US\$5 a day plus accommodation.

The role is defined as being that of a volunteer, although you will have noted that the volunteer is expected to be "professional." Presumably if, being volunteers (that is, people who work because

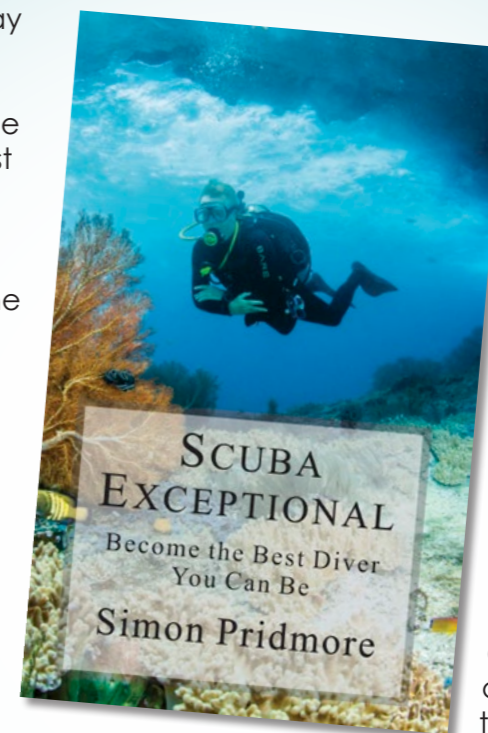
they want to work, rather than for some reward), they wake up one morning and decide they don't want to work that day, then that is not an option. They have to be "professional," a word which normally implies that someone is paid or salaried. Here, as this is not the case, we have to assume that "professional" means something else—probably that they are expected to be as diligent as someone on a paid contract would be.

The website for the dive centre in question states that it charges US\$280 for a PADI Open Water Diver course and its five-night fun diving and accommodation packages start at US\$360. These prices, it says, INCLUDE INSTRUCTOR FEES! Not only is this misleading, as it is clear that at least some of their instructors do not receive a fee at all, it leads one to wonder why they choose to mention it at all. It is certainly not something you usually see on a dive centre price list. Are they trying to dissuade customers from tipping

A New Book for Scuba Divers!

Scuba Exceptional may be the fifth in Simon Pridmore's *Scuba* series, but it is actually the true follow-up to his first book, the best-selling *Scuba Confidential*.

The philosophy of safer diving through the acquisition of knowledge and skills is the same, although this time the themes are different. As before, Pridmore provides us with a whole host of extremely useful advice and techniques, illustrated by real-life experiences and cautionary tales. The focus this time, though, is more on issues that experienced divers face. There is more technical diving content, and Pridmore covers some relatively complex issues in his usual clear and easy-to-read style. In many cases, the issues that concern technical divers reflect those that affect scuba divers at every level. After all, as Pridmore writes, technical diving is on the same spectrum as conventional sport diving:



It is just a different frequency.

Scuba Exceptional also deals in more detail with the psychological approach to scuba diving, broaching familiar topics from new angles and borrowing techniques and procedures from other areas of human activity.

While most of *Scuba Exceptional* focuses on the diver, it also takes a look at the wider picture and highlights a number of areas where scuba diving professionals and the "industry" as a whole are letting divers down.

As always, Pridmore is realistic in his assessments. He may shine a little light on the dark side of the scuba diving world, but he does this in order to illuminate bad practices and encourage change, while offering solutions.

Scuba Exceptional: Become the Best Diver You Can Be by Simon Pridmore is available on: **Amazon.com**.

their instructors? Do they not want the instructors to earn any money, from anywhere? It is all very strange.

The word according to *Scuba Professional*

However, in the world of diving, it is far from unusual. I discussed the topic in my book *Scuba Professional*. Among a number of other points, I wrote:

"Salaries and benefits for new scuba instructors vary widely but, generally speaking, diving jobs are not well paid, and this is another reason why you really need to have a vocation for teaching in order to survive in this line of work. You need to have the same sort of dedication that other profession-

als like nurses or schoolteachers have, in order to endure very long, difficult working hours for little financial reward.

"In the early days, you may have to take what you are offered but, as in any field of work, make sure before you sign up for a job that you know what the conditions are. Then decide if they are acceptable and do your best to ensure that your bosses keep to their word. Get as much as you can in writing with a signature. Of course, you have to be professional and keep to your side of the deal too.

"Be wary of accepting positions that give you no days off or wages that are ridiculously low. There are some cynical dive operators out there all too willing to take advantage of the wide-eyed



opinion



enthusiasm of newly fledged instructors. If you work every waking minute for next to nothing, then you will probably burn out very quickly. The cynical operators do not care—every week, the system churns out new instructors to replace you.

“There is another consideration. If you do not have enough respect for yourself to ensure that your rewards in monetary terms as well as lifestyle terms are commensurate with your efforts, it is unrealistic to expect others to treat you with respect. Dive instructor colleagues will not thank you for helping to bring down still further a salary bar that is already much too low.”

The reaction

Predictably, the people on social media who were most upset by the above “job” offer were indeed those who already work in scuba diving, who find it difficult enough to get reasonable pay for their work. Others sought to excuse the dive centre by pointing out that they were not the only operation that tried to get people with professional qualifications to work for nothing. This is sadly all too true, although it does not constitute an excuse. In scuba diving, the line between work and play is fuzzy, and there are plenty of people who take advantage of that for their own gain.

Other commentators tried to make the case for a win-win scenario. The dive centre gets free labour. And, it may well be that new instructors who sign on for this opportunity will have the time of their lives. Maybe they can

afford to do it because they have some money saved up to pay for their flights, insurance, training agency fees, entertainment (and food costs beyond US\$35) or perhaps they have generous parents. In the process, they will learn a lot, and they will find out whether being a full-time scuba diving instructor really suits them. They will spend three months on a tropical island as a dive guy or dive gal, make friends galore and have plenty of stories to tell when they get back home.

So, they claimed, everybody wins

Well, not everybody wins. As I pointed out already, job opportunities are already rare enough for full-time scuba diving professionals, without them hav-

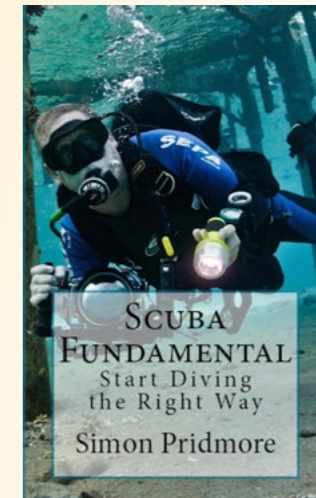
ing to compete with self-financed people who will work for nothing. The dive centre customers do not win, as they are being duped into thinking that their instructor is a paid member of staff. If they were aware that this was not the case, they might feel uncomfortable. The country, where the dive centre operates, does not win, as it seems likely that it is being conned out of overseas worker visa fees and taxes. Finally, the various bodies that administer and oversee scuba diving, who tolerate this sort of thing at the price of their reputation and self-respect, are not winning either. ■

Simon Pridmore is the author of the international bestsellers Scuba

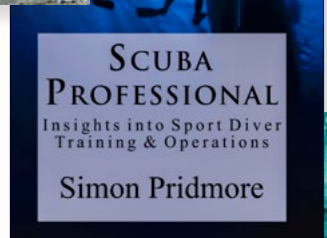
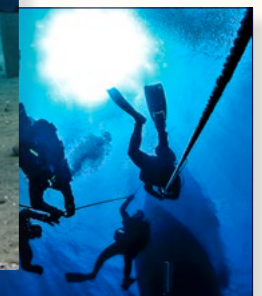
Confidential: An Insider's Guide to Becoming a Better Diver, Scuba Professional: Insights into Sport Diver Training & Operations and Scuba Fundamental: Start Diving the Right Way. He is also the co-author of Diving & Snorkeling Guide to Bali and Raja Ampat & Northeast Indonesia and a new adventure travelogue called Under the Flight Path. His recently published books include Scuba Exceptional: Become the Best Diver You Can Be, Scuba Physiological: Think you Know All About Scuba Medicine? Think Again! and Dining with Divers: Tales from the Kitchen Table. For more information, see his website at: SimonPridmore.com.

Get the series!

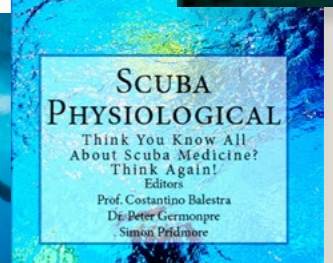
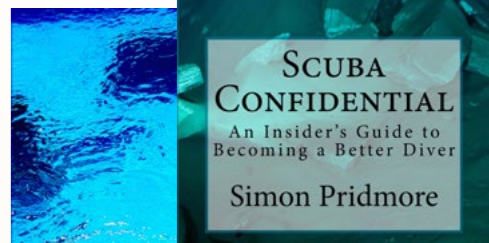
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opinion

Equipment can fail and skills have to be developed to deal with it.

Text and photos by Gareth Lock

Diving is not without risk—there is always a chance of death. There is always a latent or potential lethality within the “system”—where system is defined as the equipment, people and the physical, social or cultural environment. We cannot make diving 100 percent safe, despite what anyone tells you; we can make things safer, but we cannot make diving safe.

Most of the time, it is the diver's skills, knowledge and attitude that prevents those risks from being materialised and an injury or fatality from happening. However, when errors happen, the latent or hidden lethality within the system is exposed. Sometimes, there is some luck involved in preventing a fatality or serious injury. However, luck should never be considered part of the plan for anything other than those genuine expeditions that are really pushing the boundaries. An example of this would be the Thai Cave Rescue in 2018, where despite significant technical and non-technical skills as well as equipment or resource being present, an element of luck was needed to get the 12 junior football players and their



coach out from the flooded cave system. Before I started teaching divers about human factors, I had a career as a military aviator. I was a navigator on C-130 Hercules transport aircraft with the Royal Air Force, teaching crews night-vision goggle flying at 250ft above ground or dropping troops from 25,000ft in HALO/

HAHO missions, as well as standard strategic airlift missions. The lethality of the operating environment is quite clear, even when undertaking training missions. Aircraft do not just stay up in the sky when things go wrong, they have to be designed to cope with multiple failures, even when those failures are part of criti-

cal systems. To achieve this, it required our pilots, navigators, flight engineers and loadmasters to manage the operating environment so that there was capacity within the system to fail safely by predicting, trapping and mitigating errors which would appear. They did this via two inter-dependent sets of skills:

Technical skills. Flying the aircraft, reading gauges, inputting data into systems, preparing weapon systems, managing troops in the back of the aircraft.

Non-technical skills. This comes under the heading of Crew Resource Management (CRM), which includes decision-making,





An effective brief (left) ensures all divers understand their role and the task; Clear communications (below) help reduce errors.

Diver Error

1549”) on the Hudson River: “For 42 years, I’ve been making small regular deposits in this bank of experience, education and training. On January 15, the balance was sufficient, so I could make a very large withdrawal.”

The “hiding” of the real risks means that we do not easily understand the lethality within the system. The open discussion of near misses and close calls and how human fallibility led to them would help divers understand the real risks present—not just, “I made an error,” but what led to that error developing in the manner it did.

Another way in which this “hiding” takes place was the topic of a recent blog in which the myth or misconception that “rebreathers are trying to kill you” was explored. The authors explained that

the rebreather is actually trying to keep you alive. While the argument made is a true statement, no piece of hardware can be “safe” on its own, especially when in the underwater environment.

To create safety, it requires humans to adapt and react to the ever-changing situation and predict what is going to happen next. Most accidents do not happen because of poor decisions based on sound information, rather they happen because of poor perception of the problem and potential outcome, which leads to accidents.

Situational awareness —What? So what? Now what?

Situational awareness is mentioned during a number of diver training programmes, but really only at a cursory level, saying that

you need to be aware of your surroundings. However, situational awareness is not just about what is happening now, it is also about creating an accurate prediction of the near future. That model of the future is based on previous experiences, goals and expectations, all taking into account the limitations of human attention. We have a finite capacity to pay attention (7+/-2 active elements), and yet we are often instructed to “pay more attention.”

This approach is a flawed method to improve performance, because if we do not know what was taking the limited attention span from the diver, how do we ensure that the attention is pointing at the important and/or relevant topic at the right time?

Our ability to focus on key

situational awareness, communications, leadership, teamwork, understanding of stress and fatigue and facilitating a Just Culture.

Non-Technical Skills/Crew Resource Management

CRM training came about because of numerous high-profile accidents where there was nothing technically wrong with the aircraft, or nothing which was not “detectable and fixable” with the aircraft—for example, the aircraft running out of fuel because the crew was busy trying to track down a fault in the landing gear of United Airlines Flight 232 in 1989.

The accident analysis of these incidents showed that in the majority of aviation accidents, it was down to failures in decision-making, leadership, teamwork and communications rather than something technically wrong, which could not be fixed with the aircraft, that lead to the accident

happening. Since CRM has been brought in, the ability to predict, trap and mitigate the errors, which expose the lethality in the system, has led to improved safety in air operations. This applies to both civilian and military aviation, and across the globe. Those same non-technical skills have been ported into the healthcare domain (e.g. NOTECHS, Team STEPPS and ANTS) and the oil and gas sector (e.g. WOCRM), and the research from all domains has shown that improvements in performance and safety have been realised once a programme has been widely deployed from training to operations across organisations.

Countering the lethality in diving

Looking to recreational and technical diving, the lethality should be easily identifiable by individuals, teams and instructors. However, the marketing by some training

agencies and equipment manufacturers often hides this lethality. Fundamentally, it is not a good sales pitch when a dive shop employee or equipment sales representative says to a prospective client: “You do know if you get this wrong, you could end up dead?”

Sales and marketing are about selling benefits, not products. We sell the benefit of diving as experiences based on seeing, exploring, videoing and photographing wrecks, sealife, caves or other “things.” Dying is definitely not a benefit!

To compound this problem, the GoPro culture means that we are focused on outcomes (great videos of cave exploration or awesome photos of wrecks and sealife) rather than the process of learning, failure, incidents, accidents and the investment of time. As Captain Chesley Sullenberger said after his successful ditching of US Airways Flight 1549 (call sign “CACTUS





opinion

Debriefing (right) allows lessons to be learned—successes and failures; Standardisation (far right) reduces likelihood of misunderstanding and errors; Sometimes divers have to remove stages in order to enter a wreck (below)

critical aspects of our surroundings is thanks to a part of the brain called the reticular activating system (RAS). Over the course of our lives, through learning, experience and deliberation, we have developed an intuitive sense of what we need to know, versus what is not critical; the RAS keeps this list in order. The RAS processes all the things we encounter against four categories: things that are Dangerous, Interesting, Pleasurable and Important (DIPI).

If we encounter something that falls into the DIPI categories, we are hard-wired to pay attention to it. For example, most of us will respond if we hear our name called in a crowded room (Important) or hissing gas from a cylinder (Important and potentially dangerous). DIPI things get our attention,

and by paying attention, we can respond in the appropriate way. Anything that does not fit into DIPI will not demand our attention, which means we will not really think about it, which lessens the likelihood that we will react to it. In diving, we are often operating in a new environment, so the criticality or importance of information might not be well developed, and so we miss it.

Example of situational awareness in action

Improvement in situational awareness comes about by clearly defining what is important at the briefing stage, e.g. 50 bar is the end dive gas pressure and that this should happen at around 30 minutes



into the dive. To keep track of that, at 10 minutes, the remaining gas should be approximately 150 bar; 20 minutes, 100 bar; and at 30 minutes, 50 bar.

If this is not the case, we should look at what factors could affect that consumption rate. If it is less, are we shallower? Do we have a stronger current, or am I noticeably fitter than before? If it is more, are we deeper? Do we have a stronger current, or do I have a higher level of drag/less efficiency? If we are deeper, what does that mean for the decompression obligation and the associated gas? If we are consuming more, is the end dive pressure of 50 bar still valid if we are planning on a shared-gas ascent?

Under pressure: Stories of success and failure

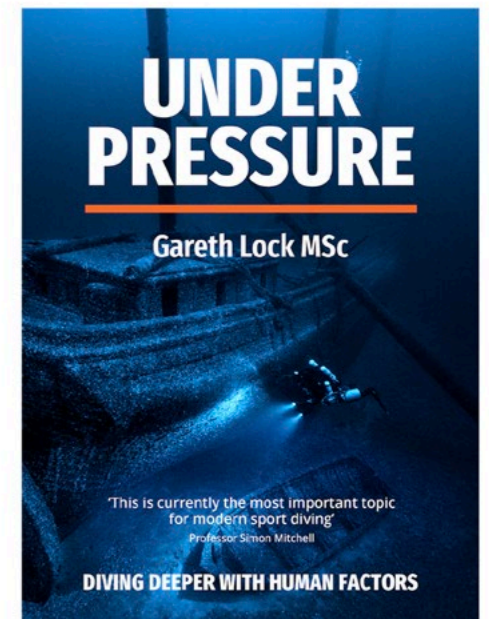
Over the next eight editions of *X-Ray Mag*, I will be writing a summary of the key themes contained within the book, *Under Pressure: Diving Deeper with Human Factors*. The book focuses on how divers can apply human factors and non-technical skills to

their diving to improve their enjoyment, performance and safety. It contains more than 30 stories of success and (recovery from) disaster, highlighting the contribution of non-technical skills to divers' successes. Contributors include Jill Heinerth, Richard Lundgren, Garry Dallas and Steve Bogaerts and it covers recreational, technical, rebreather, cave and instructional diving, so it is relevant to all divers. It will be published on 12 March 2019 and available from The Human Diver website (Thehumandiver.com), Amazon and Waterstones. The Kindle version will be available early to mid-April. ■

Gareth Lock is a diver, trainer and researcher based in the United Kingdom, who has a passion for improving dive safety by teaching and educating divers about the role that human factors play in diving—both successes and failures. He runs training programmes across the globe and via an online portal. In 2018, his online programme won an award for innovation in diving. You can find out more at: Thehumandiver.com.



The Human Diver
Counter-errorism in diving



'Understanding and integrating human factors into the practice of diving is the next frontier in improving diving safety and performance. As such, this book is a 'Must-Read' for divers, team leaders and educators wanting to up their game.'
Michael Mendundo

Published on 12 March 2019 via Amazon and <https://www.thehumandiver.com>



Edited by
Catherine
GS Lim



Dive Locations

100 Dives of a Lifetime: The World's Ultimate Underwater Destinations, by Carrie Miller

If you are contemplating your next dive trip, this book is for you. From diving

with Kona's manta rays at night and swimming with hammerheads at Cocos Island to cave exploration in Belize's Lighthouse Atoll and diving beneath Antarctica's ice floes, you'll be spoilt for choice. The suggestions are accompanied by more than 350 images, as well as marine life guides, travel tips and diving advice from world-acclaimed National Geographic divers and explorers like Brian Skerry, Jessica Cramp and David Doubilet. Targeted at divers at all certification levels.

Hardcover: 400 pages
Publisher: National Geographic
Date: 26 February 2019
ISBN-10: 1426220073
ISBN-13: 978-1426220074

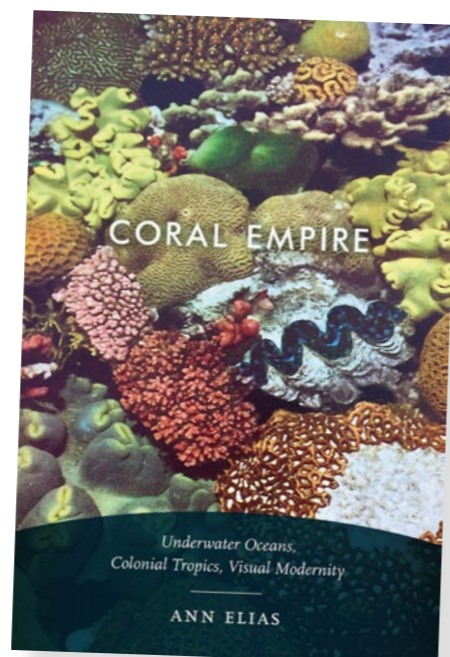


Lake Erie Tech

Lake Erie Technical Wreck Diving Guide, by Erik A Petkovic

These are the stories of 19 sailing ships and steamers that met their end in the waters of Lake Erie. Read about them and the passengers and crew who once sailed aboard them. The book also contains information about diving these challenging and rarely dived wrecks, including their present locations and conditions, dimensions, hazards and individual highlights, as well as the author's original research, contributor photos and archival materials.

Hardcover: 176 pages
Publisher: Dived Up Publications
Date: 27 February 2019
ISBN-10: 190945530X
ISBN-13: 978-1909455306



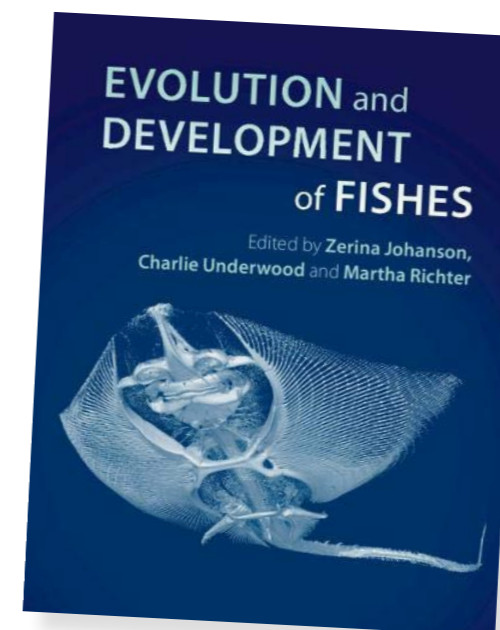
Coral Reefs

Coral Empire: Underwater Oceans, Colonial Tropics, Visual Modernity, by Ann Elias

In the early twentieth century, the public learnt about coral reefs through the works of explorers and photographers. John Ernest Williamson and Frank Hurley produced and circulated highly staged photographs and films depicting corals as hard-working creatures and the underwater environment as unexplored and fantastical. Through their works, they linked the tropics and coral reefs to colonialism, racism and human domination of nature. Author Ann Elias examines the visual and social history of their

works, and demonstrates how their depictions have led to attitudes that caused the current environmental problems faced by oceans and reefs today.

Paperback: 304 pages
Publisher: Duke University Press Books
Date: 26 April 2019
ISBN-10: 1478003820
ISBN-13: 978-1478003823

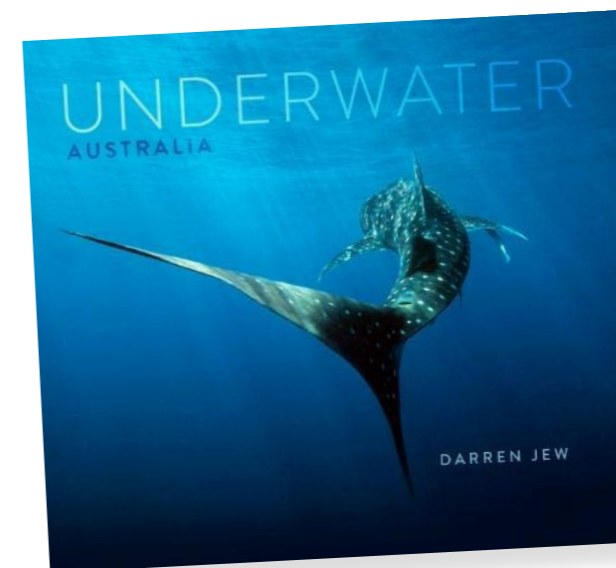


Fish Evolution

Evolution and Development of Fishes, edited by Zerina Johanson, Charlie Underwood, Martha Richter

Fish occupy the basal nodes of the vertebrate phylogeny, so they are crucial when interpreting almost every feature of more advanced vertebrates, like amphibians, reptiles, birds and mammals. Recent research combines evolutionary observations—primarily from the fish fossil record—with developmental data from living fishes, to enable us to better interpret evolutionary history and vertebrate phylogeny. In this book, world-class palaeontologists and biologists summarise current and cutting-edge topics in fish evolution and development.

Hardcover: 306 pages
Publisher: Cambridge University Press
Date: 28 February 2019
ISBN-10: 1107179440
ISBN-13: 978-1107179448



Australia

Underwater Australia, by Darren Jew

Australia definitely has more to offer divers besides the beauty of the Great Barrier Reef. Imagine swimming with giant whales, sharks, baby sea turtles and schools of fish, with its brightly coloured coral reefs as the backdrop. Certified cave divers might also venture into one of its underwater caves. In this book, using hundreds of images, nature photographer Darren Jew presents the splendour and majesty of Australia beneath the waves.

Hardcover: 192 pages
Publisher: Explore Australia
Date: 24 January 2019
ISBN-10: 1741175429
ISBN-13: 978-1741175424

Edited by Peter Symes



Undated file photo of the orca show in SeaWorld. Out of the 60 orcas in captivity, 27 were wild-born and 33 were captive-born, according to a count made in February 2018 by the Whale and Dolphin Conservation Society.

While whale shows are falling out of favour in the West, China's demand for captured cetaceans is cause for concern

While Canada has just brought an end to keeping whales and dolphins in captivity, in Russia orcas and beluga whales are still being captured for sale to China where new marine parks and aquariums are opening monthly, with many more large-scale projects set to launch in the coming years.

In China, whale shows are proliferating at new marine parks, driving demand for threatened species. Cities often initiate marine park projects as an eye-catching way of raising their profiles, and offer developers vast tracts of land and cheap loans to build them.

According to the China Cetacean Alliance, which monitors the industry, there are 74 operational ocean theme parks in mainland China featuring whale sharks, belugas, dolphins and manta rays, but no orcas have been displayed publicly up until now. More marine parks are being planned or are already under construction.

Both the United States and Canada stopped catching wild orcas in the 1970s due to negative publicity, and more recently, breeding orcas in captivity are either falling out of favour or being outlawed all together.

In Canada

The passing of Bill S-203 will prevent tourist attractions, like Marineland and Vancouver Aquarium, from breeding and acquiring new whales and dolphins. Parks that go against the bill can face a fine up to CAN \$200,000. Marineland has more than 4,000 animals, including one orca whale, 58 beluga whales, sea lions and other

marine animals. With this bill, Marineland and Vancouver Aquarium would be able to keep their existing cetaceans, but would not be able to breed or acquire new ones.

In the United States

In 2016, SeaWorld announced it was ending its killer-whale-breeding program after years of scrutiny about the theme park company's treatment of animals. The 2013 documentary *Blackfish* sparked public outcry over SeaWorld's treatment of orcas, also known as killer whales, and the theme park has been suffering ever since. The controversial Shamu-style

shows are still ongoing in some parks, although SeaWorld has promised to eliminate them entirely by 2019.

Meanwhile in Russia...

In Russia, a legal loophole has been used to catch and export cetaceans to satisfy demand in China's growing network of ocean theme parks. Photos posted online of a total of 11 orcas and 87 belugas crammed into small enclosures at a secure facility in the Far Eastern town of Nakhodka sparked a global outcry, compelling the Kremlin to intervene, saying the fate of "suffering" animals must be resolved.

Under public pressure, Russian investigators launched two probes into poaching and cruel treatment of the whales, while Russia's environmental watchdog said it has refused to issue permits to export them. But the investigations and any potential court case could drag on for months.

The Russian government appears to be split between the environment ministry, which says the animals must be released, and the fisheries agency, which defends their capture as part of a legitimate industry. The captured orcas belong to the rarer seal-eating, or transient population of the species, which does not interbreed or interact with fish-eating orcas. The environment ministry has tried to list the seal-eating type as endangered, ministry representative Olga Krever said, adding that the population has only 200 adult animals in Russian waters. Meanwhile, the agriculture ministry, which controls the fisheries agency and oversees unprotected sea species, views orcas as competitors for Russia's fish stocks and does not believe they are under threat.

872 cetaceans are captive

All 17 killer whales that Russia has exported since 2013—valued at over US\$1 million each—have gone to China, according to CITES wildlife trade figures. Since 2014, 872 cetaceans—which includes whales, dolphins and porpoises—have been put into captivity in China, according to the China Cetacean Association. ■

Does it do any good?

Research on whether the benefits of cetacean captivity are outweighed by animal welfare concerns is also in contention.

Some research has concluded that animal behaviour can be normal, and welfare, high, when provided with adequate enrichment; recent research has shown that dolphins positively anticipate interacting with their trainers.

Yet, animals in captivity have also been found to have increased stress levels, poor diet, a higher chance of injury, and, in the case of killer whales, higher mortality rates.

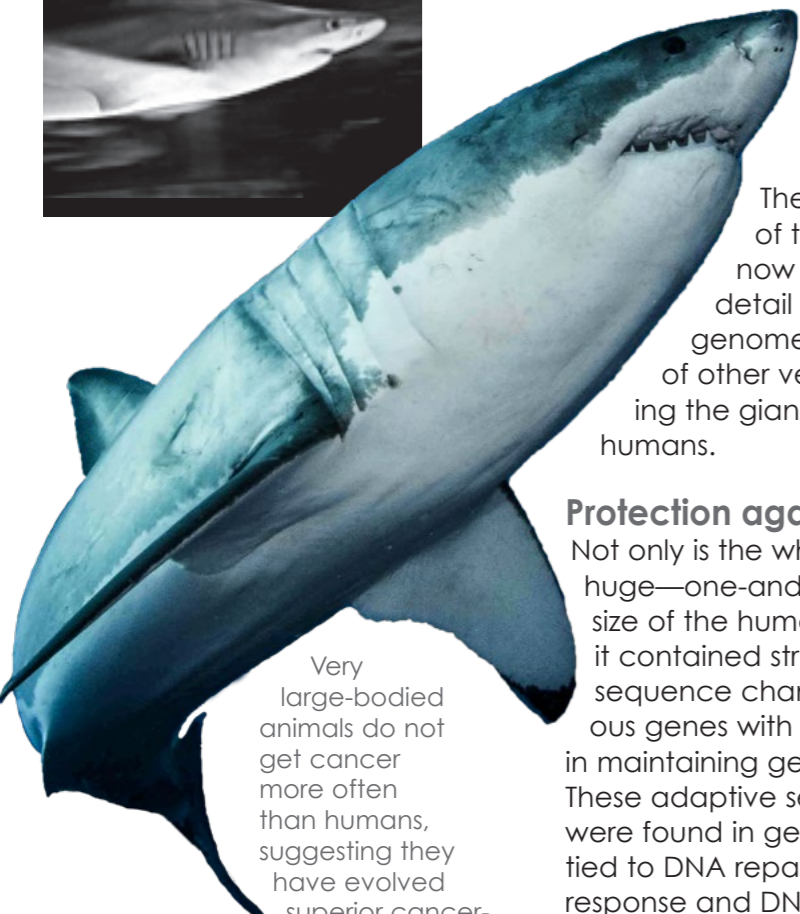
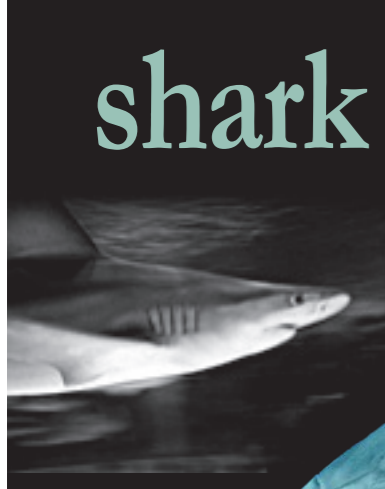
In the wild, dolphins ordinarily avoid human contact, and research has suggested that positive response to interactions with humans may be due to habituation, or a response to ostracism from a dolphin social group, rather than a common and enjoyed behaviour.

Some aquaria and captive cetacean attractions advocate that wild capture is an important conservation tool for threatened species, but this assertion has been questioned by researchers, citing the large number of individuals necessary for genetic diversity, limited available space, and high costs of captive breeding and reintroduction.

Current research on the benefits and concerns of captive cetacean attractions is mixed. While some research around cetacean captivity has found benefits to human participants and cetaceans, there is research demonstrating that these benefits are falsely-perceived or short-lived.

— Parsons et al. (2013)

shark tales



Very large-bodied animals do not get cancer more often than humans, suggesting they have evolved superior cancer-protective abilities.

BYRON DILKES, DANAH DIVERS

Great white shark genome decoded

Genetic adaptations behind superior protection against cancer and rapid wound healings discovered.

The entire genome of the white shark has now been decoded in detail and compared to genomes from a variety of other vertebrates, including the giant whale shark and humans.

Protection against cancer

Not only is the white shark's genome huge—one-and-a-half times the size of the human genome—but it contained striking specific DNA sequence changes in numerous genes with important roles in maintaining genome stability. These adaptive sequence changes were found in genes intimately tied to DNA repair, DNA damage response and DNA damage tolerance, among other genes. This is an important finding because accu-

mulated DNA damage, which leads to genome instability, is well known to predispose humans to numerous cancers and age-related diseases. The genetic innovations discovered in genome stability genes in the white and whale sharks could be adaptations facilitating the evolution of their large bodies and long life spans.

Wound healing

The shark genomes revealed other intriguing evolutionary adaptations in genes linked to wound-healing pathways. Sharks are known for their impressively rapid wound healing. The researchers say they have just explored the "tip of the iceberg" with respect to the white shark genome. ■ SOURCES: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, NOVA SOUTHEASTERN UNIVERSITY

Endangered sharks are being sold as food in the UK

Hammerhead and dogfish are being sold as food under other names to unwitting consumers in the UK.

DNA barcoding was used by researchers from the University of Exeter to investigate sales of shark products in fishmongers and fish-and-chip takeaways in England. For the first time in Europe, mini-barcodes are also used to identify species from dried shark fins. Despite a small sample size, analysis of UK wholesaler fins identified threatened sharks, including the endangered scalloped hammerhead shark, which is subject to international trade restrictions.

The majority of chip shop samples (usually sold under generic names like huss, rock salmon and rock eel) turned out to be spiny dogfish—a species that is listed as "endangered" in Europe and "vulnerable" worldwide.

Impossible to know

Once landed sharks are processed, the distinguishing features are removed, and typically, steaks of shark are sold on to consumers. Shark is also eaten battered and

It's almost impossible for consumers to know what they are buying.

— Catherine Hobbs
University of Exeter

fried in traditional fish and chips within the United Kingdom, and this process renders species identification difficult. Similarly, shark fins sold in Asian supermarkets and restaurants in the United Kingdom are highly processed and can be sourced as part of a complex global supply chain. ■ SOURCE: NATURE



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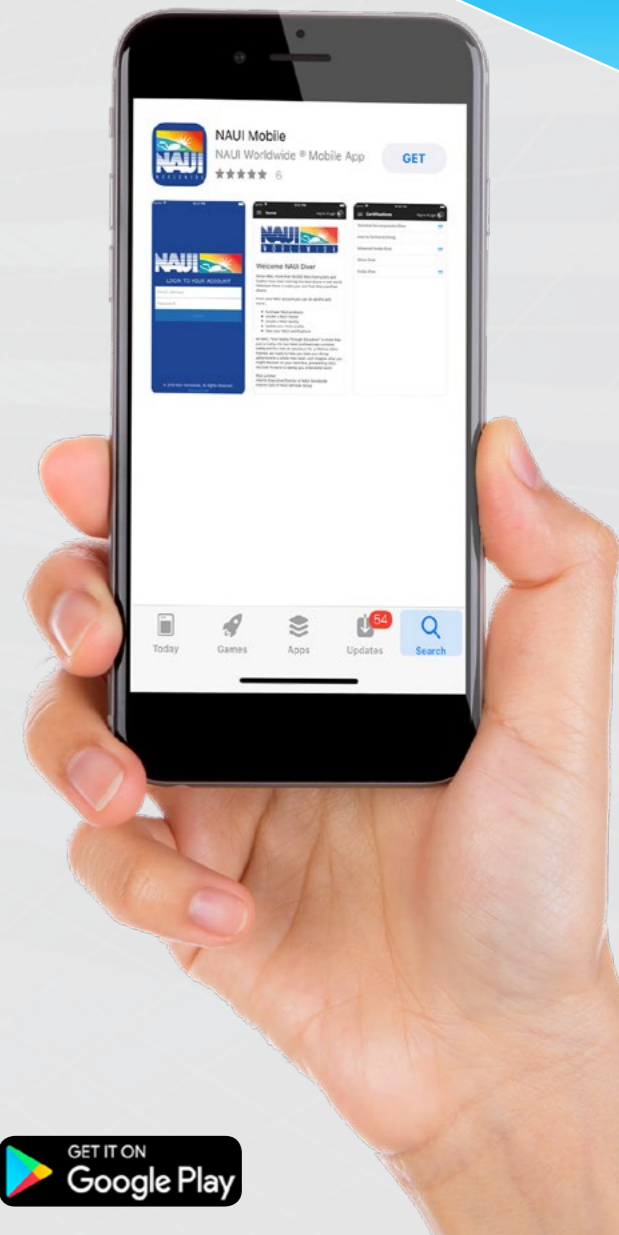
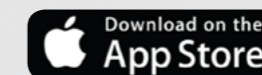
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Advanced First Aid

for Divers

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It is an unfortunate reality that divers who find adventure further afield have to prepare for a wider range of emergencies than those who stick close to home. By the time it is obvious that an ill or injured person needs help, symptoms may have progressed beyond what untrained rescuers can contend with. These situations are especially daunting in remote locations. Learning how to respond to some of the most common medical emergencies before your next offshore trip or diving expedition could help you save a life. Do you know how to identify the early warning signs of these common emergencies?

Gastrointestinal emergencies

First aid is not known for being glamorous or exciting, and neither are gastrointestinal (GI) emergencies. Many GI issues are often ignored: People suffering from them may be too embarrassed to reveal their symptoms or may have hopes of the issues resolving on their own. Severe GI distress can lead to serious medical issues via dehydration or malnourishment if the victim is miles, or even days, away from a hospital. Even in areas where the water is safe to drink, changes in flora and

fauna, routine and activity levels can be enough to cause discomfort or diarrhea.

The most important part of dealing with GI issues is determining whether symptoms warrant advanced care or can be left to resolve with time. Abdominal pain that is accompanied by a fever of more than 102°F or lasts for more than 12 hours should be watched closely and brought to the attention of a medical professional. If these symptoms are accompanied by specific localized pain, dizziness, rapid breathing, lightheadedness, sweating or anxiety, shock may have set in, and immediate medical help should be sought.

Seeking medical care is also recommended to women for whom pregnancy cannot be ruled out or any individual with nausea, vomiting or diarrhea lasting more than

24 hours.

Barring these indicators of more severe issues, it is reasonable to monitor a person with gastrointestinal distress and encourage them to eat bland food items like bananas, rice, applesauce or toast exclusively until symptoms resolve. Anti-diarrheal medications can be helpful for short-term management of symptoms, while caffeine and alternating hot and cold liquids can help alleviate constipation.

Cardiovascular emergencies

Whether you are a cardiologist or a lay provider, being a hero to someone having a cardiac emergency may be as simple as sticking to your training. Chest pain of any type is cause for a prompt response, and this holds doubly true in a remote environment. If chest pain is accompanied by sweating, cool or pale skin, shortness of breath, dizziness or anxiety, it could indicate the onset of a serious condition.

Angina (pain due to inadequate cardiac blood flow) and myocardial infarctions (heart attacks) can be indicated by these symptoms, although not all patients with these conditions will show all (or even many) of these symptoms. This chest pain, which may be described as crushing or squeezing, is com-



monly preceded by overexertion or stress, and can be accompanied by jaw, arm, abdominal or back pain. Because of the severity of undiagnosed cardiac issues and the disparity of presentations between patients, any otherwise unexplained upper-body pain should be considered a possible sign of cardiac distress.

The first step in responding to a potential heart attack is to activate EMS and encourage a conscious, breathing victim to rest in a comfortable position. If the person takes medication, such as nitroglycerin, for a known cardiac condition, it is appropriate to assist that person in taking their medication. Medications should be taken according to a physician's instructions and prescription medications should only be given to those they are prescribed to. Even if symptoms resolve, stay with the victim and continue to monitor them until advanced medical care arrives.

Respiratory emergencies

Injuries and emergencies that involve the airway are often the

most serious and require the fastest response. Individuals who are unable to breathe can suffer serious brain injuries or death in a matter of minutes if appropriate intervention is not made.

Common causes of respiratory emergencies in the field include anaphylaxis (a severe allergic reaction), asthma, airway obstruction and lung injuries. Divers face the risk of lung injury any time they engage in breath-hold diving or breathe compressed air, and people experiencing respiratory distress following a dive should always be evaluated for a possible lung injury. Lung injuries are very rarely manageable in the field — if you suspect that a diver has a lung injury the best response is to administer oxygen and seek medical care as rapidly as possible.

In the event of an airway obstruction caused by foreign bodies or tissue injuries, rescuers should refer to their CPR training for up-to-date response protocols that match their level of training. Anaphylaxis can also result in an airway obstruction if an individual with a serious allergy consumes,

inhales, touches or is injected with a particular allergen. If this allergen can be identified, separate it from the injured party immediately. If anaphylaxis occurs and the individual experiences difficulty breathing, it may be appropriate to assist them in administering epinephrine, often found in a commercially available auto-injector and likely kept on-hand by the individual with the allergy. Following epinephrine administration, victims should take an antihistamine (Benadryl or similar) and be transported to a healthcare provider for evaluation.

If a person is not adequately breathing on their own, oxygen administration is recommended. If the individual is not breathing at all, perform rescue breaths and immediately evacuate the person. Even if symptoms resolve, any person who experienced difficulty breathing should be evaluated by a medical professional, as symptoms may resume. ■

For more information on responding to medical emergencies, visit: DAN.org/Health



STEPHEN FRINK





The term "technical diving" was coined just after *aquaCORPS Journal's* "DEEP" issue was published (91 JAN). The next issue was re-named *aquaCORPS: The Journal for Technical Diving* (right); A diagram from *aquaCORPS* illustrating deep diving depths (far right)

aquaCORPS the journal for experienced divers

Volume 3 \$10.95 Winter 1991

highlights

- Deep wreck diving: a hang with Gary Gentile and deep wrecks the Washington (290 fsw) and the "Barre" (250 fsw) 44/6
- Why you should use oxygen for long decompressions 24
- Under the influence? a guide for managing narcosis 42
- Regulators under pressure, Custom Tables, and more

If you live outside the law you must be honest."
—Bob Dylan

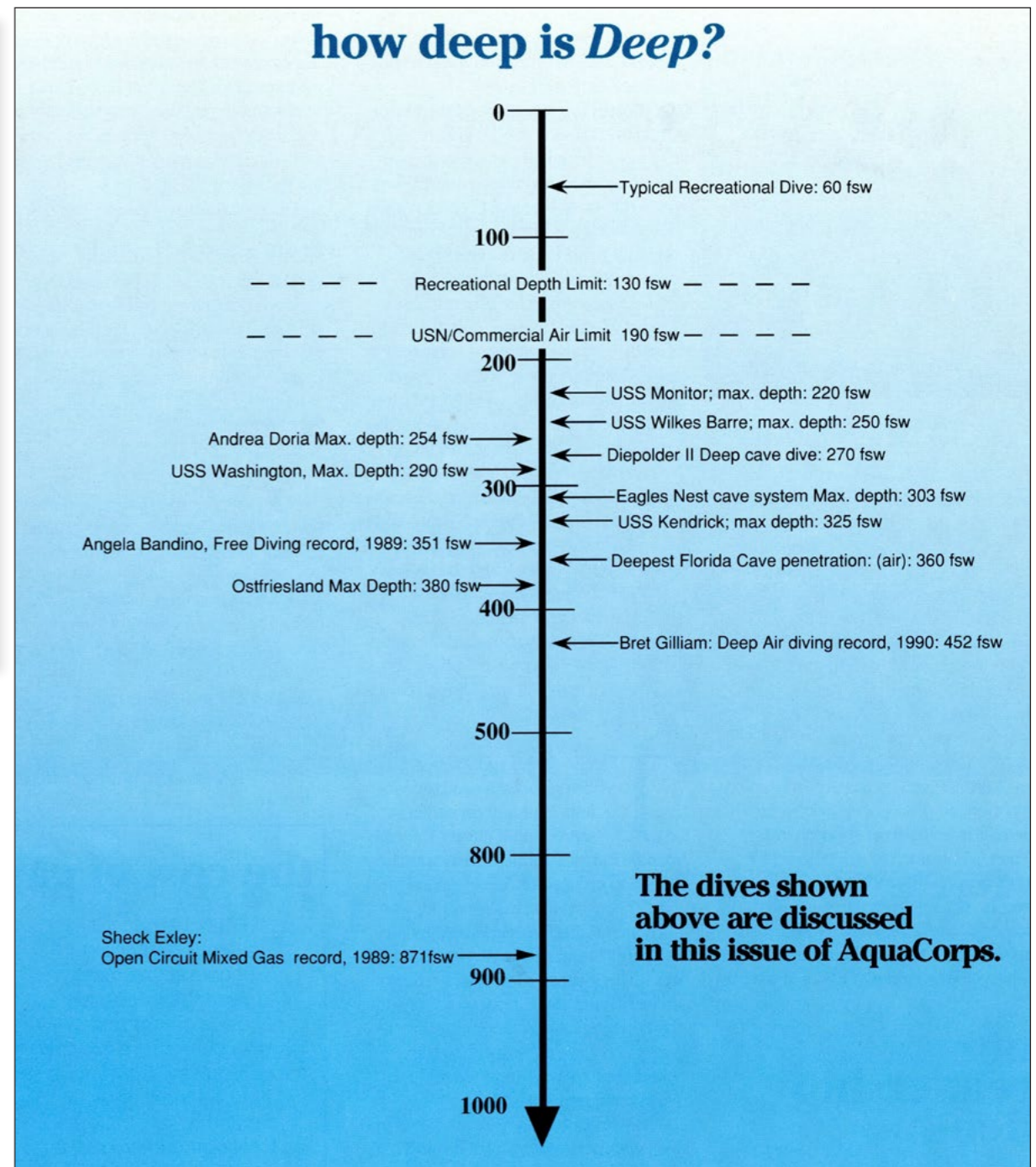
Imagine the surprise of the PADI deep diver, cautiously edging his way down a line to the 130 fsw limit, only to find a south Florida wreck diver waiting out his first decompression stop, stage bottles in tow. Perhaps it would give him pause to stop.

Just how deep is deep? While all of the U.S. training agencies adhere to the 130 fsw limit, there's continued on page three

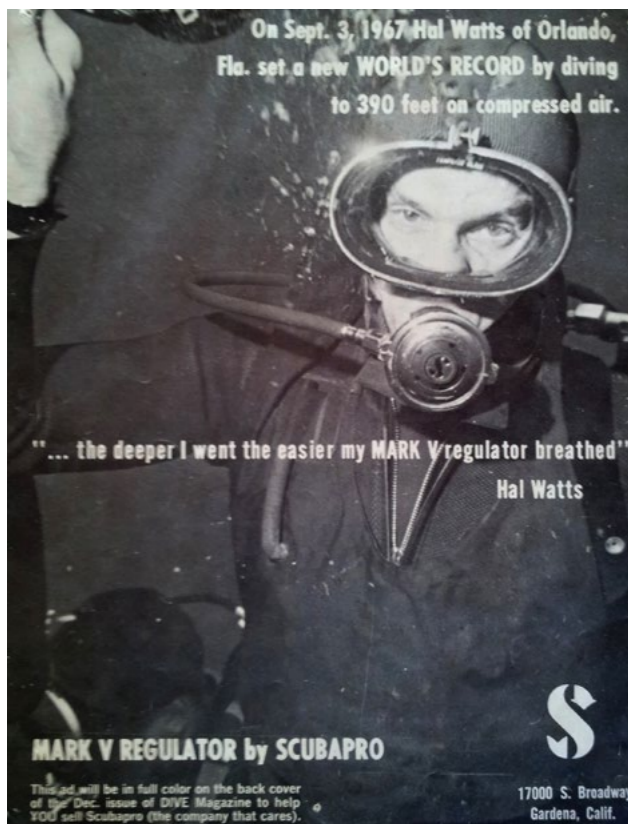
warning

Technical diving is a potentially dangerous activity. The risk can be minimized through special training and equipment. Even so, there are no guarantees. AquaCORPS is meant to provide information and is not a substitute for training. We accept no liability for the diving practices of our readers. You're on your own.

DEEP



Revisiting Deep Air Diving



Text by Michael Menduno
Photos courtesy of *aquaCORPS*

Today, the practice of "deep air" diving, and to a large extent, air diving itself has been related to the annals of sport diving history. Nitrox has become near ubiquitous as the diving gas of choice for shallow-water diving, and the trend, as pioneered by Global Underwater Explorers (GUE) is for divers to switch to helium mixes for dives beyond about 100ft/30m.

The situation was very different in the early 1990s, when mixed-gas diving was just beginning to gain traction following Dr Bill Stone's successful 1987 Wakulla Springs Project—the first large-scale,

mixed-gas expedition conducted by the who's who of US deep cave diving. Mixed-gas dive training was still in its infancy, and there was little infrastructure among retailers to support it.

It is not surprising then at that time, deep air diving was still considered a thing in diving circles, though its status in the community was rapidly changing. While the cave community was instrumental in pioneering mixed-gas cave diving through individuals like Jochen Hasenmayer, Dale Sweet, Sheck Exley, Parker Turner, Bill Gavin, Bill Main and Lamar English, most of the community was still diving air, albeit with oxygen decompression.

The wreck diving community lagged cave divers in adopting mix, and many resisted the move to mix because of the expense and increased logistics despite the pioneering efforts of explorers like Captain Billy Deans, Ken Clayton and Gary Gentile, who were

developing mixed-gas diving protocols. At the time, former deep air record holder, Hal Watts, who had held the record for several decades, was teaching "deep air" courses, at his Forty-Fathom Grotto training center, and individuals were still attempting to set new deep diving records on air, despite numerous fatalities.

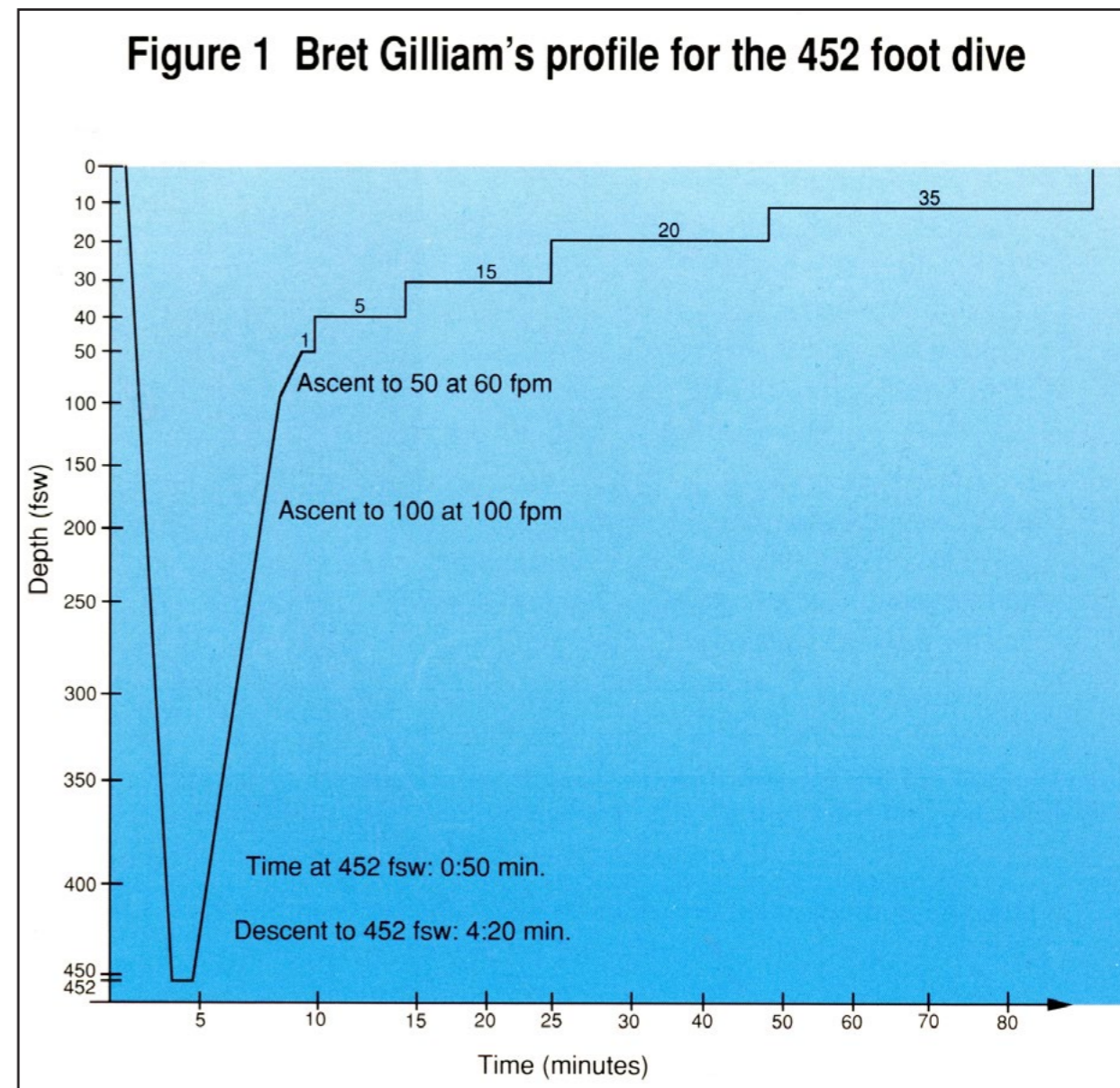
It is against this background, that we revisit the perspective on "deep air" diving in this series of three articles from my magazine *aquaCORPS Journal* N3 "DEEP" published in January, 1991—the year that we coined the term "technical diving." Specifically, we look at *aqua-*

CORPS' coverage of Ocean Quest vice president Bret Gilliam's 1990 record dive to 452ft/137m on air. Gilliam went on to found Technical Diving International (TDI) in 1994.

We also offer a perspective on deep cave diving (conducted on air) in "The Florida Deep Underground," by now retired NAUI, NSS-CDS and NACD instructor, guide and explorer Dustin Clesi. Finally, we feature a personal perspective on deep air diving in "Deep D(r)iving Motivations: A Personal View," by revered cave diving pioneer, underground photographer/filmmaker Wes Skiles. Mind those PO₂s! ■

Former deep air record holder, Hal Watts, featured in a Scubapro ad

Bret Gilliam, former vice president of Diving Operations at Ocean Quest International, before conducting his world record deep air dive to 452fsw/137msw



For the Record: 452 FSW on Air

aquaCORPS N3, "DEEP," January 1991

Text by Michael Menduno

Last February 1990, Bret Gilliam, former Vice President of Diving Operations at Ocean Quest International, set a world record of 452fsw/137msw for deep air dives, surpassing Neal Watson's 1968 record by 15ft/5m. Using a stripped-down set with a single 95, one regulator and three pressure-rated gauges, Gilliam's calculated five-minute drop, followed by 76 minutes of air decompression, was one of a series of dives, aimed at reaching 500fsw/153msw.

Regarded as stunt diving by many, Gilliam's dive highlighted the small secretive community of deep bounce divers—deep freaks—people like Hal Watts, Dick Oberlies and Tom Mount, many of whom have been making air dives in excess of 300ft/91m for more than 20 years. For some, deep air diving was a carry-over from their early military experiences—in Gilliam's case, deep water submarine reconnaissance, before the general availability of mixed gas. For others, perhaps it's a habituation with hyperbaric nitrogen, or the thrill of doing something that "can't be done." Says who?

The diving community's reaction to Gilliam's project was mixed. While the dive drew fascination from the recreational community—a consequence perhaps of limited diving depths—the repercussions of Gilliam's 130ft/40m plus dive echoed through the trade. At least two individuals who volunteered to participate in the project as advisors withdrew, fearing the negative publicity would jeopardize their standing. Others, convinced of Gilliam's sanity and his inalienable right to dive, remained in awe.

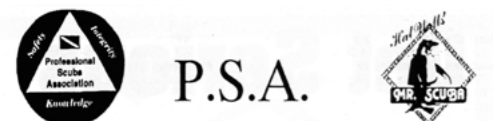
The "high-tech" bloc was more skeptical. Though no one was phased by the depth—numerous groups are building to 300-500ft/91-153m working depths—many

questioned his method and motivation. One veteran cave diver, whose circle is regularly making mix dives in the 300ft range, with 45 to 60-minute bottom times, compared Gilliam's dive to setting the Bonneville Salt Flats land speed record while drunk. What's the point?

Diving has always been an interplay of personal moxie and technology. In many respects, the deep (air) crowd has forsaken the latter; choosing instead to explore the limits of human physiology.

At 400ft/123m, most individuals are reduced to vegetables, unable to perform the simplest tasks such as clearing a mask or operating a BC. The previous record holder, Neal Watson, trained for the dive, for more than a year. His challenge? Remembering to clip the depth marker to the line. When I asked him what it was like at 437ft/134m on air, Watson replied, "I don't remember." Since that time, eight people have died trying to duplicate the experience.

If nothing else, Gilliam's dive demonstrates that individual physiology plays a quantifiable role in diving, and though limits exist, their boundaries remain fuzzy. Gilliam, who prepared for the dive for more than a year, says he was able to perform higher math at depth, avoiding a CNS toxicity hit through training, limited exposure, deep breathing and perhaps



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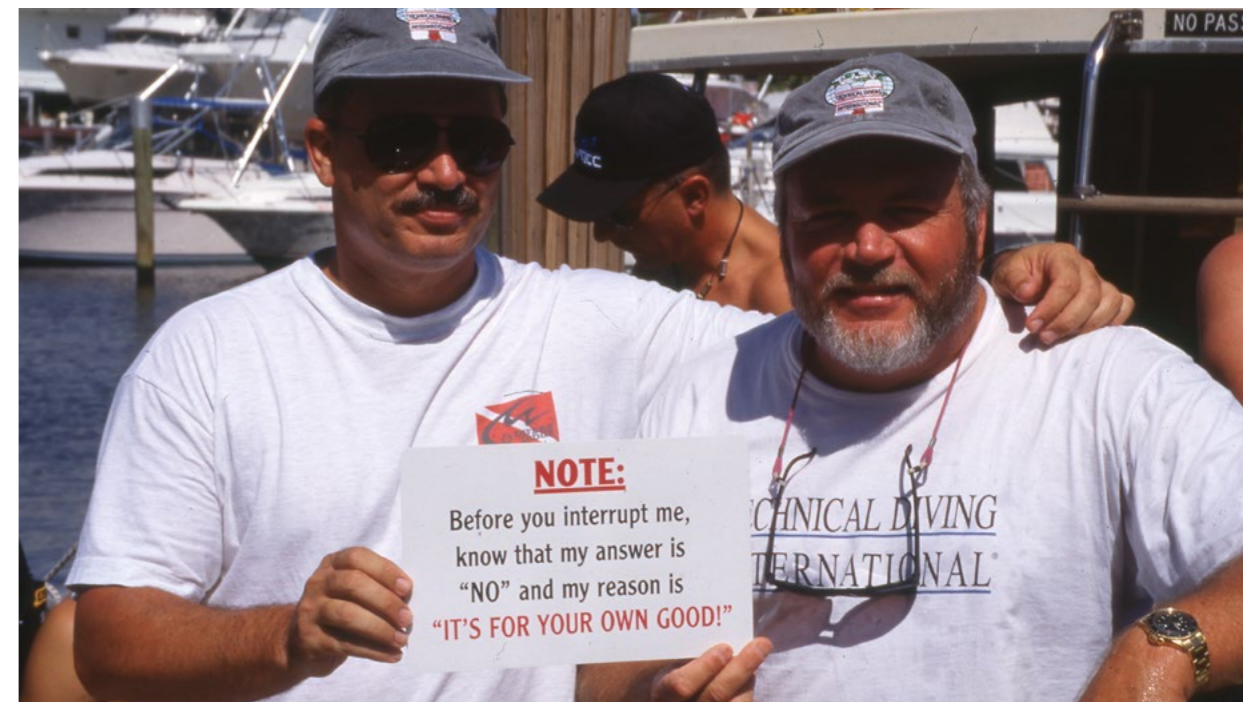
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Ad for Hal Watts "deep air" courses, at his Forty-Fathom Grotto training center



Joe Odom (left), then chairman of the NSS-CDS, and Bret Gilliam after founding Technical Diving International in 1994

NOTE:
Before you interrupt me, know that my answer is "NO" and my reason is "IT'S FOR YOUR OWN GOOD!"

The “Flag Room” (360ft/110m) at Diepolder II (Sand Hill Ranch Scout Reservation, Hernando County, Florida, USA) discovered by Dale Sweet in 1979 on one of the first successful mix dives using trimix. Believing it was the end of the cave, Sweet placed a flag there (not shown), hence the name. Sheck Exley dived to the room on air in 1981 in his famous “Salute The Flag” dive. Dustin Clesi placed that guideline shown nearly three decades ago.



just luck, is an extreme on the curve.

Interestingly enough, by comparison, Sheck Exley’s mixed-gas dive to 870ft/266m two years earlier—a 20-minute plunge in a Mexican cenote, requiring 13.5 hours of decompression and 34 stage bottles carried in fives evoked near reverence in the community.

From one perspective, their motivations appear similar. For the record: Both pushed limits that others had died exceeding. Is the difference just a penchant for technology? Or is it, in Exley’s case, the promise that others will be able to follow, at least part way? ■

The Florida “Deep” Underground

Text by Dustin M. Clesi



Dustin Clesi at Eagle’s Nest, Florida, USA

Stargate, Lost Forty, Twin D’s, Eagle’s Nest, Double Keyhole, Numero Uno, Jonah’s Gate, Nexus, Vaughn’s Hope ... these are names that command the immediate attention of the knowledgeable Florida cave diver—proper nouns that dominate private conversations, with information usually conveyed in quiet tones. This is the Land of the Cobalt, the Realm of the Few.

Many of these dive sites share common traits: fresh water with 300ft/91m plus visibility, trunk passages large enough to accommodate tandem Mack trucks, breakdown as large as a house, “Grossehalle” rooms wider than most stadiums, and most common of all, depth.

That is to say, real depth, not just your garden-variety 120ft/37m deep spring. With ceilings at 270ft/82m and major restrictions at 310ft/94m, these caves represent some of the deeper systems known in the Western Hemisphere. Deep cave diving—the specialists’ specialty.

Although professional cave diving is finally coming out into the open, deep cave diving still remains in the closet. Unlike various other cave diving specialties (e.g., staging, advanced decompression, side mount, use of diver propulsion vehicles, cave surveying), deep cave diving below 200ft/61m utilizing compressed air continues to exist in a category of its own for which no generally-accepted procedures of formal instructions exist—a category that incorporates one or many of the above specialties, and yet will always present a special host of hazards unique unto itself.

In recognition of these hazards, the

two national cave diver organizations, the National Speleological Society-Cave Diving Division (NSS-CDS) and the National Association of Cave Diving (NACD), have stressed the avoidance of diving beyond 130ft/40m in caves since 1976. This recommendation stems from concerns

over the use of compressed air below the 130ft/40m mark and complies with the standards of advanced diving within the open-water diving community. Unfortunately, the advanced diver is left to his or her own devices because neither organization has yet to address what procedures are acceptable to use beyond those depths.

Meanwhile, the few continue their adventures. It is estimated that five to seven percent of all active cave divers routinely participate in extreme-exposure caving. Of course, this number does not include the many occasional deep divers, the “tour cavers,” who “just want to see one time.” If these divers were included, the count of deep cavers would run much higher.

Two decades of trial and error. Recorded experiences of trained cave divers penetrating the deep ones go back to 1969. Beyond that, information becomes very sparse. Maps and diagrams of major

Although professional cave diving is finally coming out into the open, deep cave diving still remains in the closet.

explorations by divers attempting the more notorious systems began surfacing in 1971 and remain in circulation among the interested members of the cave diving community even today.

In the early 1970s, the new single-hose regulators, double 72s (overfilled to 3300 psi), and fast swimming were the standard bill of fare for diving in deep caves. Those divers with the highest resistance to the effects of extreme nitrogen saturation and who more aggressively managed their air supplies were the divers who laid the most line.

It was during these early deep cave explorations that the organized cave diving community suffers its first accidents. Regrettably, of the 18 certified cave divers lost since 1968, 12 drowned due to incidents occurring at depth (most beyond 200ft/61m). Four of these accidents occurred within the same cave system (Eagle’s Nest). Cavers knew then, and know today, of the unique hazards present in deep caves. Nevertheless, divers continue to go beyond the recommended

130ft/40m depth limit for air dives.

New tools for the cave diver began surfacing in the mid-1970s. Extremely powerful cave-diving lights used to penetrate large, sunken chambers started emerging from sophisticated backyard workshops. With the premier of the French Mk IV diver propulsion vehicle (DPV), deep cavers were granted a workhorse with which to extend their penetrations even further. This vehicle, rated to 300ft, could carry a light load and would offer a respite to the rider from extreme nitrogen narcosis by limiting exertion at depth. Unfortunately, the reliability of this DPV could not be taken for granted and mechanical failures were not uncommon.

The deepest penetration of a Florida cave on air was conducted by Sheck Exley to 360ft/110m in 1981. Known as the “Salute the Flag Dive,” this penetration remains impressive to this day, considering the negotiation of a major restriction at 310ft/94m that was accomplished in the process.

Rich Nicolini and Dustin Clesi on Aquazepp scooters in Diepolder II in 1991



During the early 1980s, unwritten rules gleaned from a hard decade of trial and error began emerging among the deep cavers. To name a few:

- Be fully trained and develop experience in shallower system first;
- Dive consistently with the same buddy or small group of buddies to become intimately familiar with their equipment and cave diving practices;
- Always swim slowly and with purpose;
- Use double buoyancy compensators;
- Pad schedules with oxygen [for decompression].

It was also at this time that trimix was first known to have been used in a Florida cave.



A young Dustin Clesi getting ready to cave dive

To relieve the boredom of horrendous decompression schedules, liquid snacks, magnetic chessboards, interesting reading, and catheters usually entered the sink basin with the diver, along with extra gas cylinders. Skin bends were common and chamber treatments were occasionally the “price paid” for more serious bends hits.

Since the mid-1980s, new, more serious tools for deep cave diving have come into play. Mixed gases, decompression habitats, German DPVs, and more complex decompression schedules, in addition to the normal heavy cave diving gear, are now being routinely used in Florida. Experimental, computerized rebreathers currently being tested in caves [Bill’s Stone’s Cis-Lunar Development Laboratories units] may eventually offer the subterranean ultimate and the cave diver’s dream: an unlimited air supply.

Why air?

Why do experienced deep cave divers continue to use compressed air below 130ft/40m when alternatives are now available? I recently asked five of the most well-known deep cave divers just this question. Responses varied: “I like it”; “Air is more than adequate to XXX level”; “Air doesn’t make me cold”; “Air requires a shorter hang time.” [Ed. note: Other reasons sometimes given are “Mix is too

expensive,” and “Mix requires too much time and support; we can do without it.”]

All of those interviewed agreed that compressed air was “standard” among this select group at 200ft/61m and further indicated a “comfort zone” (of mental and motor function) at 250ft/76m. As for the limits of air, all expressed the belief that the use of compressed air at 300ft/91m and below was excessive and unnecessary, and would likely jeopardize the success of the planned exploration.

When considering their views, bear in mind that these individuals have developed high tolerances to nitrogen saturation over the years of experience in caves. While they do not view themselves as transgressing the laws of physiology, their experiences are not necessarily transferable to other less-seasoned divers. In fact, when the time comes to gear up, these old hands often shun the newer

All of those interviewed agreed that compressed air was “standard” among this select group at 200ft/61m and further indicated a “comfort zone” (of mental and motor function) at 250ft/76m.

cave divers, or “young guns,” in preference to their regular diving partners with whom they have a long history of shared experiences and trust.

Obviously, what became a very personal type of cave diving almost two decades ago still remains that way to this day... out on the edge. ■

Deep D(r)iving Motivations: A Personal View

Text by Wes Skiles

Every time I think of deep diving, both good and bad memories surface together in my mind. I can recall those exciting evenings over 15 years ago when friends and I would drive from Jacksonville to Eagle’s Nest just for an evening dive. We were full of anticipation back then for the promise each dive held. Among other things, these dives offered the challenge of testing ourselves against narcosis,

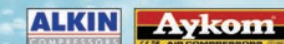
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which we viewed as an obstacle to be overcome so that we could be “good deep divers.” Mastering the depths was extremely satisfying to my ego.

I must admit that I enjoyed the sensation of narcosis, but the real reason I was there was to develop my skill as a deep diver. For some unknown reason, I just had to be able to say that I had been deep on air. I only wish that I could have known back then the scenarios that were rushing full speed towards me and the consequences of my misdirected actions.

One of the most common reasons people experiment with deep diving is to see how they handle narcosis. Invariably, they share these experiences with their diving peers, but more often than not, they hold some of the truth back about how they reacted to the depth; either they do not want to admit that they experienced any level of narcosis, or they want to give the impression that they “overcame it” and “kept it under control.”

I am sure that there are a few divers that can be completely honest and objective about their experiences. But



But most of us would have to admit that we have been a little more narked than we were willing to let on to our companions at the time.

most of us would have to admit that we have been a little more narked than we were willing to let on to our companions at the time. This situation is not helped any by the existence of those anomalous divers who seem to have total immunity to the effects of narcosis. Unfortunately, these unusual individuals—along with others who simply deny feeling any effects—set the standard for the mass of divers interested in quantifying

their capacity to dive deep.

It was hard to admit at the time, but my first face-slammng experience with narcosis occurred at just 160ft/49m. I was crushed; demoralized. I knew that experience and repetition would help get me deeper, but how was I to get that experience if I admitted to anyone that I got narked at 160ft? Eventually, after about 20 dives, I had worked my way well past 200ft/61m. I was finally the victor; I had beaten narcosis, or so I thought.

At this point, let me pose the same questions I ultimately had to ask myself: What is the point? Why would you want to go that deep on air? What purpose is served beyond the excitement of the moment? To my mind, if you do not have a really solid justification and you are doing it for the challenge alone, then it becomes just another cheap thrill. Only not so cheap.

Deep diving on air must be approached with a strong sense of the possibilities of uncontrollable circumstances and negative outcomes. Our dive plan that day was to descend

to a depth of 165ft/50m and then to explore a virgin cave passage downstream. The depth and distance we would both be travelling downstream with the current before turning the dive and exiting against the current were accounted for by our use of a conservative 1/5-air rule, that is, we would begin our return when we had used 1/5 of our air supply. This dive would require an additional stage bottle, as well as oxygen for decompression. Certified cave divers, we descended on our adventure.

The dive proceeded as planned, with the new passage being explored and survey data collected. When the allotted air was consumed, we began our return trip, having spent considerable time already at the 170ft/52m level. We gave each other the double-time signal, which meant we would pick up the pace during our exit. Retrieving stage bottles on the way, we prepared for our final exit from the cave.

Seconds later my partner signaled me, indicating that he felt so-so. Although I did not comprehend the scope of his problem, I realized that we had better slow down. Then, swimming only a few feet farther, I turned to see my friend losing consciousness. My mind raced, with heartbeat and breathing fol-



Wes Skiles with gear at the Wakulla Springs Project in Florida in 1987. Photo courtesy of US Deep Cave Diving Team.

Deep diving on air must be approached with a strong sense of the possibilities of uncontrollable circumstances and negative outcomes.

lowing, as the full impact of the situation hit me. Fortunately, he was still breathing and not yet fully blacked out, but there was no way he was going to be able to get out on his own.

Grabbing him by the arm and pulling him over my shoulder like a sack of potatoes, I began a desperate swim for the exit. Less than a hundred feet later, my body began to succumb to the stress, my brain pounding like tribal death drums. I clearly remember a flash of regrets—not the kind people supposedly have before they die, but much more pragmatic thoughts. Why didn't I realize that this could happen? Why was doing this dive so important?

By the time I got to deals and promises with God (I will never

do this again, really...), I regained control of my runaway breathing. Reorganizing my thoughts, I got underway at a pace I hoped would keep us both alive. It was still a touch-and-go exit, but both of us survived.

An analysis of our situation pointed to a combination of CO2 buildup and narcosis—a very real problem that is often ignored by air-breathing deep divers. Our own level of difficulty with this problem could only have been amplified at a greater depth. I ask the air-breathing, deep-diving readers if they are confident of their own abilities to handle a sudden injection of mental and physical stress at depth. If the answer is a smug “yes,” how do you know that?

Instead of modifying my dive habits after this incident, I continued to deep dive. Having been the “victor” of that round—at least in my mind—my response was to change buddies and stick

with the “challenge” of deep diving. I was in control. An upcoming scenario featuring me as the victim was unthinkable.

These experiences played out in the late '70s, when many large, deep cave systems still remained virtually unexplored. I believe my personal motivation at the time was simply to explore deep caves. In retrospect, exploration imperatives were probably only 20 percent of that motivation; I will now admit that the other 80 percent was what I call “deep diving ego syndrome.”

It was on one of my deepest dives, as part of a three-person team exploring a deep tunnel, that things caught up with me. On two previous dives here, I had led the team, so on this third dive, I was to be along “for the ride.” Relaxed, confident and without the responsibilities of leading, I was unconsciously lowering my guard.

The descent and dive went



Wes Skiles and Lamar Hires at Devil's Ear, Ginnie Springs, Florida, in 1984. Photo courtesy of Lamar Hires.



ANDREY BIZYUKIN

smoothly, with the exception of a couple of minor communication glitches. I was surprised at how far we were getting, and that my buddies had not yet hit their air turn-around point. I called the dive on air and gave the thumbs-up, confident that the others would be ready to turn also. That is when the horror of a narcosis-clogged mind challenged whatever senses I had left.

As I turned to begin our exit out, the others flashed me with their lights, the beam sweeps an imparting sense of urgency. Spinning about in response to a possible emergency, I now faced my buddies who were signaling emphatically that the surface was in the direction we had been swimming. This meant that either I had gotten confused or the both of them had.

Had we turned the dive and begun the exit without my noticing it? Or were my trusted buddies mentally blind with narcosis? This 50/50, coin-toss moment of decision nearly caused me to pass out

Many years have passed since my “air-powered” deep-diving days. Now my friends will tell you that I am reluctant to dive below 130ft/40m without the benefit of a gas mix.

from the rapid dump of adrenaline entering my system. But it was two against one. Being not sure but shaken, I decided to give in. Either

they would lead us to our doom or to dinner. I simply followed them, not at all sure of who knew what.

The gravity of that error ended my misdirected, ego-driven deep dives on compressed air, which, up until that time, had seemed so very important. From that experience, along with a few other not-quite-so-close calls, I began to reassess the reasons that others and I had

used to justify a deep dive on air. Many years have passed since my “air-powered” deep-diving days. Now my friends will tell you that I am reluctant to dive below 130ft/40m without the benefit of a gas mix. I have come to

I now know there is no such thing as getting “good” at deep diving on air. While a person may be truly competent, trusted, and liked, their competency will only allow them to be lucky when diving deep.

feel that there is nothing down deep worth visiting while on air. It is just not worth the risk, especially with the advent of mixed-gas sport diving techniques, equipment and table, and with one-atmosphere suits on the horizon.

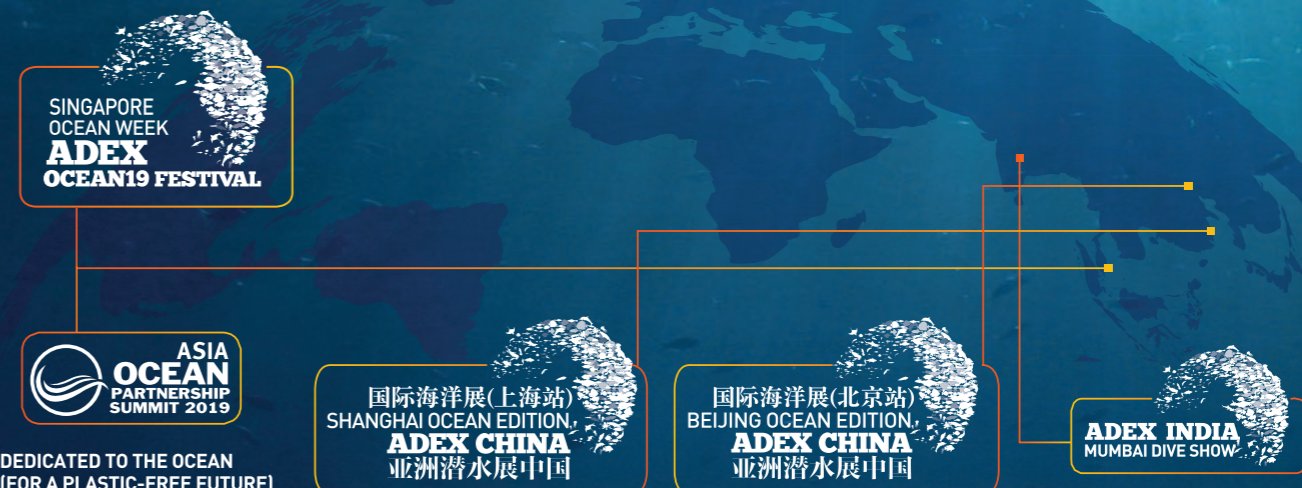
A wise old diver once told me, “If you stick around long enough, you will see the whole show repeat itself time and time again.” I have been around long enough now to agree with him, having seen the loss of a few divers—some really good ones among them—as the show gets replayed.

Deep diving on air never offers a guaranteed safe return, no matter what your reason and confidence tell you. I constantly hear people say, “Boy, that person is a real good deep diver.” I now know there is no such thing as getting “good” at deep diving on air. While a person may be truly competent, trusted and liked, their competency will only allow them to be lucky when diving deep. ■

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Photo courtesy of Matthew Smith





Text and photos
by Rico Besserdich

The aspect ratio of an image often has a noticeable effect on the visual impact and thus can be considered a powerful tool of image composition. Some aspect ratios might nowadays be considered common, some might be considered “old school,” and what may be common today could be old school tomorrow. But in photography (including underwater photography), it always pays to give image aspect ratios some deeper thought, especially when considering image composition.

What does aspect ratio actually mean?

Aspect ratio describes the relationship between the width and height of an image. The width always comes first; therefore,

aspect ratios are written in a width:height format. A 30cm (width) x 20cm (height) image has an aspect ratio of 3:2. In simple words, aspect ratios are about image proportions. The

right proportion can give the final kick to an image.

Aspect ratio is based on the camera type used. However, some newer camera models allow one to alter the aspect

ratio in camera. This, however, comes with a loss of pixels, similar to cropping an image in post-production.

Aspect ratios, as we use them today, are actually simplified val-

ues. So, a full-frame 35mm sensor (digital camera) has a physical dimension of 36mm x 24mm. Its correct aspect ratio would be 36:24, a figure that perhaps not everyone can keep in mind. To

have a more simplified and thus easier way to memorise the value, we simply divide both dimensions by 12, and then we have a 3:2 aspect ratio.

As aspect ratio is not dictated



3 : 2

Aspect Ratios

— *The History & Magic of Dimensions*

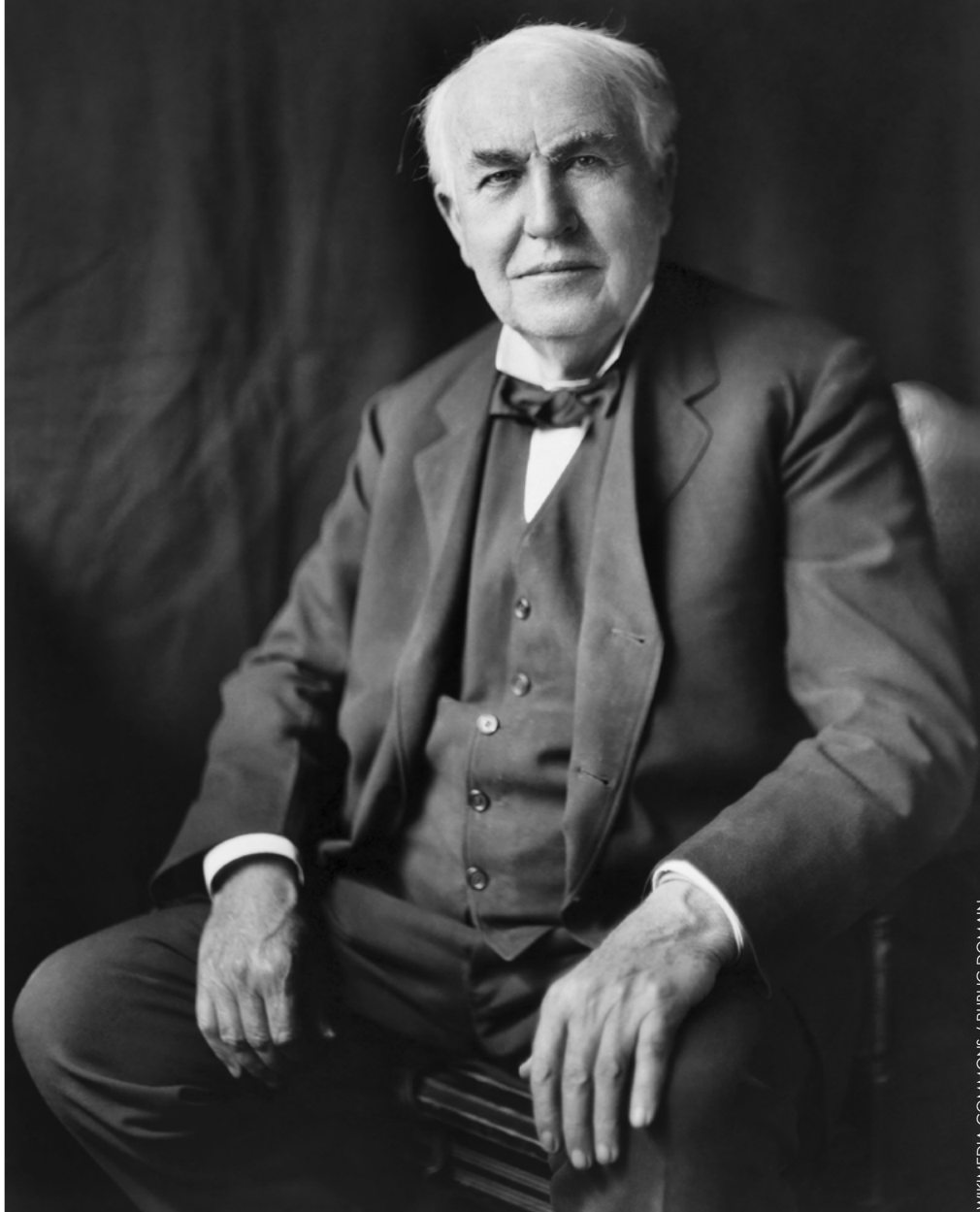


photo & video

"About like this." Thomas Edison, seen far right in this historical photo by Louis Bachrach of Bachrach Studios and restored by Michel Vuijlsteke, invented lightbulbs and the commonly used 4:3 aspect ratio. It started with a kiss—the film, *The Kiss* (by Thomas Edison, Black Maria Studios, 1886), was 18 seconds short, and the first movie ever presented for money. Shot with an aspect ratio of 4:3, this filmstrip (right) from *The Kiss* pretty much reminds one of pictures captured by still photo film cameras.



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by the size of a digital camera sensor (or film) but by its own proportions, the same story goes for sensors of crop cameras. Crop cameras have a smaller sensor—in many cases, one of approximately 22.5mm x 15mm—but it can vary depending on camera model and brand. However, these measurements conform to the 3:2 aspect ratio of the full-frame sensor: The sensor is 1.5 times as wide as it is high.

Important to know: Aspect ratio has nothing to do with sensor size or megapixels.

Let's have a look at some aspect ratios and see where they came from, why they are in use, and what Thomas Edison has to do with all of it. We will then compare different aspect ratios and their effects to underwater images.

4:3

The 4:3 aspect ratio has a long history, which goes back as far as the paintings of the old masters. But as far as it concerns the imaging world, we can say this aspect ratio was invented in the lab of Thomas Edison himself. "About like this," said Edison when he was asked what format he wanted for his

silent film, forming a shape somewhat close to 4:3 with his fingers—so the story goes.

Edison's movie *The Kiss* (1886) was one of the first films ever shown commercially to the public. In 1900, *The Magician* followed, and then in 1910, *Frankenstein*. Edison's Black Maria Studios was the first film production studio in the United States. One could say Black Maria created a standard. Of course, photography did exist at that time already. The so-called "full plates" (sometimes called "whole plates") used in Daguerreotypes had a size of 6.5in x 8.5in, which is roughly 4:3. However, when the images "learnt to walk," cinema (and not photography) did set the standard, as cinema was simply far more popular, thus beating a path for the entire imaging industry.

For decades, the 4:3 aspect ratio was the standard for television and computer screens. When digital cameras hopped on stage in the 1990s, the 4:3 aspect ratio was the first thing they adopted. Still, most digital compact cameras

(including point-and-shoot models) do use this aspect ratio, and it still remains the standard for most of the micro-four-thirds mirrorless cameras, several digital medium-format digital cameras and some medium-format film cameras, which use the 6cm x 4.5cm format.

The 4:3 aspect ratio lends images that old-school feeling, and many old masters of fine art photography would never ever use any other ratio. Some of them have absolutely nothing good to say about the aspect ratio I will introduce next.

3:2

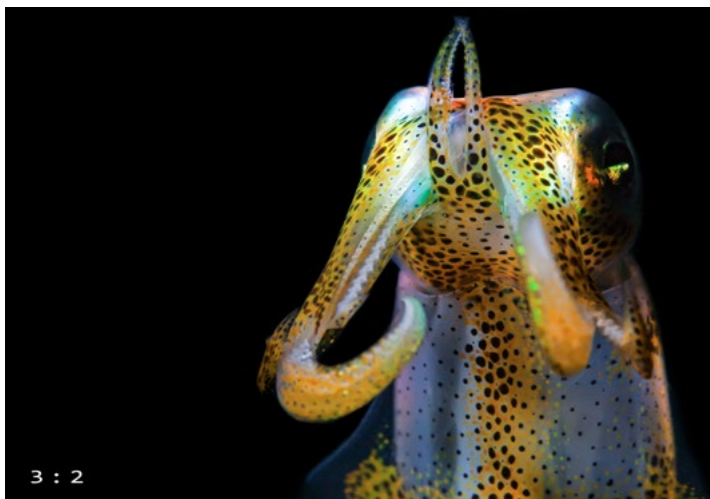
Oskar Barnack (1879-1936), the inventor of the Leica camera (yes, Leica) and of the 35mm film format, set the first stone on the path of the currently popular 3:2 aspect ratio. Barnack decided to use a

BELOW SERIES: The original image (far left) comes in a 3:2 aspect ratio. There is perhaps a bit too much negative space, one might say. A change of the aspect ratio to 4:3 (in post-production, by cropping) decreases that negative space. Cropped to the lovely "old school" ratio, the 5:4 aspect ratio, makes the image look a bit more classy, whilst the aspect ratios of 7:6, and lastly, 1:1, might be a bit too "tight."

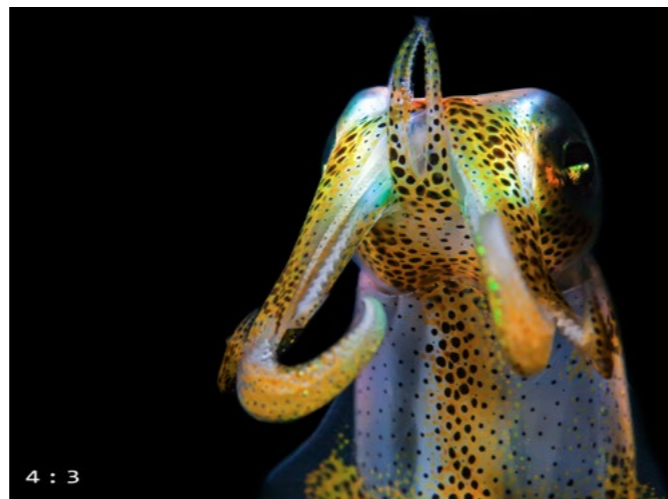


The first Leica camera had a 3:2 image aspect ratio.

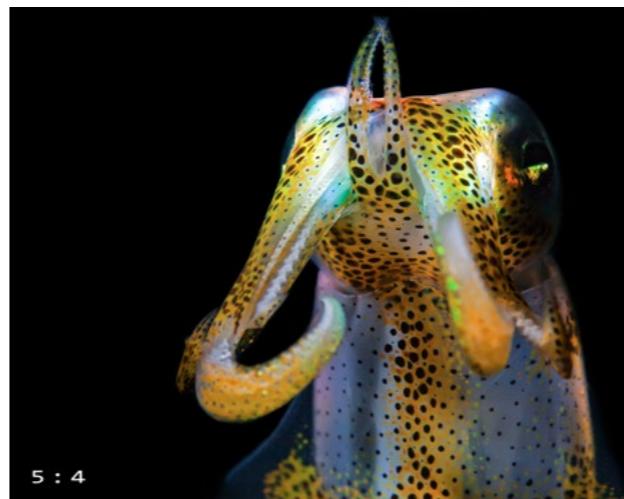
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3 : 2



4 : 3



5 : 4



7 : 6



1 : 1



The original image (far left) has an aspect ratio of 3:2, which works just fine. A 4:3 or 5:4 ratio might perhaps help enhance the “retro look” of this scene, but that is a question of personal taste. The 7:6 aspect ratio, however, is far too tight.



double 4:3 cinema film frame, which then ended up in a 4:6 ratio—that is 3:2 when you turn it 90 degrees.

What is important to know is that at the time of Barnack, photo cameras were far from being handy. His intention and invention was the development of a camera people could easily carry with them. Therefore, he invented the 35mm format, which was widely known as the “small format.” Nowadays, digital shooters call it the “full frame format,” but its origin was the small format.

The proportions of a 35mm film, or sensor, results in a 3:2 aspect ratio, and as such, became the standard for digital crop sensors and full-frame D-SLRs, and most film cameras. Also, a few (full-frame) mirrorless cameras and some high-end compact cameras use the 3:2 aspect ratio as well.

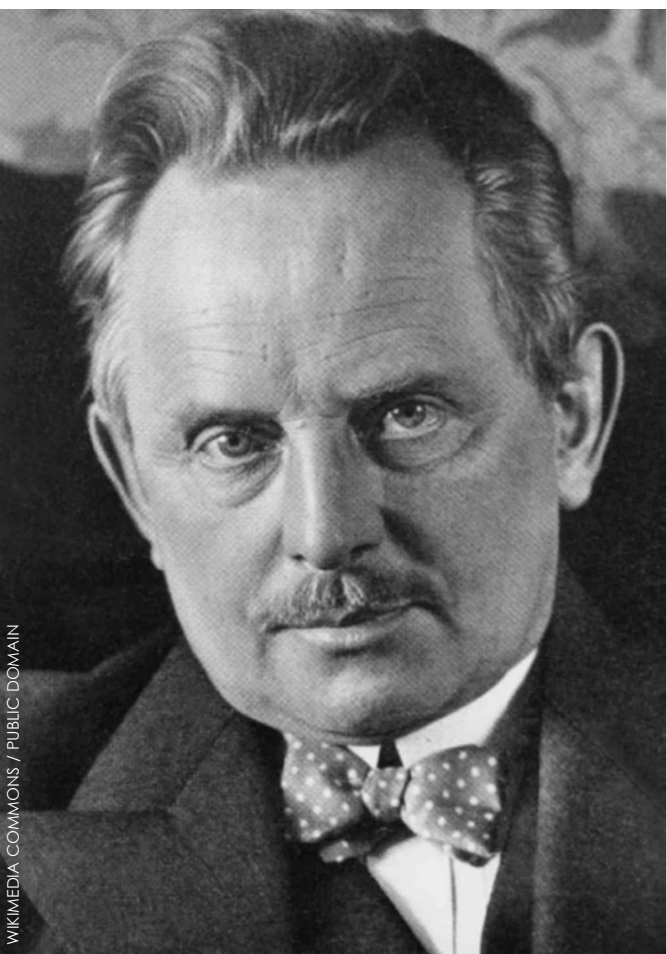
Images with the 3:2 ratio do look a bit “wider” than those with the 4:3 ratio, which was much welcomed by nature and landscape photographers, but received not-so-optimistic opinions from portrait photographers, who thought the 2:3 (vertical) was simply a bit too “tall.” But that did not stop the success and popularity of 35mm small-format cameras.

What is important to know is that the 35mm film format, with its resulting 3:2 aspect ratio, has its roots in the early days of cinema, and with a photographer,

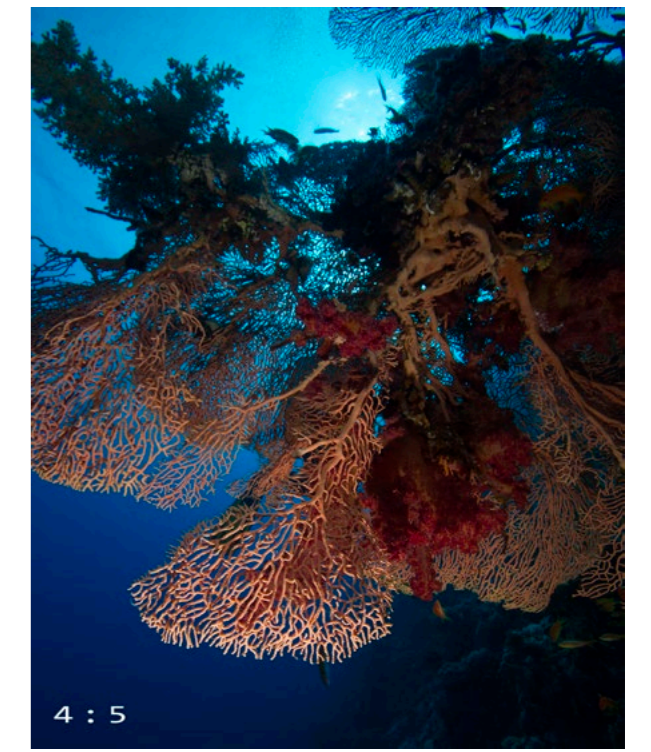
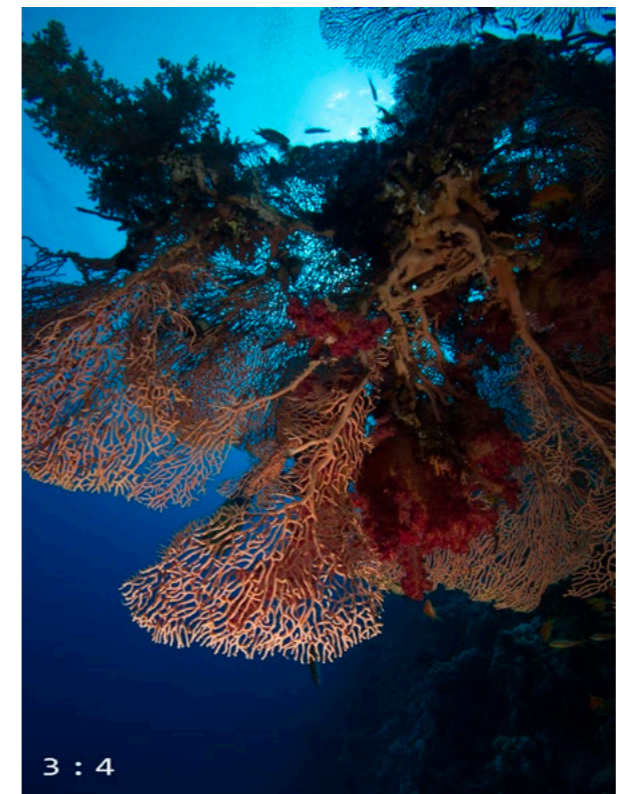
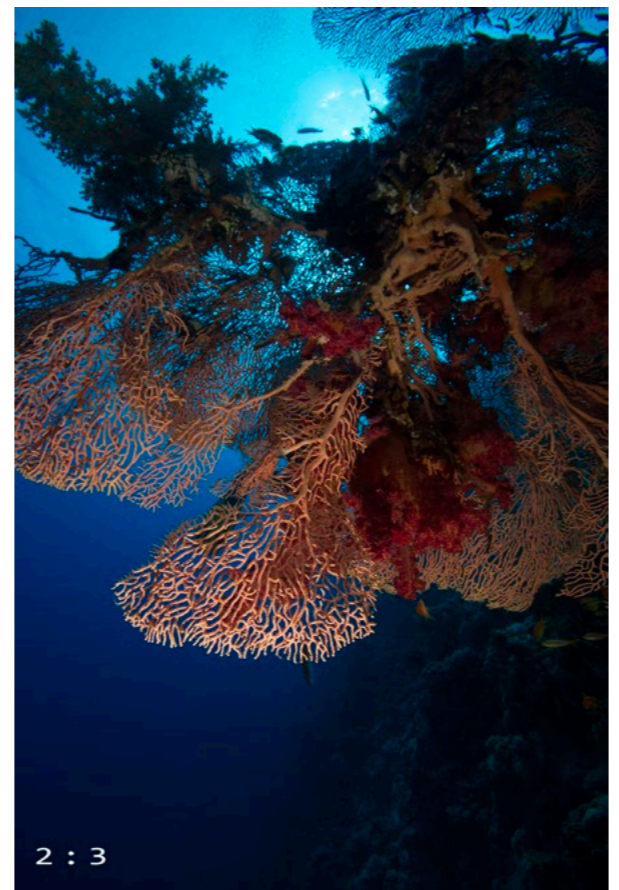
Barnack, who simply had had enough of carrying heavy and bulky cameras with him. Barnack suffered from asthma and was not a very sporty gentleman. The myth that pops up here and there, which states that the 3:2 aspect ratio was

invented because it matched the mathematical proportions of the Golden Ratio of art and architecture, is simply wrong. The 3:2 ratio does not even come close to the Golden Ratio.

A sniff into history
The early days of photography and film formats were days of a lot of confusion, as film formats were arbitrary and specific to each camera model. For example, Kodak start making “pocket cameras” as



Oskar “Mr Leica” Barnack (1879-1936), the father of the 3:2 image aspect ratio



The 2:3 aspect ratio (the vertical version of the 3:2 ratio) sometimes presents a problem with the frame being a bit “too tall.” Here, it may help to go back in time: The historically established 3:4 or 4:5 aspect ratios eliminate negative space, and thus help improve the image composition.

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The camera that went with the Apollo mission to the moon, the Hasselblad 1600F, had a 1:1 image aspect ratio.



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early as 1885, but each model used a different (film) format. In 1916, Kodak had 30 different models with more than a dozen different film formats. Aside from Kodak, other camera manufacturers did their own thing as well—hence, days of confusion.

The first film cameras made by Nikon and Minolta used the 4:3 aspect ratio; but later, they changed their plans and followed the better-selling 3:2 standard.

1:1
The 1:1 (formerly 6:6, or just simply “square”) aspect is in a class of its own. It existed for



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quite a while but had its first glorious moment in 1929 when Rollei launched its first twin-lens camera, the legendary Rolleiflex TLR. A successor of this model was, by the way, the first camera ever used for commercial underwater photography by the pioneering diver Hans Hass. Some of you divers of the older generation might still remember the legendary Rollei Marine camera.

The Rolleiflex was copied many times. The first camera of mine was a Weltaflex—a Rolleiflex copy made in East Germany.

Hasselblad later followed the hype, utilising the 1:1 aspect ratio by using a 6cm x 6cm film in its model 1600F in 1948. Years later, the very first image of planet Earth

seen from space was made with a Hasselblad (model 500EL, with 6cm x 6cm film)—perhaps the most famous 1:1 photograph ever made.

From a compositional point of view, not much can be said about the 1:1 square format. The “why” of this aspect ratio might be answered with technical aspects, not with aesthetic aspects.

However, the super old-school 1:1 ratio has never been forgotten or buried. Sixty million images with the 1:1 aspect ratio are uploaded daily to Instagram, which proves that 1:1 never dies.

5:4
The 5:4 aspect ratio is the standard in large format photography. There is, as yet, no large format digital camera sensor, so film is it for now. However, large format film cameras are still produced and available on the market—for example, the Linhof Master Technika 3000. An upscaled version of the 5:4 aspect ratio is the 10:8 aspect ratio, a very popular print size and proportion.

7:6
The 7:6 aspect ratio is the classic aspect ratio of medium format film photography—namely, with Pentax and Mamiya cameras. However, modern digital medium format cameras moved away from that dinosaur. The Hasselblad X1D works with a 4:3 aspect ratio, and the Leica S-Series of cameras—despite being medium format—surprisingly work with the 3:2 aspect ratio. Fujifilm goes even one step fur-

The Rolleiflex TLR (right) had a 1:1 image aspect ratio; The Linhof Technika (bottom right) large format film camera had a 5:4 image aspect ratio; A model from the Mamiya 67 series of medium format film cameras (bottom left)

Aspect Ratios

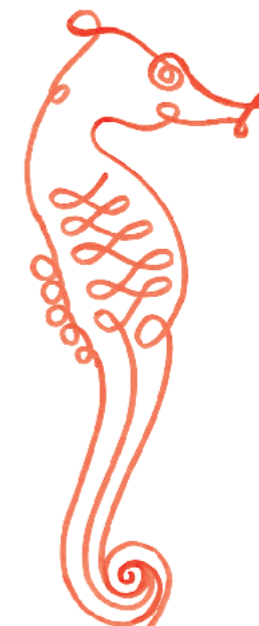


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Wide-angle scenes sometimes benefit from the 16:9 aspect ratio. Compared to the original 3:2 aspect ratio (first page), the 16:9 version simply looks "wider." Nowadays, more and more people are used to viewing images in "widescreen" proportions.



16:9

ther, offering its users seven different aspect ratios from which to choose (in-camera). However, Fujifilm's digital medium format cameras' native aspect ratio is 4:3. Different aspect ratios offered in the menu of a camera itself always come with a loss of pixels and resolution. However, with a 50+ megapixel sensor, there is a lot of ground to play with.

16:9

For decades, people have been used to viewing images in the 4:3 or 3:2 aspect ratios. This is, in some way, still the case; but in the meantime, a new player has entered the field—the 16:9 aspect ratio.

Known as HDTV Standard, this aspect ratio is now used in televi-

sion screens, computer screens and, last but not least, in all smartphone screens. But smartphones are a "critical case," as their screen aspect ratio is actually 9:16, simply dictated by users holding their smartphones (even when taking photos or movies) in a vertical position.

The 16:9 aspect ratio is also called "widescreen," and that is exactly what it is—a nice, wide proportion suitable for landscapes, and furthermore, perhaps suitable to attract the clients of tomorrow. Several early Panasonic compact cameras used the 16:9 aspect ratio, but modern digital cameras usually work with 3:2 or 4:3 aspect ratios, offering the 16:9 aspect ratio as a selectable in-camera option.

Making creative use of aspect ratios

Whether it is provided by your camera as a native or selectable image aspect ratio, or you just help yourself by cropping in post-production, an awareness of the impact different aspect ratios have will certainly improve the composition of your image. Not every image must be in a 3:2 aspect ratio, for example, just because this is what your camera provides. You often can improve composition by selecting a different aspect ratio in camera (some newer cameras support such functions) or by cropping your image in any image editing software of your choice.

You might lose some pixels, yes, and you might have a limitation in maxi-



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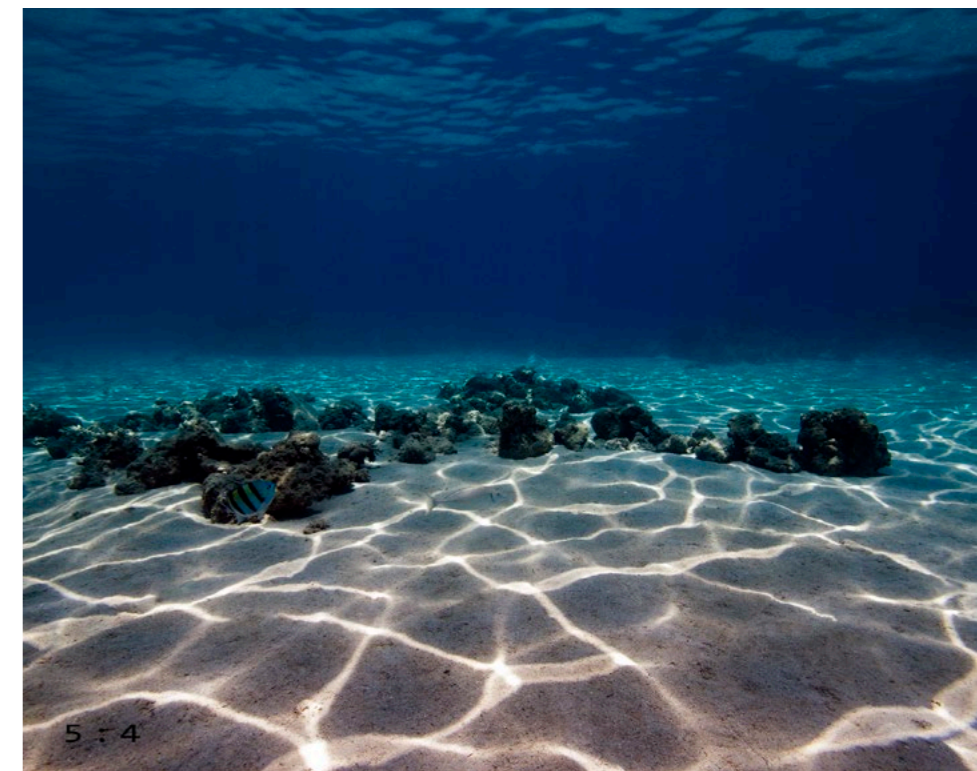
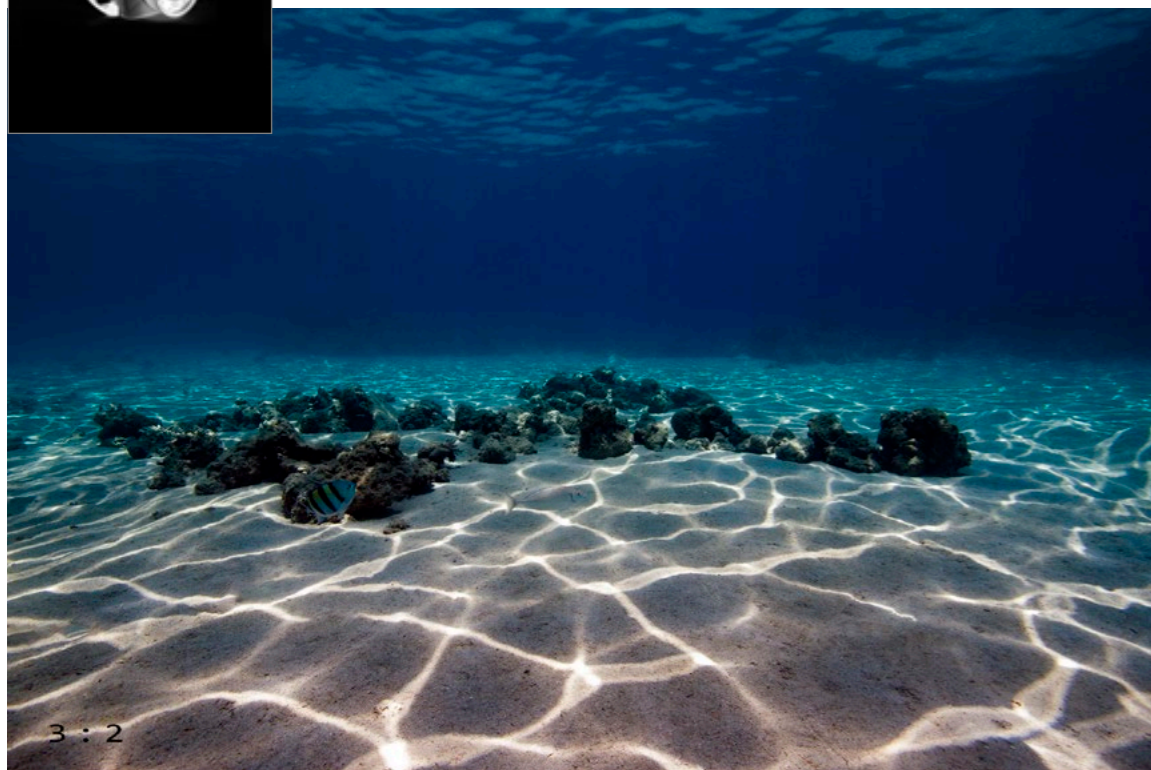
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photo & video

One and the same image in six different aspect ratios actually results in six different images. However, the original aspect ratio of 3:2 (below) works just fine. The 16:9 aspect ratio (bottom left) might be a possible alternative.



aspect ratio has a sort of "compact" visual output, which makes it suitable for close-ups, macro shots and fish portraits. This is also true for the 7:6 aspect ratio.

Last word

There are several image aspects ratios in existence. This article has just listed the most common ones in photography. Explore the possibilities. ■

It always pays to just give it a try. Try and check whether a different aspect ratio (other than the native one) improves your image or not. Luckily, image editing software such as Photoshop or Lightroom (and many other software programmes) offer you several common aspect ratios when you use the crop tool.

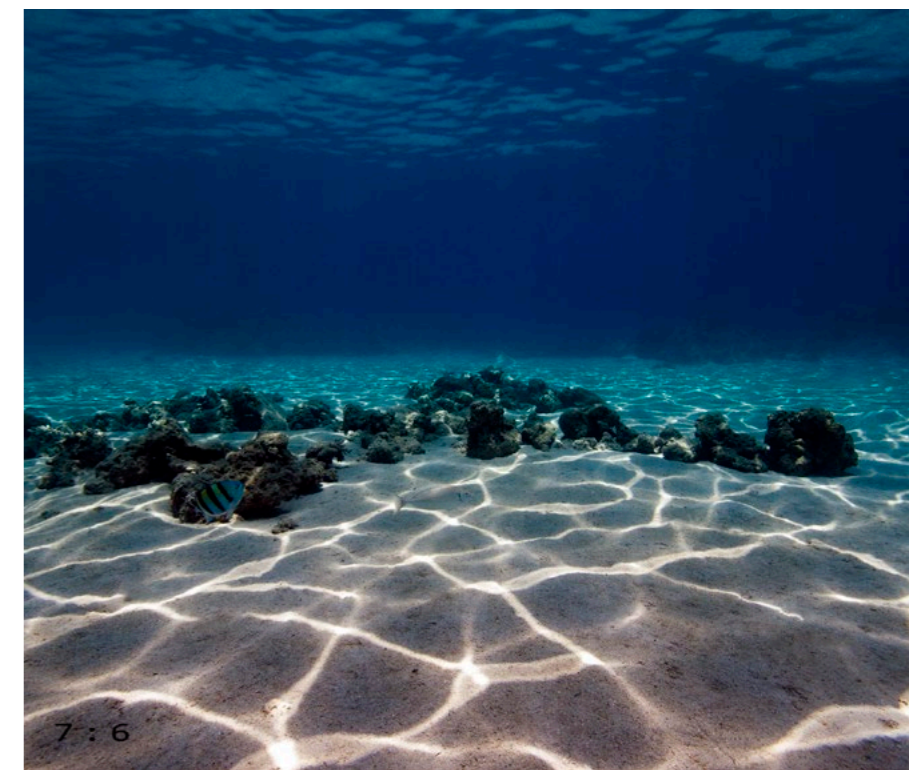
Rico Besserdich is a widely published German photographer, journalist and artist based in Turkey. For more information, visit: Maviphoto.com. See his latest book at: Songofsilence.com.

mum print size; but nowadays, where 24MP (megapixels) is considered "amateur class," 36MP is considered "mid-range," and 50MP (or more) is considered "professional," one should not worry too much. No one needs a 36MP (or even 50MP) image resolution to get a photo published full-page in a magazine.

much depends on the subject or scene being photographed. A 1:1 ratio might not work well with an underwater landscape scene, but a 3:2 or even a 16:9 ratio does. If a 2:3 portrait (vertical) proportion comes with slightly too much negative space, a 3:4 aspect ratio might be the better choice. The classic 5:4

However, when working with aspect ratios as a tool of image composition, it is generally recommended that one stick with common aspect ratios. A "fantasy aspect ratio" is, in terms of aesthetics in photography, a risky thing. It is better to stick with the standards, as these do exist for a reason.

Which aspect ratio to use pretty



SOURCES:
FEININGER, A. (1978). THE COMPLETE PHOTOGRAPHER. PRENTICE-HALL, ENGLEWOOD CLIFFS, NEW JERSEY, USA.
INTERNATIONAL PHOTOGRAPHY HALL OF FAME
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photo & video



Snoots for Inon flashes

The Snoot Set for the Inon Z-330 and D-200 strobes allows for six different beam coverages from approximately 20° to 80°. The set features an aluminum sleeve

that screws onto the strobes' threaded heat sink, and a telescopic rubber hood that fits onto the sleeve, and accepts either of the two included 1-inch diameter and 0.4-inch diameter brushed-aluminum snoots. Inon.jp



Remote control

When I spotted this strange-looking, boxy gadget in Keldan's booth at the Boot show in Düsseldorf, I had to inquire what it was. It turned out to be the prototype of an upcoming videolight controller with which the imagemaker can remotely adjust the output of two videolights directly from the camera housing. The principle is similar to the remote flash triggers, which are frequently used in photo studios, wherein the controller is mounted in the camera's hotshoe and used to balance various remote flashes placed elsewhere. In the same manner, this unit also controls the output of each videolight separately. The two lower dials—one for each light—simply turn the power up and down. The main difference from the studio flash controllers is that this unit controls video lights and wirelessly connects to them using ultrasound rather than radiowaves. Keldan says that the unit is currently still undergoing final developments, design tweaks and maturation for release on the market later this year. Keldanlights.com



Ricoh WG-6

Ricoh's latest top-of-the-line waterproof camera is depth-rated to 20m (65ft). It features a 20MP sensor, 28-140mm F3.5-5.5 lens and a built-in macro ring light. The six-LED ring light unit positioned around the lens allows for the use of a faster shutter speed to minimize camera shake and subject shake in macro and close-up photography. This feature also allows the photographer to choose specific LEDs to illuminate a subject more three-dimensionally and emphasize its delicate contours. The WG-6 has a built-in GPS and electronic compass, a 3-inch (non-touch) LCD, remote control receivers on the front and back and a USB-C socket. It is also capable of capturing 4K/30 video. Ricoh-imaging.co.jp

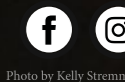


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Underwater Photographer of the Year 2019 and British Underwater Photographer of the Year 2019: "The Gauntlet" (right) by Richard Barnden of the United Kingdom

Underwater Photographer of the Year 2019 winners announced

Taking the top spot of this year's competition was British photographer Richard Barnden, who was named Underwater Photographer of the Year for his photo, "The Gauntlet," which captured the precise moment when a pack of gray reef sharks caught and ate a parrotfish.

Originally from Brighton, England, Barnden, 40, who now resides on Palau in Micronesia, described the events culminating in the shot taken on a night dive in French Polynesia: "As I descended, hundreds of sharks covered the bottom. This unlucky parrotfish flinched, and that tiny movement alerted the swarm of sharks. The mayhem hurtled straight towards me and I instinctively pressed the shutter. Moments later, all that remained was a rain of parrotfish scales in the darkness, and this photo on my camera."

Over 5,000 underwater photographs were entered in this year's competition by underwater photographers from 65 countries around the globe. This year's judges included experienced underwater photographers Peter Rowlands, Martin Edge and Alex Mustard. Mustard, who was Chair of the jury,

said: "I hope that you are as bowled over these winners as Martin Edge, Peter Rowlands and I were during the judging of the competition. UPY 2019 attracted more photographers than ever before, over 10% more than last year's record numbers, and entries came in from 65 different countries, meaning competition was fiercer than ever. As much as I love the category and special award winners, it is the entire collection I value most because it celebrates excellence across the different disciplines of underwater photography. It is a reminder that while

we are a specialist niche in the world of photography, ours is a very varied discipline. Please enjoy every single picture."

Other winners topping their categories included Spanish photographer, Eduardo Acevedo from Tenerife, who was named Marine Conservation Photographer

of the Year 2019 for his photo of a loggerhead turtle caught in a discarded fishing net. Acevedo said, "The turtles come to the Canary Islands by crossing the Atlantic Ocean from the Caribbean and have to avoid many manmade dangers, like plastics, ropes and fishing nets. This



Up & Coming Underwater Photographer of the Year 2019: "Paradise" (far left) by Taeyup Kim of Korea

Marine Conservation Photographer of the Year 2019: "Caretta caretta turtle" (lower far left) by Eduardo Acevedo of Spain

Wide-Angle category winner: "Gentle Giants" (left) by François Baelen of Reunion Island

Macro category winner: "Fast cuttlefish" (lower left) by Fabio Iardino of Italy

Wrecks category winner: "Big Guns" (below) by René B. Andersen of Denmark





photo & video

individual was one of the lucky ones because we were able to free it and recover the net." Judge Mustard added, "Plastic pollution and ghost fishing are ever-increasing, serious issues threatening the ocean; this sad image highlights both issues."

Taeyup Kim of Korea was recognized as a new talent, winning the Up & Coming Underwater Photographer of the Year 2019 for his technically-challenging, over-under shot entitled, "Paradise" Kim said the image of corals at a resort in French Polynesia was "physically tough to shoot holding the heavy camera exactly in this position while floating in the water." Competition judge Edge said, "A perfect under and over split. One of the best examples I have seen of this type of image for some time."

The title of Most Promising British Underwater Photographer 2019 went to Malcolm Nimmo from Plymouth, England, for his photo, "Marine Compass," which was captured while snorkelling in the Scilly Islands, in the United Kingdom. Nimmo said, "Maintaining both the surface features and subject illumination requires high strobe power settings, and hence, careful strobe positioning. Hopefully, this image highlights the

beautiful marine environments we are lucky to have around the UK."

Based in the United Kingdom, the annual Underwater Photographer of the Year competition aims to celebrate the diversity of underwater photography taken in oceans, lakes and even swimming pools. The first person named Underwater Photographer of the Year in 1965 was British photographer Phil Smith. Today, there are 13 categories challenging photographers in macro, wide-angle, behaviour and wreck photography, as well as four categories for images taken specifically in British waters.

Sponsors of the competition included: Agulhas House, Atmosphere Resorts, Backscatter, Crystal Blue Resort, Dive into Lembeh, Fourth Element, Go Aqaba, Magic Filters, Master Liveaboards, MV Halton Charters, Nauticam, Red Sea Diving Safari, Scuba Travel, Scubalamp, Sea Safari Cruises, Siladen Resort & Spa, Siren Fleet, Suunto, The Crown Estate, Thresher Shark Divers. ■

For more information, visit: underwaterphotographerofftheyear.com.



TOP ROW LEFT TO RIGHT: Most Promising British Underwater Photographer 2019: "Marine Compass" by Malcolm Nimmo of the United Kingdom

British Waters Wide-Angle category winner: "Off the Wall" by Robert Bailey of the United Kingdom

British Waters Living Together category winner: "Morning Tide Mackerel" by Victoria Walker of United Kingdom

CENTER ROW ABOVE LEFT TO RIGHT: British Waters Compact category winner: "Playtime?" by Martin Edser of the United Kingdom

British Waters Macro category winner: "Beauty in the Mud" by Arthur Kingdom of the United Kingdom

BOTTOM ROW LEFT TO RIGHT: Portrait category winner: "Fly high and smile" (far left) by Nicholas Samaras of Greece

Black & White category winner: "Between Two Worlds" (center) by Henley Spiers of the Philippines

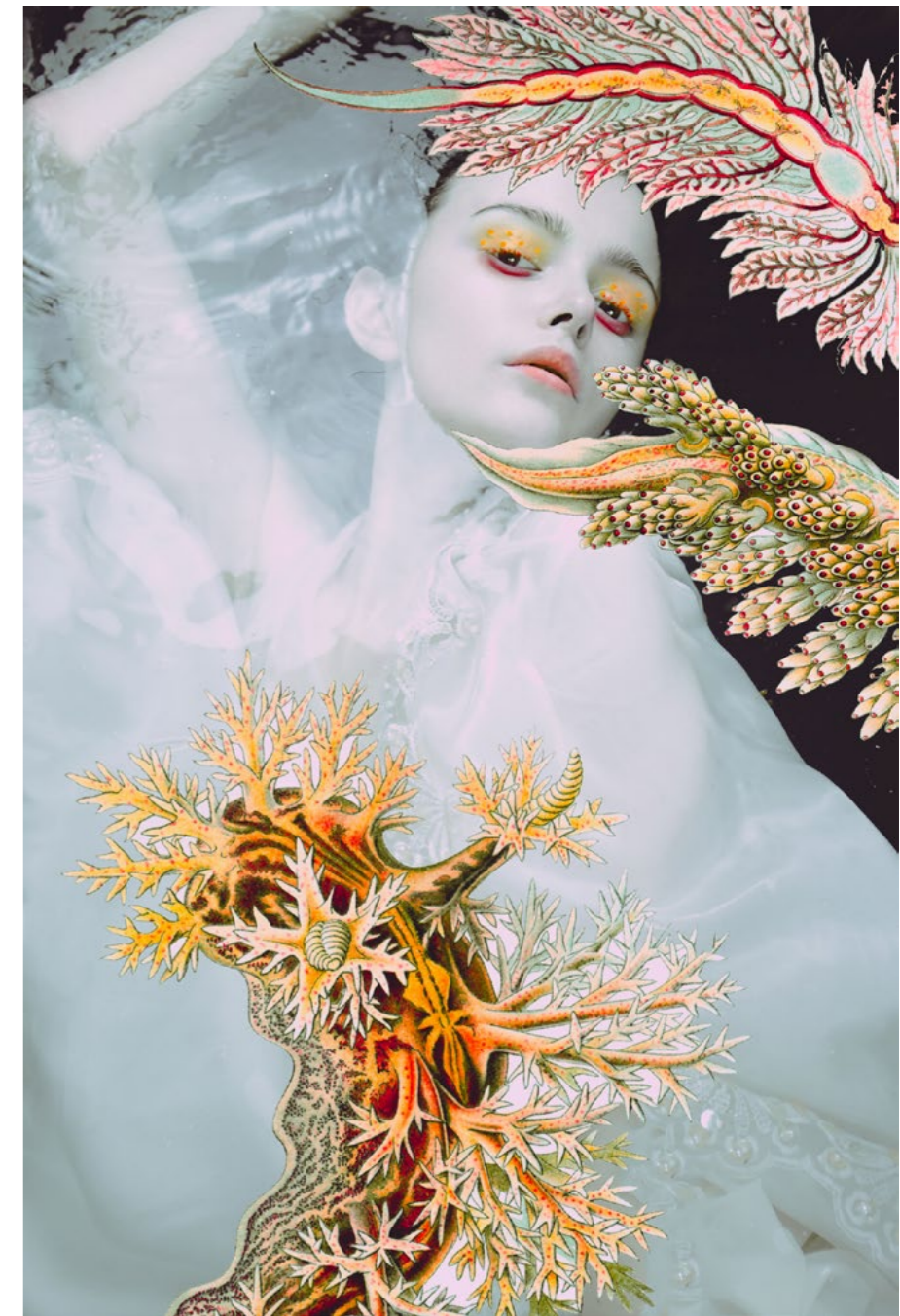
Compact category winner: "Hairy in the Sunrise" (left) by Enrico Somogyi of Germany



Mira Nedyalkova



P O R T F O L I O



Mira Nedyalkova

Text edited by Gunild Symes
All artwork and photos by Mira Nedyalkova

Mira Nedyalkova is a Bulgarian artist and photographer based in Sofia who creates stunning, sensual, surreal and evocative imagery by approaching photography and the element of water with the touch of a painter. *X-Ray Mag* interviewed the artist to gain insight into her thought-provoking art and her creative process.

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

MN: I have always loved photography as an art, but I started out with drawing and painting. Later in 2007, I discov-

ered photography as a means of expressing myself, and it completely replaced painting for me. My photographs are not exactly photographs, because I do a lot of editing in Photoshop, and my creations are somewhere between paintings and photography. Both arts, for me, are very similar and interrelated.

X-RAY MAG: Why marine life and underwater themes, and how did you develop your style of photography?

MN: Yes, the majority of my works are in the water; this, of course, is not accidental. From many points of view, for me, the water is a very suitable means for expressing what I carry



X-RAY MAG: What is your artistic method or creative process?

MN: It's different every time. Sometimes, I decide to shoot spontaneously, and I organize everything very quickly—in a day. When I do that, I like to improvise, and I usually either do not use any props or I just repurpose old ones from previous projects.

In other cases, I start out with whole concepts, with fully formed ideas and projects. In these cases, I start preparing earlier because I need to find specific clothing and objects, as well as a suitable model. I usually shoot for about four to five hours; but this, of course, includes coffee, water and chocolate breaks.

X-RAY MAG: In your underwater imagery, what locations, set-up and camera equipment do you use in your shoots?



inside me and recreating my ideas.

First, I will say that from a technical point of view, shooting water brings me great joy. Upon contact, water transforms light, shadow, shape and color in an incredible way, and the final effect is outstanding and always surprising. It's really inspiring to me.

From an artistic point of view, the water is my creative vehicle. Creation, life, power... water is filled with tremendous energy. It gives both pleasure and delight. It gives life, but also poses a risk and a threat. It can destroy us.

I love the transparency and purity of water, and the light, reflections and transformations that result when it is in contact with another medium. For me, water is a highly erotic element precisely because of the opposites that it brings. Water is the thing that quenches our thirst and saves us in our lust for life, our thirst for love, our eternal struggle and our attempts to erase, to dull or to heal our pain, sadness and loneliness.



THIS PAGE: Digital compositions from the *Element Like Deity* series by Mira Nedyalkova



Digital composition from the *Element Like Deity* series by Mira Nedyalkova



MN: Actually, I do not shoot underwater, so I do not use any special underwater equipment. I take my photos using a large aquarium, which the models enter, and I shoot through the glass.

X-RAY MAG: Please tell us about your series *Element Like Deity*. What was the inspiration for this series?

MN: For this series, I was inspired by the German biologist and artist Ernst Haeckel and his incredible illustrations of marine animals. My idea was to merge the beauty of the model (representing our human race) with the beauty of these marine organisms into a perfect symbiosis.

X-RAY MAG: What is your relationship to the underwater world and marine life and where have you had favorite experiences?

MN: I love nature and animals very much, and I also love the sea and the entire underwater world. My dream is to be able

Digital black-and-white compositions from the *Countdown* series (left) and *Origins* series (below) by Mira Nedyalkova

Mira Nedyalkova

to live on the seashore so that I can enjoy it constantly, observing all of its forms and states.

X-RAY MAG: What are your thoughts on ocean conservation and how does your artwork relate to these issues?

MN: A very large topic, this is a global and very serious problem, affecting not only the seas but also our entire environ-





ment. With our constant technological progress, we are responsible for the problems and the climate changes on our planet, and we do not realize the consequences of it.

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

to make my audience look deep inside themselves, feel life with all of its beauty and pain, and appreciate it for the small, simple things that are its essence.

X-RAY MAG: What are the challenges of being an artist in the world today?

MN: Creating for me is an internal necessity. I would not call it a challenge—it's

MN: With my works, I am trying just something I need. This is my therapy, the best way I manage to reveal my inner world. I believe that in this way, I am reaching out to many people who need to feel it as well.

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

MN: I often receive emails from people who write to me with a lot of emotion about how my art has affected them. Often their response has been so strong

Some others are new and maybe not clear yet.

It often happens that, even when I have projects and ideas ready to be put into practice, I might start on something new that just popped into my mind. I prefer to do things spontaneously and in accordance with my mood, with the people who are around me, and with my free time.



THIS PAGE: Color underwater photographs from *La Femme Parallel* series (far left), *Sanctuary* series (left), and *Heart Space* series (below) by Mira Nedyalkova

that they have cried while looking at one of my pictures.

Part of the audience is afraid of looking at my works, linking everything to death, even if it is beautiful. Others feel bliss, total peace of mind and inner calm. Whatever the emotion is, it's always there, and that's my main desire. Emotions are the engine of our existence, our real and most faithful way of communicating.

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

MN: I really have many projects in my mind. Some are a bit old and not realised for various reasons.

Mira Nedyalkova

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

MN: I would like to thank them for the support, attention and love they give me, and I promise them that I will continue to do what I love, and I will always be honest with myself and with my audience. ■

For more information, visit the artist's website at: miranedyalkova.com.

