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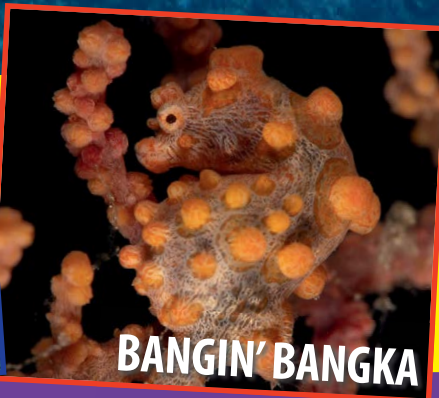
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An underwater photograph of several dolphins swimming in clear, turquoise water. The dolphins are the central focus, with their sleek bodies and dorsal fins visible. The lighting is bright, creating a vibrant blue atmosphere. The text is overlaid on the top left and bottom left of the image.

SHARM EL SHEIKH

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The Red Sea resort of Sharm el Sheikh, situated at the southern point of the Sinai, has some of the world's most celebrated diving attractions around its shores. The world-famous Ras Mohammed National Park is located at the very tip of the Sinai Peninsula where deep water upwellings generate incredible coral growth, particularly on the signature sites of Shark and Yolanda Reefs.



During the summer months this area is also a hotspot for schooling snapper, barracuda, batfish and unicorn fish. Marine encounters recorded by divers on these life-filled sites also include whale sharks, manta rays and dolphins.

Head north from Ras Mohammed to the Strait of Tiran and you will find a coral garden described by scuba diving pioneer Jacques Cousteau as one of the most spectacular reefs he had ever seen. The steep-sided walls of Jackson Reef are where you will find some of the most beautiful coral cover in the Sinai region, including the famous rare red anemone. Strong currents, most profuse at the edge of Jackson

Reef, attract an abundance of pelagic fish particularly during the summer months. In the less wind-swept and calm days of summer, boats are able to dive the north side of the reef. Although far from guaranteed, the chance to see the resident school of scalloped hammerhead sharks is well worth a dive in the blue water.

Wrecks are also a major pull for visitors, with one of the most famous sunken diving attractions located just a few hours' boat ride from Sharm. Voted time over as one of the best wreck dives, the *Thistlegorm* alone attracts scuba visitors from all over the world to the northern Egyptian Red Sea resort.

If you don't want to travel far to a dive site, or like the idea of half-day trips, you can opt to go local. Sharm's local reefs are excellent for training and photography, and at the right time of year throw up their own spectacular surprises. From the months of May to September it is not unusual to spot the odd manta ray or whale shark passing by as they follow the plankton.



Getting aboard in a new world

FREDA WRIGHT, who pens DIVER's popular recipe column, was explaining how coronavirus had affected business. Everyone in the diving community has their own story, but hers seemed to sum up neatly the current mood of uncertainty and trepidation entwined with strands of optimism.

Freda and her husband Al run one of the best-known UK diving liveaboards, out of Portland. "It is a worry how and when we will be operational again," she told me. "As soon as we're allowed we'll have to do the best we can to get *Salutay* cleaned up and painted ready for our first charter. Divers are being very co-operative and thanking us for rescheduling later in the season, or even next year!

"We just hope we can scrape through this year and have a busy season in 2021. Maybe because diving abroad will be put on the back-burner for some time, divers will start to appreciate British diving even more. It could even boost our economy, and be like it was 20 years ago!"

Out of nowhere, an uncaring virus has thrown the dive industry up in the air, as reflected in this month's news pages. When the pieces land, the scenery will look different.

Overseas travel won't be off-limits but it will be altered for some time to come, if only because of long-term effects on the aviation business. Which has its upsides in terms of reducing pollution, and if UK diving gets a shot in the arm, as Freda suggests, that will be a welcome boost for the industry. But we still need to reach the world's other scuba hotspots.

It's said that resorts have built-in survival capacity, because ultimately the owners are in the property business, used to weathering off-seasons and with paying guests a bonus. We'll find out how true that is. Dive-centres and perhaps liveaboards could be more vulnerable.

A CLUE TO THE practical shape of future diving comes from Nautilus Dive Adventures, famed for its liveaboard trips run from Mexico out to the Socorro area of the Pacific. With lockdown set to end in Mexico by June, and flights available from the USA and Canada, where Nautilus is based, it hopes to be heading back out in late June.

It's a 150-mile journey so, you might think, one of the most challenging operations to undertake in the current climate. I was interested to see the safety measures being put in place.

"We're taking a cautious and thoughtful approach to onboard sanitation and hygiene," says Captain Mike Lever. Guests have to monitor and record their body temperature twice a day the week before boarding.

Temperature and health checks continue aboard, with divers and crew wearing face-masks in public spaces. Hands-free sanitation stations are located on the back-deck, but "mask-rinse buckets are unfortunately a thing of the past", we're told.

Fogging machines dispense hospital-grade disinfectant. Rental gear comes in sanitised vacuum-packs, while a crew-assisted buffet service takes care of meals. People do get sick on these long crossings anyway, but if anyone shows Covid symptoms? "Protocols and equipment are in place."

Here in the UK, meanwhile, we go on diving virtually in a thousand ways – dreaming of the day we can add water.

FIRST IN



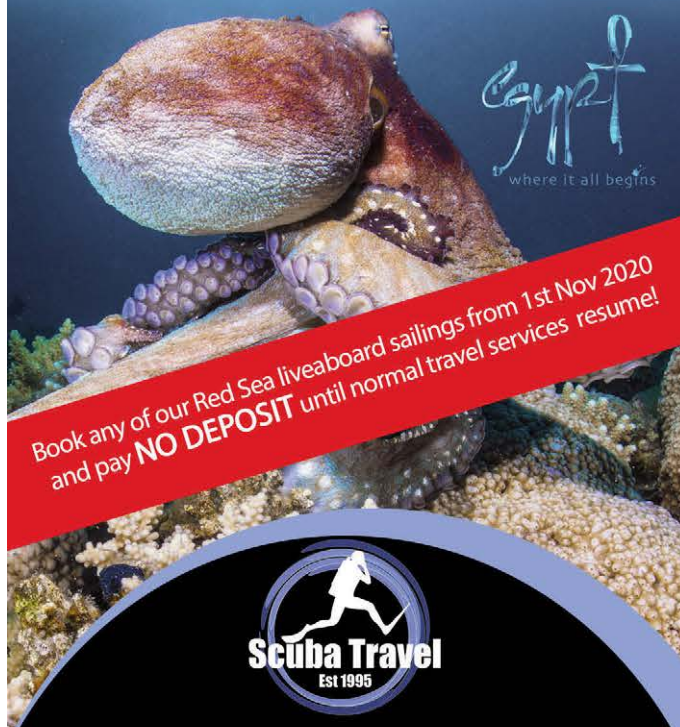
STEVE WEINMAN,
EDITOR

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Published monthly by Eaton Publications Ltd,
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DIVER is distributed by Seymour Distribution Ltd,
2 East Poultry Avenue, London EC1A 9PT
and printed by Pensord Press Ltd,
Tram Road, Pontllanfraith, Blackwood, NP12 2YA.

the magazine that's straight down the line...

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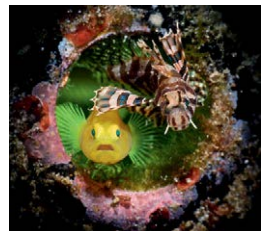


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UK diving frozen through lockdown – with a few regrettable exceptions

TWO HAPLESS DIVERS were fined after demonstrating why the Coastguard insisted early on that leisure diving should be suspended under the UK's lockdown conditions.

The unnamed men, one of whom was reported to have travelled to Lyme Regis in Dorset from Edinburgh and the other from Wadebridge in Cornwall, were fined an undisclosed amount by police after triggering a major search and rescue operation.

One of them had gone missing on a dive off Lyme Regis, Dorset on the afternoon of Saturday, 25 April.

The two had been diving from a boat, but when one failed to return from his dive the other called the Coastguard at 3.23pm. This led to the launch of two RNLI lifeboats from Lyme Regis and Exmouth, two search and rescue helicopters from St Athan and Newquay, and the Coastguard rescue team from Lyme Regis.

Nearby vessels including HMS *Tyne* and two fishing-boats also assisted in searching for the missing man, with a sailor from the warship said to have spotted the diver three miles from where he had gone missing.

"The diver, who had been diving without a buddy, was found safe and well by the lifeboat from Exmouth shortly after 5pm," reported the Coastguard. "He had surfaced safely but had lost sight of the dive-vessel after his line became detached.

"Both of those on board the boat had been diving as a leisure activity and were fined by police after being brought back to shore.

"The Government has been clear that during this coronavirus pandemic

we need to #StayHomeSaveLives.

"Leisure diving is not essential and every 999 call made could put our frontline responders at risk of Covid-19 and places avoidable pressure on our vital NHS services.

"So please – stretch your legs but not our resources."

Most divers appeared to have been observing the emergency rules, imposed at what would normally be the beginning of the UK diving season. However, on 8 April one man

was found night-diving in a shipping lane outside Poole Harbour in Dorset, while another diver trying to beat the ban under cover of darkness was spotted off Brighton a few days later.

Referring to the diver who provoked the 10.45pm Portland call-out, the Coastguard stated: "We were tasked to give safety advice for the danger he placed himself in, and also the risk he put others in during these difficult times.

"Water activity isn't really suitable due to the greater risk to themselves and the emergency services should anything happen to them."

The Coastguard also pointed out that decompression chambers were running at reduced levels with some, such as that at Princess Elizabeth Hospital in Guernsey serving Channel Islands divers, suspended altogether as resources were prioritised to deal with the pandemic.

Channel Islands divers were warned that if they ignored restrictions and got into difficulties they would be liable for the costs of being transferred to the UK mainland for medical treatment, as well as for the treatment itself. ■



The Coastguard has pushed to prevent unnecessary strain on emergency services' resources.

Diver medics on Covid front line

HUNDREDS OF commercial-diving medical support staff started volunteering during March and April to reinforce the National Health Service in its battle to treat the worst-affected Covid-19 patients.

Risk-management company AMDP Response Development led the recruitment campaign among certified diver medical technicians (DMTs), life support technicians (LSTs) and offshore medics (OMs).

"The NHS is stretched and patients need care," it said. "DMTs and OMs deal with mixed-gas life-support and are well-placed to make a great contribution to the Covid-19 response."

AMD's campaign was being co-ordinated by Dr Michael Von Bertele, a former director general of British Army Medical Services and humanitarian director of the charity Save the Children

International. He said that assistance was initially offered to the NHS as a whole and the administrators of the London ExCel and NEC Nightingale emergency hospitals, and that it was agreed to undertake recruitment and enabling fast-track training of the technicians.

The volunteers, already trained to understand the effects of gases under pressure, though usually supplied through a mask rather than a ventilator, were required to undertake short periods of training before being assigned to operational tasks in hospitals.

They would normally be employed by diving contractors and offshore operators, with AMDP works "to enable safe, efficient operations", but most commercial-diving operations remained suspended. ■

CLOSED-CIRCUIT REBREATHER

UK REBREATHING MANUFACTURER

Lungfish Dive Systems switched its attention from CCR diving to its founder's initiative to transform into hyperbaric oxygen chambers some of the thousands of commercial aircraft grounded close to population centres by the Covid-19 pandemic.

"At the current casualty rates, if the treatment proves effective one day's difference in response speed could mean a difference of thousands of lives saved," said diver and Lungfish founder Dr Daniel Reynolds on 23 April.

Fewer than half of coronavirus patients placed on ventilation were surviving the virus at the time. Hyperbaric oxygen therapy (HBOT), the breathing of O₂ under pressure, could prevent them deteriorating to the level at which they required ventilation, said Reynolds – but shortage of HBOT chambers had

prevented adoption of this approach.

"I'm sure this idea will have occurred to lots of divers – in fact we often talked about it before the crisis became truly serious," he told **DIVER**. "If oxygen helps, why not have more oxygen? However we, like everyone else, assumed that ventilators would be enough to cope as long as we had enough of them, and didn't give it serious thought."

As Lungfish became involved in ventilator design to help cope with the coronavirus crisis, Reynolds asked clinicians why ventilated patients had such a low survival rate, even using top-end kit. "When we heard... that they died of multiple organ failure through chronic hypoxia, despite being ventilated, we immediately considered that hyperbaric O₂ might be a solution."

Lungfish consulted its contacts in hyperbaric medicine, aerospace, and

Covid-19 lung effects cause diving doctor concern

AN INDICATION THAT scuba-divers should be especially wary of contracting the Covid-19 coronavirus – and cautious if in recovery – has emerged from a report by a senior doctor in Austria.

Dr Frank Hartig, himself a diver, heads the emergency unit at Innsbruck University Clinic and is crisis co-ordinator for Covid-19 patients.

He told the Austrian Press Agency in April that he had observed “massive changes” in the lungs of patients who have recovered from the infection – even though their cases had not been deemed serious enough to warrant admission to hospital.

“This is shocking, we don’t understand what’s going on here,” said Dr Hartig, who was concerned that for divers the lung changes could significantly increase the risk of accidents under water.

Six active divers were among Covid-19 patients seen at the hospital during the coronavirus pandemic, though none was considered to need hospital treatment. After several weeks all six were declared to have recovered, and showed no outward residual symptoms beyond coughs

and “reduced performance.”

Yet according to Dr Hartig their lung CT scans suggested that the damage sustained could be “irreversible.”

“They are probably lifelong patients,” he said. “As an emergency doctor with 20 years’ experience, you gulp when you see something like this in a 40-year-old patient.”

Two of the divers showed significant oxygen deficiency when under stress, normally a sign of persistent lung shunt.

Two displayed the kind of symptoms usually observed in asthmatics, and in four cases the scans revealed such significant changes to the lungs that Dr Hartig had to check with the X-ray department that the files hadn’t been mixed up.

The doctor said he wanted to issue a warning to all divers because, while he couldn’t tell how long the effects



would last, he found it difficult to believe that his patients’ lungs could heal completely.

“After a Covid infection, even if you have had only mild symptoms and your medical certification to dive is still valid, you should definitely have a diving doctor examine you thoroughly before diving again,” said Dr Hartig.

He also cautioned against diving using elevated levels of oxygen, such as when using nitrox, suggesting that this could be dangerous if the lung tissue was still sensitive.

And he said that any coronavirus patients hoping to dive again in the short term should be very cautious, because scientific studies would not be available before 2021. ■

DAN tackles restart queries

DIVERS ALERT NETWORK (DAN) Europe has issued a downloadable document called *Covid-19 And Diving Operations: 10 Safety Recommendations* that is likely to prove useful for anyone organising diving when lockdown conditions are eased and activities are able to resume. While intended primarily for dive professionals, it could also provide useful guidance for clubs.

The document is based on questions received from dive operators and professionals on the procedures to be followed.

“The epidemiological and regulatory situation is constantly evolving,” says DAN. “At present, there are no clear answers to all questions. However, as an organisation closely linked to the diving community and committed to promoting diving safety, we intended to share our knowledge and experience.”

10 Safety Recommendations offers guidance on risk-mitigation for diving operators through answers to the most frequently asked questions and practical tips on matters such as wearing protective masks and gloves, though DAN includes the proviso that it might be subject to changes and updates based on scientific advice and feedback from the community.

The document can be downloaded from daneurope.org ■

MAKER PUSHED FOR AIRCRAFT TO BECOME HBOT CHAMBERS



Dan Reynolds: ‘If oxygen helps, why not have more oxygen?’

other areas such as civil engineering to find a way to scale up the concept.

Commercial airliners can be pressurised to around 1.6 times atmospheric pressure – the required level for potential effective treatment. “We’d imagined to start

with that the treatment might be akin to the long stays at pressure used in treating decompression illness,” said Reynolds.

“However, it seems at this stage that the effect of HBOT in suppressing inflammation could be

just as important, if not more, than overcoming the diffusion barrier of a compromised lung.

Experiments in Wuhan in China showed improvements in patients after relatively few short treatments.

Reynolds maintains that aircraft used as makeshift HBOT chambers could relieve pressure on hospitals by treating large numbers of patients in a non-invasive way to prevent them requiring full intensive care.

The therapy could also benefit the developing world, where fewer treatment facilities are available.

Reynolds told **DIVER** that he first approached the government about the idea in early April, and believed its inaction was the result of a lack of conclusive clinical trials.

These had not taken place, he said, because the hyperbaric industry had issued guidelines against treating patients with Covid-19 for fear of unknown complications or spreading

the virus. “The guidelines are absolutely not a ban on trials for Covid-19 – however, they give that impression, despite the fact that expert medical opinion is quite the reverse,” said Reynolds.

He also said that hospital-based chambers best suited to clinical trials in the UK had closed, with staff occupied in treating patients, while overseas trials had been held up by finance, approval and patient-recruitment issues.

However, the aircraft industry had taken “positive steps” to implement the plan quickly should the clinical trials prove successful.

“We have been offered both aircraft and hyperbaric chambers with which to do the trials and treatment, and at least one major airport, currently closed, has signalled willingness to help.”

A clinical trial was due to start at a Canadian hospital. ■

Travel: where do we go from here?

HOW DID THE CORONAVIRUS crisis look from the perspective of a specialist UK dive-tour operator, and what does the future hold? **DIVER** asked Phil North, head of one of the best-known companies, Dive Worldwide, these and other questions in early May.

Is everyone keeping well?

All the team are safe and well. It's "business as usual" and our teams across the sales, operations and marketing departments are fully working.

Everyone is set up to work from home with complete access to all our phone-lines, emails and internal systems, so we can support clients and manage bookings easily.

We all work closely and communicate daily with Zoom calls, which the teams really appreciate.

We've been operating for more than 20 years, and as part of The Natural Travel Collection we're well placed to combat this difficult period. We're taking new bookings and interest in our holidays is increasing weekly, which is good news.

One moment the Foreign Office advice was that it was OK to travel to many diving destinations, then suddenly all but essential travel was stopped. Do you feel you and your clients were given enough official warning of what was likely to happen in the early days of the pandemic?

Essentially, no! The situation moved incredibly quickly, and initially the expectation was that travel would be restricted to a number of destinations but a blanket travel ban was unprecedented.

Did you already have contingency plans in place by that point?

While the situation was evolving at a great pace we had a crisis-management procedure in place, so were able to react quickly. Usually when issues arise that affect travel to a particular destination we're able to offer alternative holiday arrangements but with the borders closing up and then a total ban on non-essential travel, this was not possible.

Our priority was to contact all our divers who were on holiday with us and arrange their journey home.

What challenges did you face in getting those divers home? Did you manage to get everyone back safely without incident?

In the initial stages of the pandemic

the situation was changing daily – in fact hourly at times – so one of the biggest challenges we faced was keeping up to speed with the travel-advice updates from the FCO.

Flight schedules and quarantine regulations kept changing and country borders were closing quickly, but our operations and sales teams worked together around the clock to ensure that we repatriated our clients as quickly and smoothly as possible.

The benefit for clients booking through a reputable tour operator was that, while we made contact with them overseas, they could also use our 24/7 emergency telephone number at any stage if they needed to.



With access to contacts around the world and multiple airfares we



made all repatriation arrangements, reducing the worry clients experienced at such a difficult time.

Have many divers who had already booked trips asked for their money back, or are they generally willing to postpone?

Despite media reports and insurance companies passing the buck, many of our clients are understanding of this challenging situation and simply want to postpone their holidays so they can dive again as soon as it's safe to do so.

We're doing all we can to support our clients through this extraordinary time and have set up a page on our website to provide details of our approach to the situation.

The diving community is amazing and generally clients are sympathetic to the huge challenges that the whole world faces.

And are they responding well to the chance to book ahead on a no-deposit basis?

Yes, we've had a good response to our flexible approach to deposits for new

bookings. We're finding that clients are increasingly looking to the future and wanting to start to plan their next dive adventure, so our Flexi Booking Promise provides the opportunity to book a trip without the worry of paying a deposit in this uncertain time.

Can you break down the sort of enquiries you're getting from clients?

We're receiving enquiries for the usual popular diving destinations, which include the Maldives, Indonesia, Egypt and some in the Caribbean.

Restarting flights and lifting quarantine restrictions depends on the approaches of many different countries, but what will need to happen for overseas travel to resume, and how do you see it rolling out?

As the world recovers, our expectation is that destinations may open up in stages, with certain areas that have possibly been less affected by the

able to welcome guests to their resorts and liveaboards. Unlike in the UK, there is little or no government support to help.

Some are making use of the time to renovate if funds allow, but generally they're looking forward to the future when divers are able to travel again. And if divers want to help, they can start booking their dive-trips.

Do you foresee more demand for shorter-haul trips in future?

Not necessarily. We believe that the usual favourites will remain popular for our divers. We predict that destinations that offer a direct flight will be favoured, and expect that multi-centre trips will take a bit longer to recover.

Many of our short-haul dive trips are based around flights with low-cost airlines so require immediate payment, which means that divers would need to commit earlier than perhaps with some long-haul destinations, where we can hold airline seats for a period of time without payment.

Is the UK dive-tour trade co-operating during the pandemic?

We have a great relationship with our friends in the dive travel industry and communicate regularly to try to support each other where we can. Our overseas suppliers rely on income from tourism and we're all keeping positive and looking forward to the world opening up for travel again.

Do you see diving holidays being permanently reshaped by the crisis? Might there be any positives in the longer term?

One consequence of the Covid-19 pandemic is that many of us have had time to think about changes we would like to make when we emerge after lockdown. We hope to see an uplift in people wanting to learn to dive, because many are looking to push boundaries and learn new skills.

In the short term, because there are fewer divers in the ocean corals will have time to recover, and once the world opens again and we can travel we imagine that dive-sites will initially be less crowded.

Longer term, we hope that this pause in international travel gives time to reflect, and that in the future the benefits of travel remain but the aviation industry adapts to ensure that we can fly as carbon-neutrally as possible. ■

outbreak and also those more reliant on tourism opening up first.

We think the Caribbean may be welcoming visitors again soon and could be a good option, along with the Maldives. It is obviously still quite a dynamic situation, however, so things might change. That's why we've introduced our Flexi Booking Promise so that our clients have peace of mind while things remain uncertain.

Ultimately divers will also be looking for value, so we're offering some great special deals and are in the process of securing some more exclusive deals. As a worldwide specialist we're in a great position to be able to offer travel to dive destinations as soon as they open up.

How are your resort and liveaboard operators managing without guests? Are any destinations especially problematic?

Many of our overseas partners are finding the situation incredibly difficult, and are really sad not to be

BSAC calls on divers to back the industry

THE BRITISH SUB-AQUA CLUB called on members and, in its role as UK diving's governing body, all scuba divers to get behind the hard-pressed diving industry during lockdown – arguing that it was in everyone's interests for businesses to survive until restrictions can be lifted.

"Some diving businesses, such as the UK charter-boats, have slipped between the cracks of the government's relief funding, making the situation even more challenging,"

pointed out the training agency, which came up with an 11-point plan for ways in which divers could help to prop up the trade.

These included six measures that it said involve no financial outlay. Half of these required online engagement, such as rating favoured companies with positive online reviews; engaging with social-media posts and entering competitions; and sharing picture and video content involving dive-businesses.

Two suggestions involved projected dive-trips for those who had already made advance payments: "If you are able, consider postponing your plans instead of

cancelling," said BSAC, pointing out that this could make the difference particularly for smaller dive companies. It also posited using time to plan trips through online research and direct contact with suppliers.

BSAC also said that the extended surface interval was a good time for divers to convince friends and relatives to take up diving. Although it would hope that this would occur through its own e-learning options, other training agencies have also been active in promoting e-learning during lockdown, with RAID notably declaring all its online programmes permanently free at an early stage of the global pandemic.

Suggestions for divers that did involve a financial outlay included auditing dive-gear and investing in new or replacement items; giving kit vouchers to other divers for their birthdays; booking in kit for servicing at a local dive-shop, possibly paying in advance; and arranging future holidays now with ABTA- and ATOL-bonded companies for protection.

Many tour-operators in any case now offer no-deposit schemes. ■



RAMPIXAL.COM

FACE-MASKS: PADI & AP DIVING STYLE

SHOULD WE BE THINKING about obtaining face-masks for ourselves, helping to provide them for frontline healthcare staff, or both?

As training agency PADI launched a range of face-coverings using ocean-recycled materials, UK dive-gear manufacturer AP Diving were tackling a continued shortage of personal protection equipment, particularly for care-home staff.

Non-medical-grade masks for the public are intended to stop wearers spreading a virus rather than directly protecting the wearer, so are as effective as the number of people who use them.

By the start of May official advice around the world (including the UK) appeared to be shifting towards encouraging wider use of masks when lockdown conditions are eased.

PADI linked up with Irish rash-vest manufacturer Rash'R, which had already produced its own range of non-medical-grade face-masks with disposable PM2.5 filters. They are made from "Ocean Balance" polyester fibre recycled from plastic bottles, fishing nets and other materials reclaimed from the sea.



The double-layered reusable masks are said to be machine-washable and quick-drying and are available in one adult and one child size at one price, £17.20. Each comes with five carbon-activated filters, which work for up to eight hours. Replacement filter packs of five cost £8. Designs feature great white, geometric, blue and whale sharks, manta rays and divers.

PADI says it will make no profit from the masks. "We wanted to give divers an opportunity to make a difference in an issue that, as ocean-

lovers, we care deeply about – plastic pollution," said marketing vice-president Lisa Nicklin. The product can be ordered from padigear.net

Meanwhile staff at UK dive-gear manufacturer AP Diving were concerned about shortages of masks among front-line community care-workers, and raising cash to boost production of washable face-masks with replaceable filters to help protect these staff from Covid-19.

Operating as Cornwall Masks, a small team of volunteer sewing-machinists started making the face-masks at their homes.

They were then collected, steam-cleaned and sealed by AP marketing manager Jeff Parker, who designed the initial mask, before being distributed free to care-workers.

In the first week Cornwall Masks produced 220 masks but wanted to boost output by getting more volunteer machinists and materials, especially the expensive replaceable Hepa-Flo filter inserts, elastic and nose-clips.

They launched a crowd-funding appeal in a bid to raise the necessary funds at justgiving.com. ■



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Devon's Tiger wrecks protected

THE WRECKS of two WW2 US Landing Ship Tanks (LSTs) that lie 50m deep off the Devon coast have been granted "heritage protection," 76 years after being torpedoed during a rehearsal for the D-Day Allied invasion of Normandy.

Historic England (HE), which recommended the move to the Department for Digital, Culture, Media & Sport (DCMS), announced that the amphibious vessels *LST-507* and *LST-531* wrecks had been scheduled and added to the National Heritage List for England.

Scheduling means that divers can still dive the sites without a licence but that the wrecks themselves and their contents are deemed protected. "Although all cases are determined on a case-to-case basis, DCMS is moving more towards scheduling wreck-sites," HE told **DIVER**.

Exercise Tiger took place off Slapton Sands in the run-up to the 6 June Operation Overlord landings. Live-fire rehearsals for British and US personnel were considered vital because no combined operation on such a scale had ever been mounted.

The two 100m LSTs that were lost had been launched in Indiana the

previous year. Along with the large numbers of personnel, they were carrying tanks, trucks and other military vehicles that would have disembarked through the large doors built into the vessels' bows.

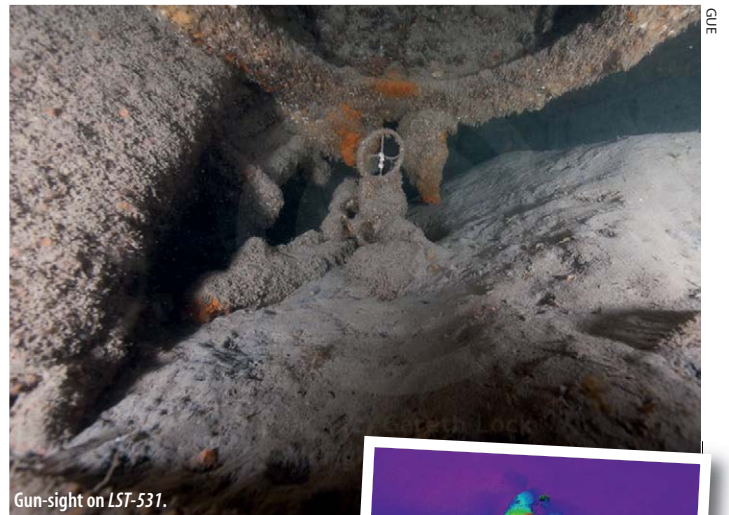
A torpedo struck the engine-room of *LST-507*, which was carrying nearly 500 US army personnel, trucks and 22 amphibious vehicles. With the power gone the lifeboats could not be lowered, and fires broke out in the tank deck, causing petrol tanks and live ammunition to explode. More than 200 servicemen were lost.

LST-531 was struck by two torpedoes and explosions were followed by a fireball. Ammunition started firing from the bow guns and surviving personnel jumped into the freezing sea amid burning fuel-oil.

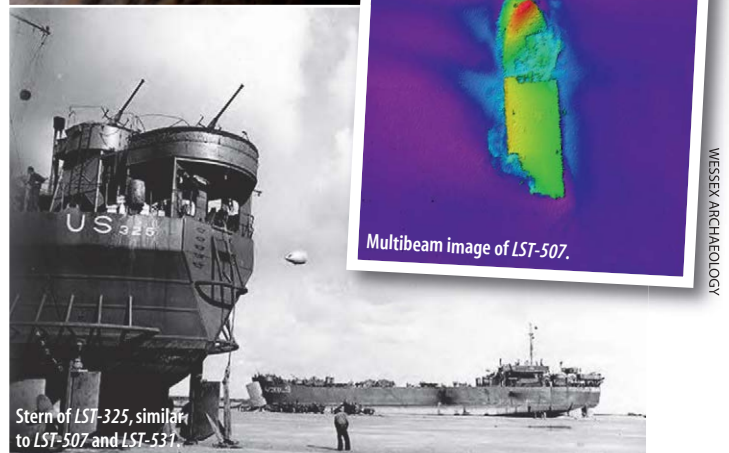
Many others were trapped below decks as the ship rolled over and sank within six minutes. Some 424 died.

Further lives were lost when two other LSTs were severely damaged in the attack.

The designation came shortly before commemoration of the 75th anniversary of the end of the war in Europe on 8 May. "We're delighted at the scheduling of these two LSTs,



Gun-sight on *LST-531*.



Stern of *LST-325*, similar to *LST-507* and *LST-531*.

Multibeam image of *LST-507*.

GUE
WESSEX ARCHAEOLOGY

which we investigated during the 75th anniversary of D-Day last year," said Dan Atkinson, coastal & marine director at Wessex Archaeology. "The work we have done has not

only helped to ensure that their importance to the story of D-Day is recognised, but it also complements the work to record them by volunteer divers." ■

BABY OCTOPUS LEADS DIVERS TO SPARKLER

IN CANADA, where scuba-diving had resumed by late April, a baby octopus was credited with helping divers track down a lost diamond ring.

Annika Parkinson-Dow, 26, went swimming in Howe Sound near Bowen Island, Vancouver one evening, according to a CBC report, moving her hands around to stimulate bioluminescence in the water.

Back on shore she realised that she had lost her engagement ring, a 1930s heirloom that had belonged to her fiancé's grandmother. Though unable to pinpoint the area where she had been swimming, she hired a team of divers from a local club to carry out an underwater search the next morning.

After an hour's fruitless search in murky conditions the divers were about to give up when they saw the octopus and followed it. They then

saw something glinting and realised that it had led them to the ring.

Chris Harley, a zoology professor at the University of British Columbia told CBC he didn't think this was a coincidence.

"Octopuses do like to grab various objects and leave them out in front of their little dens – so often that's a rock or a shell," he said. "But there have been lots of reports of octopuses liking shiny things, so it's not out of the realm of possibility that the octopus actually found it," he said.

"My guess there is that if the octopus put it out in front of its little den, when it saw the divers it probably thought 'well, I don't want



I don't want anything to do with those divers!

TOLLAN/3

anything to do with those divers, I'm going to hide, and if the divers then followed it back to its home, that's where it might have left the ring.

"If I lost my ring and I was scuba-diving and I saw an octopus, I would certainly follow it as a potential lead," said Prof Harley.

Both the Pacific red and giant Pacific octopus can be found in Howe Sound. ■

Death in Florida

A US DIVER died after she and her husband were reportedly pulled under their dive-boat while awaiting pick-up off Palm Beach on 29 March.

Mollie Ghiz-Flynn, 37, was struck and then trapped by the propeller, and her husband Sean Flynn and other divers and crew had difficulty in freeing her.

Rescuers gave her CPR back on the boat but could not resuscitate her.

The couple, from Melbourne in Florida, were diving from a 15m commercial boat called the *Southern Comfort*, captained by Dustin McCabe of Florida Scuba Charters, according to state press. The trip had gone ahead despite a ban on diving expeditions and other water-based activities imposed the previous week by Palm Beach County, as part of efforts to contain the spread of coronavirus.

The Florida Fish & Wildlife Conservation Commission was investigating the incident. ■

BRITISH SCUBA PIONEER BOB FORSTER DIES

GEORGE ROBERT "Bob" Forster, one of the earliest British marine biologists to study the underwater world using scuba, has died at the age of 92.

Born in Paignton, Devon in 1927 and brought up overlooking Torbay, Forster developed an early interest in marine biology as well as sailing.

After graduating in zoology from Aberdeen University in 1949 he was offered a Department of Science studentship with the Marine Biological Association (MBA) in Plymouth, and began his career there studying the common prawn.

His interest in diving began when MBA staff were invited to a lecture about the then-novel Siebe-Gorman scuba gear.

Impressed, the association applied to the Royal Society for a grant to buy the equipment, but found that training was not readily available.

In 1951 Forster was allowed to join a two-week Royal Navy shallow-water diving course at HMS *Vernon* near Portsmouth, but the apparatus used turned out to be oxygen rebreathers, as used by frogmen during the war.



Pioneer diver Bob Forster.

"Breathing oxygen produced a greatly enhanced appetite, mainly for potatoes, and a subsequent desire for long sleep," he remembered later.

By 1953, however, he was using a Siebe-Gorman aqualung and drysuit to carry out ground-breaking survey dives off the South Devon coast.

His ability to collect specimens of sponges, algae and bryozoa by hand as opposed to through dredging also

led to many requests for his assistance from other scientists.

His early diving was in the 9-18m range but once he started venturing to around 24m he was excited to record a less-familiar environment.

"In the early days if you went down to 80ft you could have half an hour quite safely – that's about what you could get from the bottles," he told the *Western Morning News* some years later. He would use a two-piece drysuit, the halves rolled together and worn with a cummerbund.

"The trouble was that you wore thick longjohns and a jersey underneath and you had to get the air out of it. The deeper you went the tighter it became – it was all slightly aggravating."

He would take underwater photographs but making notes during dives was a major problem. Attempts at dictation using a sealed office recorder and a full-face mask proved unsuccessful because of headaches caused by CO₂ build-up!

With the help of students Forster kitted out his own motor-yacht *Sunset*

for diving and was able to extend his expeditions west to Torbay and Falmouth and even to the Scilly and Channel Islands.

In 1961 he was engaged in diving surveys in Guernsey studying ormer sea-snails.

Alongside many other projects in the

UK and overseas he continued diving for the MBA until his retirement in 1985.

In 2003 Forster assisted an MBA dive-team by providing his original notes and photographs to help them assess changes in Devon's underwater environment since his survey dives of half a century earlier.

The divers were able to record that certain species of sea-squirt could no longer be found, while species of hydroid, rare seafan anemones, pink seafingers and carpet coral had moved into the area.

"Bob published several descriptions of the characteristic marine life of hard substrata (rocks and the wreck of the *James Eagan Layne*) off South Devon," says Dr Keith Hiscock, who had been the MBA's programme director in 2003 and considers Forster to have been a significant scuba pioneer.

"Fifty years on from his description of Halsea Point Rock (then known as Stoke Point Rocks) I resurveyed the site and found it, with a very few significant differences, much as described in 1953."

Forster was married to Alison in 1961 and had two children, Hilary and Michael. "Bob contacted me via his daughter in February to let me know that he was 'going downhill' with stomach cancer," said Hiscock. Forster died on 12 April.

"I carried on diving for years and years and I loved it," he had said in 2003. "There is so much to see when you're diving – in good conditions it can be perfectly light and you don't have time to be worried." ■



Forster shows Prince Philip his scuba-set.



Diving in later years.

Safe Under the Sea fund-raiser

HAVE YOU BEEN revisiting your prized collection of underwater photos during lockdown? You might be able to put the best to good use – US-based Underwater Photography Guide is hosting a special online photo competition called Ocean Art Safe Under the Sea, designed to help bring the global diving community together creatively while raising money to fight coronavirus.

"International dive travel is one of the businesses hit hardest by the



Ocean Art winner *A Friendly Ride* by Paula Vianna.

recent economic downturn," says UPG. "Dive operators, travel agents and customers have all been largely affected and underwater photographers are some of the

most prolific customers."

Ocean Art is an annual contest regularly reported in *DIVER*, with the 2020 event open for entries this autumn, but Safe Under the Sea is

an additional event. A quarter of all proceeds from entry fees is pledged to the CDC Foundation, a charity created to support Centres for Disease Control in some 140 countries, and to the World Health Organisation's Covid-19 response fund.

Aimed at all levels of underwater photographer, the competition has 12 categories, including three for compact cameras. It offers \$10,000-worth of dive-holiday and photo-equipment prizes from sponsors Bluewater Photo & Travel, Atlantis Dive Resorts (Philippines), Aquamarine Diving (Indonesia), Ikelite and SeaLife.

Photos need to be submitted by the end of June. Details can be found at uwphotographyguide.com/ocean-art ■

Cyprus impounded deep-wreck finds

REPORTS OF A DEEP-LYING multiple shipwreck discovery made five years ago in the eastern Mediterranean made national headlines in late April, based on information issued by British salvage company Enigma Recoveries.

But artefacts recovered from the site by Enigma using an ROV were seized by Cyprus at the time, and in the wake of the reports the island's Department of Antiquities lashed out at the company, accusing it of illegally excavating ancient shipwrecks, according to a *Cyprus Mail* report.

The salvors, who were based in Limassol while recovering artefacts from one 17th-century wreck, were also accused by the department of "violently extracting objects, causing destruction to their context".

Enigma Recoveries reported finding a dozen Hellenistic, Roman, early Islamic and Ottoman wrecks at depths of around 2km in the Levantine Basin, which lies between Cyprus and Lebanon but outside their territorial waters.

Almost 600 artefacts were said to have been recovered from a 43m



Ming dynasty porcelain found on the Ottoman wreck.

ENIGMA RECOVERIES

Ottoman trading vessel dating from the 1630s. The finds included 360 Chinese Ming dynasty dishes and cups as well as items ranging from glass and ceramics to incense and pepper, originating from countries ranging from Belgium, Italy and Spain to Yemen and India.

However, when Enigma's research vessel returned to Limassol the artefacts were impounded by Cyprus Customs officials on the grounds that they had not been listed as cargo.

Enigma has claimed that the authorities planned to auction the

items, but the antiquities department denies this, countering that Enigma is "well-known both to Cyprus and other countries, as well as international organisations including Unesco, for its activities in illicit underwater excavations".

The department, which is part of Cyprus's Ministry of Transport, Communications & Works, stated that Enigma's own intention to sell the objects was "evident in the documents filed with the US Securities and Exchange Commission".

Enigma said that its vessel's crew

had not been made aware that Cyprus required cultural finds to be listed as cargo.

It also claimed that it had recorded the artefacts in line with archaeological practice, although the antiquities department said that it had overseen conservation of the items and that its own recording had revealed their "violent extraction".

The department said that it had recently amended the antiquities law "to enhance the protection of the underwater cultural heritage in all the sea-zones of the Republic of Cyprus". ■

Australian WW2 sub victim and early lime-trader identified

AN AUSTRALIAN coastal freighter that was torpedoed by a Japanese submarine in WW2 has been discovered at a depth of 95m in the Tasman Sea off the New South Wales coast.

Archaeologists from Heritage NSW identified the wreck as *Wollongbar II* after following up on reports from the local Crescent Head and Port Macquarie communities.

The ship was one of many victims of Japanese attacks along Australia's eastern coastline during WW2.

"In 1943 a Japanese submarine, the *I-180*, destroyed the freight vessel with two torpedoes, killing 32 people on board," said Acting Minister for

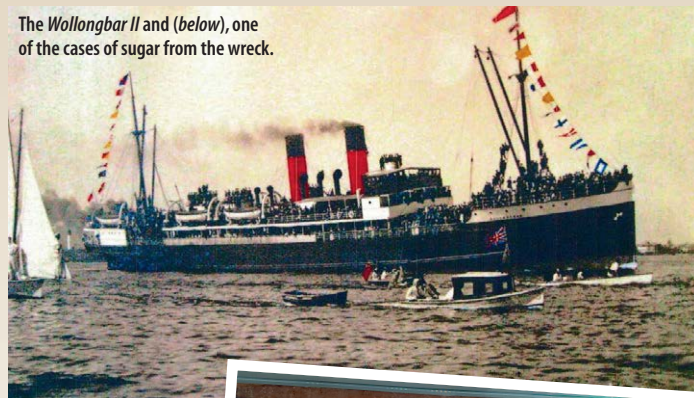
Veterans Geoff Lee. "The ship sank in minutes, with only five crew surviving the attack.

"This secret has been hidden at the bottom of the deep sea for decades and the find will give some closure for descendants and relatives of the 32 people who lost their lives."

The 87m single-screw steamship was built in 1922 in Glasgow to replace an earlier steamer of the same name also wrecked off New South Wales, and was owned by the North Coast Steam Navigation Company.

The first torpedo struck forward of the bridge near number 2 hold, the second on the port side. The ship broke in two and had sunk within

The *Wollongbar II* and (below), one of the cases of sugar from the wreck.



two minutes.

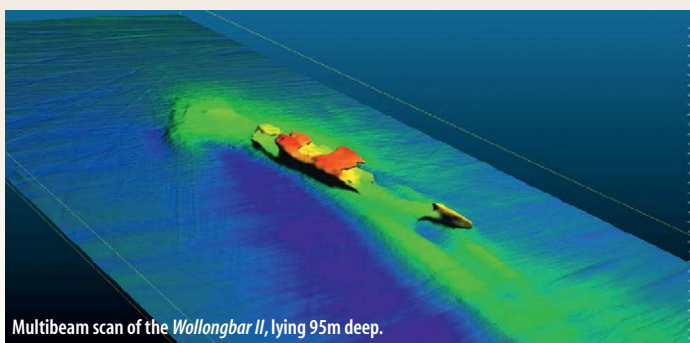
The *Wollongbar II* had been carrying 18,000 cases of butter and sugar as well as bacon. Many were washed ashore and recovered by local people, who were said to have welcomed having provisions until then restricted by wartime rationing.

Meanwhile the wreck of a schooner built in 1841 is said to be providing new insights into the early years of Australian boatbuilding.

The Tasmanian-built lime-trader *Barbara* was wrecked in 1853 when

a gale blew it into the shallows off Mornington Peninsula in Victoria – but only now have maritime archaeologists been able to confirm the identity of the wreck.

The 12m schooner is a rare find, according to Flinders University-based marine archaeology professor Wendy Van Duivenvoorde.



Multibeam scan of the *Wollongbar II*, lying 95m deep.

JODIE RUMMER / ARC COE CORAL REEF STUDIES



Mass GBR bleaching event confirmed

THE GREAT BARRIER REEF Marine Park Authority confirmed in late March that a “very widespread” mass-bleaching event was occurring on the world’s biggest coral reef.

The reef had been under pressure from heat stress that accumulated particularly in February and early March. The mass-bleaching event is the third to occur since 2016.

Aerial surveys conducted by the ARC Centre of Excellence for Coral Reef Studies at James Cook University confirmed that the worst bleaching was on reefs that had suffered from the highest heat stress, extending across large areas. Some southern areas that experienced little or no bleaching in the 2016 and 2017

events had suffered from moderate or severe bleaching this time.

In the far north of the GBR, where corals that had survived the previous events were “relatively heat-tolerant”, moderate to severe bleaching had occurred on reefs closest to land.

However, the authority noted that “key tourism reefs” in the northern and central GBR had experienced only moderate bleaching, from which most corals were expected to recover.

“On mildly or moderately bleached reefs there is a good chance most bleached corals will recover and survive this event,” said the GBRMPA.

“Equally, on severely bleached reefs, there will be higher mortality of corals.” ■

KEVIN EDWARDE / FLINDERS UNIVERSITY



Divers prepare to investigate the shallow wreck of the *Barbara*.

Timber samples collected from the wreck have revealed that it was made not only from local Tasmanian blue gum but also from trees found in Victoria, New South Wales, Northern Territory and Western Australia.

“This is possibly the first time such a wide variety of timbers have been found in one Australian-built vessel, and indicates that early ship-builders had developed a detailed knowledge of the properties of Australian timbers appropriate for shipbuilding,” said Van Duivenvoorde.

“The builders of *Barbara* also appear to have been willing and able to access non-local materials for this ship.”

Heritage Victoria’s research vessel

was used to transport divers and equipment to the wreck-site near Rye Pier, a location popular with divers, before the coronavirus outbreak.

They investigated the wreck alongside the university’s annual maritime archaeology field-school and the community-based Maritime Archaeology Association of Victoria.

Australian team-members, joined by others from Japan, the Netherlands, Singapore, Thailand and the USA, surveyed the wreck using measured drawings, photographs, underwater photogrammetry and limited excavation.

Results were still awaited from analysis of metals and fibres found on the *Barbara*. ■

Freda’s Diver Dishes



Sustainable black turtle bean *en croûte* makes for a great alternative to a beef Wellington. You will be surprised just how delicious this dish is and how easy it is to make. It is absolutely packed with protein from the black beans and pumpkin seeds.

I created this dish during the Covid-19 lockdown, which happened when our season would normally just be beginning, I was reminiscing about diving at St Kilda and as I looked through old photos I remembered a dive on the *Tapti* on which we spotted a turtle! It had been swept off course by the Gulf Stream and had arrived on the west coast of Scotland. Sadly, it died a few weeks later.

Black Turtle Bean en Croûte Serves 4-6 divers



Ingredients 150g dried black turtle beans; 2 tbsp olive oil; 2 medium onions finely chopped; 3 cloves of garlic finely chopped; 1 small aubergine diced; 3 tsp cumin powder; handful of chopped parsley; 4 tsp ground chia seeds; 60ml cold vegetable stock; 4 tbsp ground pumpkin seeds; 2 tsp miso powder, white, red or black; 2 tsp black bean paste; 1 tbsp seaweed (sea lettuce, dulse & nori); sea salt & pepper; 1 tbsp sesame seeds; 375g sheet of ready-rolled puff pastry.

Method Soak the beans for 12 hours in cold water. Rinse in cold running water and put into a saucepan. Cover with fresh cold water and bring to the boil. Turn down heat and simmer for 35 minutes, then drain and re-rinse. Tip into a container, mash with a potato masher and set aside.

Heat the oil using the same saucepan and gently fry the onion. Once soft, add the garlic, aubergine and cumin powder and continue until cooked.

Mix the ground chia seeds with the cold vegetable stock in a small bowl and leave for 2-3 minutes. Add the mashed beans to the onion mix with the miso, black bean paste, pumpkin seeds, parsley, seaweed mix, chia seed mix and a good grind of sea salt & pepper. Continue to cook on a low heat until well combined.

Unroll your pastry sheet, leaving it on the greaseproof paper that it came in. Arrange the bean mixture along the middle to make a thick sausage shape, leaving a border of about 4cm at each end. Brush olive oil all around the edges.

Fold both short ends of the pastry over the bean mixture, followed by the long sides, to enclose it completely. Brush all over with olive oil and sprinkle with sesame seeds. Place on a baking tray, on the same greaseproof paper, and cook for 40-45 minutes at 180°C until golden-brown. Allow to rest for a few minutes before slicing. Serve with your favourite chutney and humus if desired.

Top Tips Make this black turtle bean mixture up in advance and keep it in the fridge ready for when you return back from your dive, so all you have to do is wrap it in puff pastry and chuck it in the oven. Did you know that, gram for gram, pumpkin seeds have the same amount of protein as beef?

* Freda Wright is a diver and chef on British diving liveaboard *mv Salutay*. Find more of her recipes in the book *40 Dives 40 Dishes*. It costs £16 plus £1.95 postage, with £1 from every sale going to Oceans Plastics Greenpeace, salutay.co.uk



Longest 'sea-worm' found in Indian Ocean

SCUBA-DIVERS HAVE become accustomed to tales of "monster sea worms" that turn out to be colonies of organisms identified variously as salps, pyrosomes or siphonophores.

But an example discovered recently off Ningaloo in Western Australia seems to have reset the scale for such sightings, with an estimated length greater than for any other known animal on Earth at around 45m.

The gelatinous siphonophore *Apoemia*, essentially a string of free-swimming hydrozoans each with the ability to clone itself, was discovered during a month-long expedition to explore the deep-lying Cape Range

and Cloates Canyons using an ROV.

The scientific team aboard the Schmidt Ocean Institute research vessel *Falkor* were excited by the discovery, along with that of as many as 30 species previously unknown in the area.

Their ROV *SuBastian* completed 20 dives as deep as 4.5km, recording finds that included glass sponges, the bioluminescent Taning's octopus squid, a long-tailed sea cucumber and a number of other molluscs, barnacles and squat lobsters.

"We suspected that these deep-sea areas would be diverse but we have been blown away by the significance

of what we have seen," said chief scientist Dr Nerida Wilson of the Western Australian Museum.

Other researchers on the trip represented Curtin University, Geoscience



At 45m, this siphonophore is the longest-known animal on Earth.



Species previously unknown in the area.



Excitement aboard the *Falkor*.

Australia and Scripps Institution of Oceanography.

The California-based Schmidt Ocean Institute is carrying out a year-long series of expeditions in Australia and the Pacific using *Falkor* and *SuBastian* to enable scientists to explore for the first time a number of deep-sea canyons and coral reefs.

It says the video footage and samples collected "will have important implications for the sustainability and protection of these

underwater ecosystems – and for similar habitats worldwide that are in peril because of rising ocean temperatures and other environmental threats".

Falkor, said to be the world's "only year-round seagoing philanthropic research vessel", and *SuBastian* are made available at no cost to international scientists who agree to make their discoveries public.

Highlights of the dives can be seen at schmidtocean.org ■

THE LONGEVITY OF whale sharks, the world's biggest fish, has always been a mystery – until an international team of scientists came up with a way of estimating their ages, based on the nuclear bomb-testing of the 1950s and '60s.

The study, led by Joyce Ong of Rutgers University in the USA, explains how radiocarbon dating provides an accurate method of assessing the longevity of *Rhincodon typus*.

Whale sharks can weigh up to 36 tonnes and grow as long as 20m, although 12m is typical. Like all sharks and rays, they lack the bony structures that scientists use to assess the ages of other fish.

Whale shark vertebrae do feature distinct bands known to increase with age, but while some scientists argue that new rings form annually, others insist that two form every year.

Ong's research team examined the radioactive legacy of the Cold War nuclear arms race during which the USA, USSR, UK, France and China tested weapons in the atmosphere.

This temporarily doubled levels of carbon-14, the naturally occurring radioactive element often used by archaeologists to date ancient bones and artefacts. The fall-out saturated the air and ocean, with the carbon-14 gradually moving through

Bomb tests reveal whale shark ages

food webs and still lingering today.

When the team tested carbon-14 levels in the growth rings of dead whale sharks stored in Taiwan and Pakistan, they found that they made it possible to assess their ages accurately. One was estimated to be 50 when it died, making it the oldest known, and the other was reported to be 35.

"Accurate estimates of longevity, growth and mortality will better inform management and conservation efforts for whale sharks," said Ong. "The extended longevity, slow growth rates, late maturity and global connectivity of this species indicate high susceptibility to death caused by human impacts, such as ship strikes. Hence, this knowledge can help conservation managers adjust their strategies to be more effective."



A whale shark, age unknown.

Next steps include seeking the vertebrae of stranded sharks and studying further large, old whale sharks, she said. This would enable growth models to be refined and increase the accuracy of growth and natural mortality estimates.

Scientists at the University of Iceland, Australian Institute of Marine Science, King Fahd University in Saudi Arabia and the Pakistan node of the UN Food & Agricultural Organisation also participated in the study, which is published in *Frontiers in Marine Science*. ■

A RARE MOMENT of positivity for the future of the world's oceans has emerged from a new international study. Leading marine scientists have laid out a plan of action required for marine life to be restored to full abundance by 2050 – and insist that it is not too late to achieve it.

The research was led by Professors Carlos Duarte and Susana Agusti from the Red Sea Research Centre at KAUST (King Abdullah University of Science & Technology). In the UK the University of York participated in the study, which involved scientists at 16 universities across four continents.

The participants took heart from what they describe as evidence of the resilience of marine life and the slowing-down in the 21st century of the sharp population losses suffered during the previous century.

For some species such as humpback whales, they point out, recovery from those losses has been taking place. There were only a few hundred humpbacks left in the 1970s – now there are tens of thousands.

"We are at a point where we can choose between a legacy of a resilient and vibrant ocean or an irreversibly disrupted ocean," says Duarte. "Our study documents recovery of marine populations, habitats and ecosystems following past conservation interventions. It provides specific, evidence-based recommendations to scale proven solutions globally."

The scientists believe that recovery rates for most marine-ecosystem



components could be accelerated to achieve substantial recovery within a single human generation – assuming a concerted effort to tackle climate change, and sufficiently large-scale interventions.

They have identified nine key marine-life components for their recovery scheme: salt marshes, mangroves, seagrasses, coral reefs, kelp, oyster reefs, fisheries, megafauna and the deep sea.

Their plan involves deploying combinations of six "recovery wedges" or interventions: protecting both species and spaces, intelligent harvesting, habitat restoration, pollution reduction and climate-

change mitigation.

While recognising that the plan requires unprecedented international co-operation and spending, "rebuilding marine life represents a doable grand challenge for humanity, an ethical obligation and a smart economic objective to achieve a sustainable future," says Agusti.

"We have a narrow window of opportunity to deliver a healthy

ocean to our grandchildren's generation, and we have the knowledge and tools to do so," says Duarte. "Failing to embrace this challenge – and in so doing condemning our grandchildren to a broken ocean unable to support high-quality livelihoods – is not an option."

"The success of many marine-conservation projects in recent years illustrates how we can make a real difference to life in our oceans if we apply the lessons learnt from them at scale and with urgency," says study co-author Prof Callum Roberts from the Department of Environment & Geography at York University.

"Overfishing and climate-change are tightening their grip, but there is hope in the science of restoration.

"We now have the skills and expertise to be able to restore vital marine habitats such as oyster reefs, mangrove swamps and salt marshes – which keep our seas clean, our coasts protected and provide food to support entire ecosystems.

"Science gives us reason to be optimistic about the future of our oceans, but we are not currently doing enough in the UK or globally."

The study "Rebuilding Marine Life" is published in *Nature*. ■

HELP US TO SPOTLIGHT THOSE 30 DIVING INFLUENCERS

DIVER WOULD LIKE to thank the many readers who have been submitting their nominations for the greatest "Diving Influencers" of the past 30 years since the call went out in the May issue of the magazine. We've been delighted with the response and the quality of your suggestions.

While the future remains uncertain in the wake of the Covid-19 pandemic, at present October's DIVE 2020 show at the National Exhibition Centre is still set to go ahead. Our trawl for the movers and shakers of the diving world is one of the ways in which we hope to celebrate the 30th anniversary of the Shows, which are organised by the **DIVER** Group.

We're looking for individual divers who you believe have done the most to change our sport for the better since 1990. They might come from any

part of the world, and be involved in any of many spheres of activity.

They could be underwater explorers, wreck-divers/researchers/technical divers (we can tell you that they're showing up well at the moment!), cave-divers, freedivers, conservationists, photographers, film-makers, eco-activists, dive-gear developers, marine biologists, instructors, travel facilitators, TV broadcasters, authors, charity workers – the possibilities are endless.

The chosen will feature in our Diving Influencers Gallery at the Show, and we hope many of them will be attending, so that you get the chance to meet them.

So please email your three names to steve@divermag.co.uk and get your dive-buddies to do the same. The more names the better! ■

Scuba Sophie

Eleven-year-old diver Sophie O'Dea from Blackburn has set herself the goal of raising £5000 as a thank-you to the NHS by carrying out a dive at the Capernwray inland site as soon as it's safe. She plans to build a Lego plane on top of one of the real ones, supported by Canary Divers. Find her JustGiving page by searching for "Scuba Sophie's Underwater Task".



Zen in VR With the 40th anniversary of the iconic *Zenobia* ferry's sinking off Cyprus in June, check out a free virtual tour completed under lockdown by Anastasia Pash of Globetrotter VR, with guided dive, 360° model and history. Go to globetrotter-vr.com/zenobia-2

CovEDtalks Many online diversions have helped divers through lockdown, but stand-outs have been the NAS "self-educating while self-isolating" lunchtime webinars, set to last until the end of June and perhaps beyond – register at nauticalarchaeologysociety.org

In the Beginning One webinar that left a big impression comprised the recollections of true Red Sea scuba pioneer (and Fantasea Line founder) Howard Rosenstein. It's still on YouTube and well worth a look – key in "50 Years Under the Red Sea and More".

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TAKING THE HINT

If you can't go diving at the moment, you can at least look back on the dives you've done, perhaps with the help of your trusty logbook. You know, reliving the experience as you wait patiently for things to get better.

Maybe, maybe not, you decide.

Our hero turned up at the inland site at the end of February and swiftly assembled his kit, only to find that the valve on his cylinder was looser than he expected, and that the cylinder itself was empty.

It had probably opened when it caught on something in the boot of the car, allowing his gas to escape.

Annoying, but not too bad – he had a second cylinder and that one was still full. It was the work of a moment to change the bottles over and screw the reg set in place.

Have you ever heard an O-ring go bang? Noise. Lots of noise.

But it was only an O-ring, and they're easily replaced if you have a spare, which he had.

He hadn't even lost much gas, because the O-ring had blown pretty much as soon as he'd opened the valve.

Not one to be easily deterred, he finished kitting up, with just a bit more attention paid to the buddy-check than usual, truth be told, then reached into the boot of the car for the last item of kit, his camera.

He held it in his hand for a long moment, then put it back in the boot, closed the lid and went for his dive.

Two out of three ain't bad.



In withdrawal

A while ago I was sitting in a bar in Hurglada with a fellow-diver. When the beers arrived he took a pack of cigarettes from his pocket, slid one slender cancer-stick from the pack, lit up and sat back in his chair with an expression of absolute contentment on his face as he blew smoke toward the ceiling.

"I love being able to go to the pub and light up," he told me. "Just like we used to be able to do back home before smoking in public places was outlawed."

I mention this only because I haven't been diving for months because we're not allowed, and I understand just how he felt.

Ah, for the smell of neoprene in the mornings and the joy of dropping into the water. Any water.

Phones for divers

Apple, bless it, makes computers and phones and watches. Some swear by them, others swear at them, but it has just patented touch-screen technology that it says could make its next iPhone range usable under water.

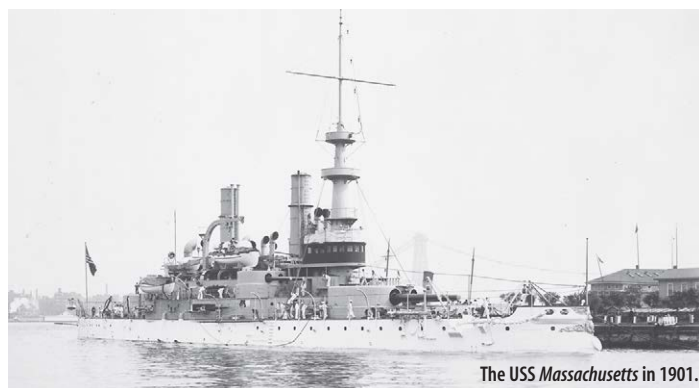
Probably not for making calls, of course, but touchscreen tech that works beneath the surface would be so useful.

It's currently aimed at snorkellers, but I tell you what, Apple, make the phone waterproof to 100m, add a pressure-sensor and deco algorithm, bung in a wide-angle lens and I might even buy one myself!

Lister on my list

The USS *Massachusetts* was a battleship constructed in 1893 for the fledgling US Navy – and regarded as one of the worst ever built.

Her main gun batteries were so



The USS *Massachusetts* in 1901.

US NATIONAL ARCHIVES

So it's come to this...

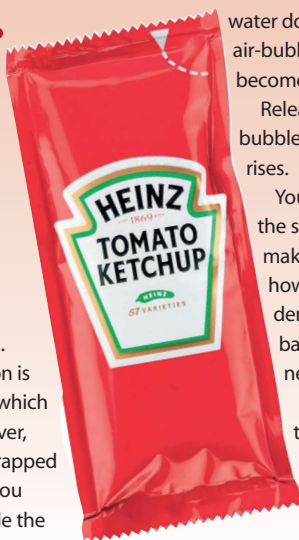
For all the strangeness so far this year all isn't lost, provided you have a cup or bowl of water, a 2-litre plastic bottle, some paper-clips and an unopened plastic sachet of ketchup or vinegar.

At least, that's what *The Times* reckons you need to make your very own scuba-diver at home.

What you do is make sure the sachet of sauce just floats in the cup or bowl, using the paper-clips as weights if necessary, then fill the bottle with water, shove the perfectly weighted sachet in and cap the bottle.

Make sure there's no air-pocket left in the bottle. Observe the sachet at the top of the bottle. Now squeeze the bottle, and the sachet sinks. Stop squeezing, it rises.

The explanation is neat. The sachet, which represents our diver, has a bubble of trapped air inside. When you squeeze the bottle the



water doesn't compress but the air-bubble does, so the sachet becomes less buoyant and sinks.

Release the pressure, the air-bubble expands – the sachet rises.

You hear that noise? That's the sound of diving instructors making notes and working out how to include this practical demonstration of so many basic scuba concepts in their next series of lectures.

You're welcome, and thank you to the Thunderer!

I'd rather be doing it for real, mind.

the Far East during the last war, though he's actually looking for the 13 tons of coins she was also possibly carrying.

When he first dived the site in 1976 he found a 1-cent Sarawak coin from Borneo, so there seems to be cash down there.

There might even be examples of the vanishingly rare Hong Kong 1-cent coins that are worth thousands each.

Jeb isn't doing the diving alone, of course, and has recruited a crack team of local divers to help out, the youngest in his mid-70s, according to the *Daily Mirror*.

See, British divers are getting older. Brilliant, so am I. But it would have been so much more impressive if the *Mirror* had used a picture of Jeb in the North Sea or on a boat in the North Sea to illustrate its piece, rather than a holiday snap in clear blue water and a wetsuit.



As Allied forces forayed into Germany in the early months of 1945, the Ruhr river, a tributary of the Rhine, became its last line of defence in the west. The riverbed is still littered with bombs, guns and other artefacts. German waterways are usually off-limits for divers, but an Essen diving school has a special permit. Report and photos by **DANIEL BRINCKMANN**

RUST IN PEACE

WITH SHAKY STEPS we descend the embankment above the historic Ruhr Bridge. What will the vis be like? How about the current? The two whirlpools at the surface don't bode well.

"There are two large bomb-craters in those spots – the water is 8m deep," explains Martin Fehd from the Dive In Essen school.

When the school's previous owner carried out the first exploratory dive, he felt as if he had entered an armoury.

Just as we're about to step into the water, Martin reminds us of the most important rule in the game: "Don't even think about touching anything that remotely resembles ammunition or

Above: The river is a no-take zone, but limited posing is permitted – as long as the finds are not explosives...

Below: Thousands of people must have walked past this rifle sticking out of water over the past 60 years.

grenades. Those nice little bubbles at the surface rise up from corroding phosphor bombs!"

Greenish-yellow water engulfs us, causing a bit of distress as visibility hardly exceeds 2m. By 3m deep, little ambient light makes it down to the bottom. These are not exactly Alpine river conditions.

Before we're 10 minutes into our battle against the moderate current, a crusty piece of wood can be seen protruding from the gravel bank. With its reddish-brown colour and angular structure, it doesn't fit into the overall picture.

Guess quickly turns to certainty. The object, which sticks up all the way up to the surface and into the orchids on the riverbank, is a rifle barrel, and the rectangular recess in the middle is the cartridge chamber.

It's a Wehrmacht sniper rifle, thrown from one of the bridges like so many weapons and Nazi insignia in the last days of World War two in this area.

Spring floods and the periodic opening of the reservoir Lake Baldeney bring to





the surface artefacts that had rested in the mud for more than seven decades.

After a few photos, we set course for the bridge pillars, where most artefacts are to be found.

Suddenly my dive-buddy Holger starts shaking his torch violently. The pointed, rusty object ahead turns out to be an aerial bomb, perhaps 50kg in weight.

As if as a reminder of what could happen if you touch explosives, the 3m riverbed suddenly drops to 8m.

We're gazing into a 5m-deep bomb funnel in which the explosive force has ripped out massive chimney-red rocks.

In the next few minutes in the ghostly twilight we pass several licence-plates, a tree-stump covered with sponges, a few

50mm cartridges, a pistol weathered beyond recognition and a bollard for boats or a mobile landing bridge.

It doesn't take much imagination to imagine how the British infantry crossed the river on pontoons beside the blown-up Ruhr Bridge.

NOT EVERYTHING THAT COMES from above is a blessing. It was a white rain of leaflets that stated what every citizen of Essen already suspected – the "Ruhrpott" was now a battle area.

Since 1942, Allied airpower had been targeting the heart of the German armaments industry, the Krupp factories.

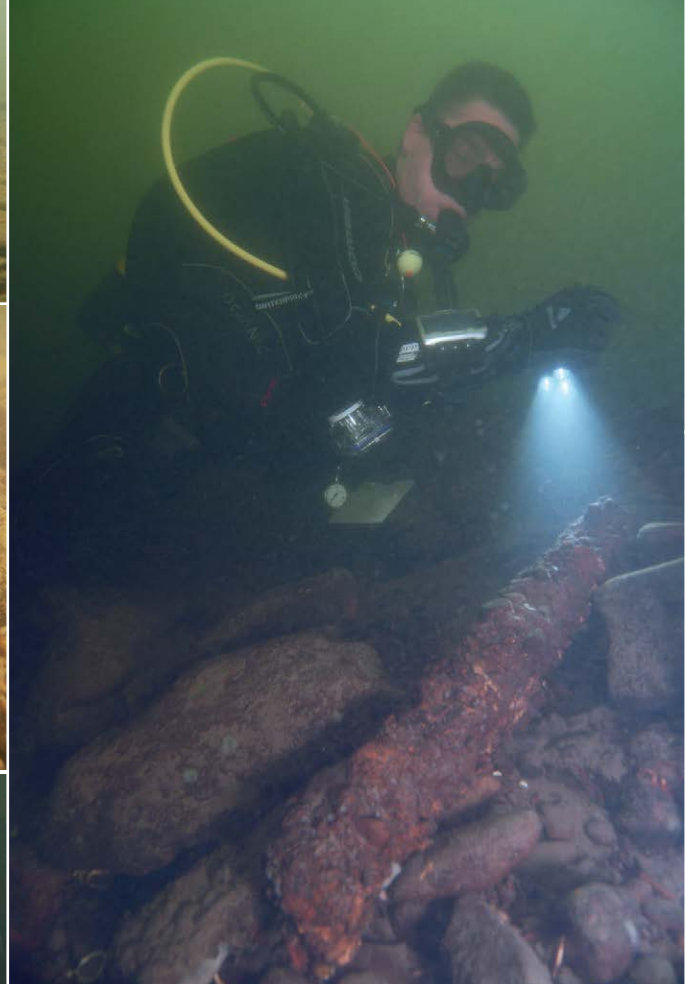
Now, in late March 1945 with the fall of Essen pending, the National Socialist

Above from top: Diving in the placid Ruhr includes a certain amount of coming up for orientation: "The number of metal items on the riverbed will twist your compass and makes you lose track," says Brinckmann.

bubble was finally bursting. Despite an insane order to stop the Allied infantry advance at all costs, and violent threats from the Nazi party, hardly any Essen residents gathered by the river to take up weapons as instructed.

The historic Ruhr Bridge in the small neighbourhood of Steele was blown up by the last fanatics on the same day, but that action could not delay the inevitable.

A pioneer unit of the US Army was first to cross the Ruhr, but RAF bombers had already turned downtown Essen to rubble. When its mayor handed the city over to US General Ridgway on 11 April, there was only silence. The advance on Berlin was underway to bring about the end of the "1000-year" Reich.



Thanks to the whirlpools we are as disorientated as our compasses, which are being distracted by all the metal items on the bottom, but a quick peek above the surface is enough to show that we have strayed too far down the river, into uncharted and not-so-legal territory.

As we wade across a flat ford to a belt of pond roses, strollers on the towpath stare at us, flabbergasted.

It's fairly unusual to see scuba-divers in the Ruhr, or any German river for that matter, but our buddy Marco waving another rifle above his head like a trophy might explain their alarm.

That sort of bounty might have occurred in the early days of diving, but it's not for us. The Dive In Essen staff take great care to ensure that any discoveries remain where they belong, but they are also security-conscious.

In addition to harmless artefacts, the riverbed and the sediment layers below it are littered with still-dangerous ammunition from hand-grenades up to aerial bombs, and require the services of the bomb-disposal operatives.

WE TREAT OURSELVES to a different kind of loot – delicious apple pancakes in the garden of the neighbouring Boathouse Ruhreck, a place that provides an opportunity not only to fill our stomachs but gaps in our knowledge.

“Unlike heavy explosive devices, such as aerial bombs wedged between stones, the grenades are flotsam simply washed away in strong currents or floods,” explains Martin.

“So it's only possible to speculate before a dive what the river will release – sometimes it's more, sometimes nothing.

“We differentiate between harmless finds, things that can explode and absolute risk cases – and if we find the latter, we report them.” Which is understandable, because a good relationship with the district government in Düsseldorf and the regulatory office in



Clockwise from top left: Probably a Wehrmacht semi-automatic Gewehr 43 rifle; stonefish moment – this 40kg tank projectile is most likely a dud; with improved water quality the riverbank shallows resemble a salad bowl; 0.50-calibre machine-gun shells; a stick grenade.

Essen are the basis for the dive-shop's exceptional permit for river-diving between April and September.

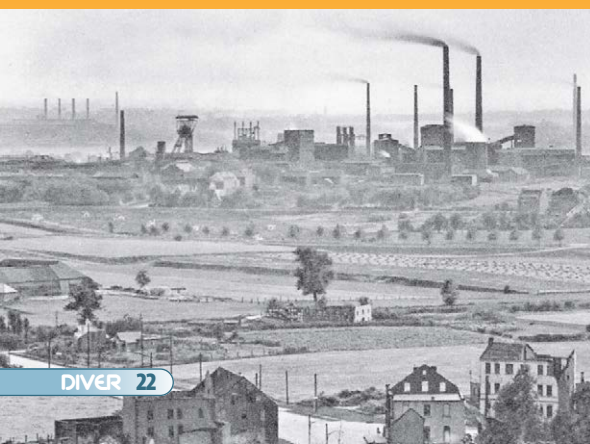
It is the only one of its kind in the Ruhr area, and probably one of very few in Germany. Waterway legislation forbids scuba-diving wherever swimming takes place.

Current and visibility in the Ruhr can change from day to day, and diversity among its fish species is remarkable.

There are catfish, pike, eels, large perch and even trout, albeit not in huge quantities.

There are three diving zones extending over about 1.25 miles. The easternmost route stretches between two bridges, and divers can continue downstream to the west into the other zones depending on their air-consumption.

To the west of the second bridge, three improvised fairways run through the



‘Out there, gentlemen, no chimney will ever smoke again. Where the cast steel plant once stood, grass and herbs will grow. The British military government has decided to end Krupp forever. That is all, gentlemen.’

Colonel Douglas Fowles



riverbed to provide a nice shift of gear.

However, before reaching this freshwater equivalent of a drift-dive through an atoll channel, the area around the bridge pillars is worth a close look.

What looks at first like an old wine-bottle morphs into a tank grenade. But visibility has dropped tremendously since that first dive while the current has picked up, almost as if the flood doors of Lake Baldeney have been flung open.

Clockwise from top left: No wine-bottle – artillery shells come in various forms; tree from a past storm in a deep bomb-crater; briefing at Dive In Essen; that protruding rifle on the river-bank seen from below.

Below, from left: The Ruhr in its heyday – and after the Allied bombings of WW2.

Fighting the current, Martin’s words come to mind. He told us that the quality of the Ruhr dives were determined by dry-weather periods, algae bloom and current flow rate, and that a bit of luck was always necessary.

On exceptional days visibility could approach 10m – but it’s more likely to be in the 1-4m range.

By now, the grenade has long gone from our sight – we’re in the channel and speeding from left to right over the riverbed gravel, where no algae will grow.

For a few seconds we enjoy seeing the furiously paddling feet of panicking swans beneath the surface, but shortly afterwards an object comes into view that at first resembles an old toilet-brush.

Wrong again. Martin shakes his index finger violently: stick grenade!

Once we make back it to the riverbank,

chilled but impressed, one question lingers: what is all this Nazi junk doing in the river?

Shortly before the white flags were hung from the windows, the German army threw almost everything off the bridges that reeked of National Socialism – and of course that included weapons.

“Staff and friends of the dive-shop’s former owner Holger Cremer used to find SS daggers and steel helmets here,” Martin recalls. “You simply never know what the river will bring into the light of day after a flood.”

He is matter-of-fact, just as residents living around alpine lakes such as Austria’s Toplitzsee speak of the infamous Nazi gold treasure that drew many renegades-turned divers in the 1960s.

The lakes kept the majority of their secrets, however, and so will the Ruhr. ▣



FACTFILE

GETTING THERE ▶ Fly from UK to Düsseldorf and it’s a half-hour rental car drive from the airport to Essen.

DIVING ▶ Dive In Essen, dive-in-essen.de. Minimum certification is AOWD or equivalent with 30 dives. All diving must be guided, maximum ratio 4:1. Certification, medical certificate and logbook mandatory. Guests tend

to drive to the entry point in Essen-Steele, but transport can be arranged.

ACCOMMODATION ▶ As an alternative to city hotels, accommodation is available around picturesque Lake Baldeney three miles out.

WHEN TO GO ▶ April to September.

PRICE ▶ 49 euros pp per dive.

VISITOR INFORMATION ▶ ruhr-tourismus.de

TIME OUT

AFTER KITTING UP ON A wooden bench at Octopus Dive Centre, set on beautiful Cote D'Or beach on the north side of Praslin, we were asked to carry our equipment across the wide stretch of sparkling white beach into the surf zone, where Octopus's dive-boat was waiting in the shallows.

Buffeted by swells and waves, we managed to pass up our cameras, dive-gear and tanks before climbing aboard

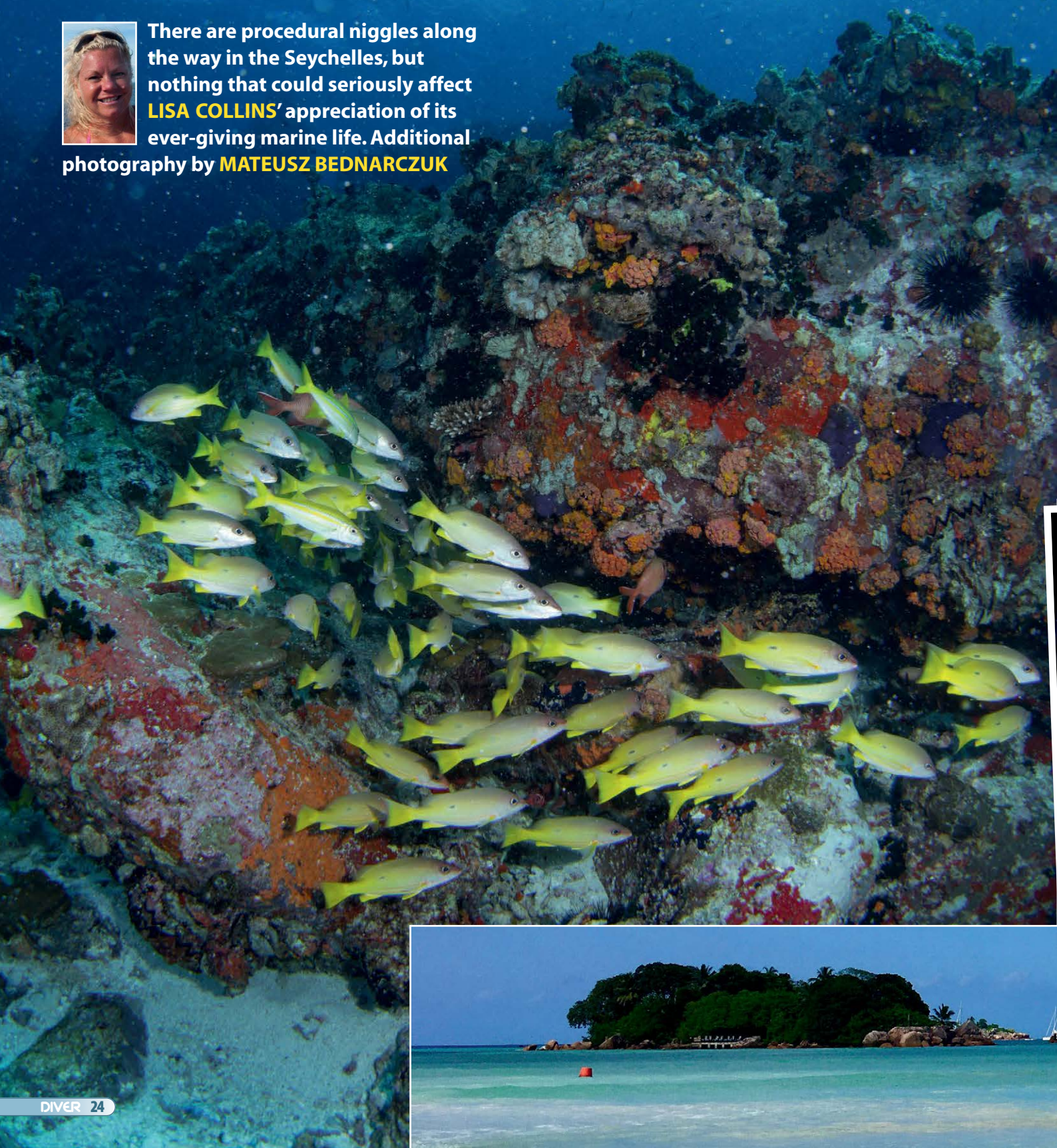
the two-engined speedboat, which could carry 12 people.

Another diver from Germany and a zoologist from Sri Lanka, who had both been diving with Octopus over the past seven days, joined us.

Cote D'Or is a large bay without a barrier reef, but with numerous boulder islands scattered about, some above water and many below, there in the north of the Seychelles archipelago.



There are procedural niggles along the way in the Seychelles, but nothing that could seriously affect **LISA COLLINS'** appreciation of its ever-giving marine life. Additional photography by **MATEUSZ BEDNARCZUK**



We bumped east across the swells, holding on tight to our cameras for 25 minutes to reach the channel between the second largest island Praslin and La Digue, renowned for its beautiful beaches.

The surface water was bubbling. Our dive-guide Cyril had briefed us on the Channel Rock site back at the dive-centre, warning of a lot of current and probable large swells under water, and had suggested trying another site.

The German diver had been to the other, better-protected sites during the even rougher weather of the previous seven days, and insisted on the drift-dive at Channel Rock.

Knowing that this was our check-dive and that we were carrying large cameras, we had been surprised when Cyril agreed.

As regular divers at divemaster and instructor level we felt confident of being OK in the water, but less confident of being able to take decent photos.

We expressed our reservations, but it was clear that we could either take the chance or stay on the boat.

Of course, not wanting to miss the first dive, and conscious that we could just drift if photography was ruled out, we back-rolled into the blue and looked down to see a fair current over a 20m-deep seabed of white sand interspersed with huge granite boulders.

We swam down against the current following Cyril and fought our way to the first rocks. I had heard about the coral-bleaching over the past 10 years, so was pleasantly surprised to find very healthy

colonies of both hard and soft corals on the rocks, with little sign of bleaching.

As we swam around the rocks, sometimes into the current, sometimes drifting with the considerable surge, we did our best to document the dive-site.

From the start we were followed by several large, bold and curious batfish. I wondered if other divers had fed them, or whether they just liked to play in our bubbles.

As remote islands in the western Indian Ocean, the Seychelles have many rare and endemic fish species. We were in wonder as we spotted fish after fish we hadn't seen before, many of them brightly coloured or unusually patterned.

The site was very "fishy". Emperor and regal angelfish graced the rocks, while large soldierfish and other bigeyes filled each cut between the boulders.

Many types of butterflyfish, several I didn't recognise, hid in protected areas within the boulders, out of the current.

Big schools of yellow-striped snapper moved as one with the surge.

Cyril caught my attention just as I had spotted a large Napoleon wrasse, and tried to pull me towards the fish. I knew it would be impossible to reach and photograph against that current before it swam off, but I appreciated Cyril's help.

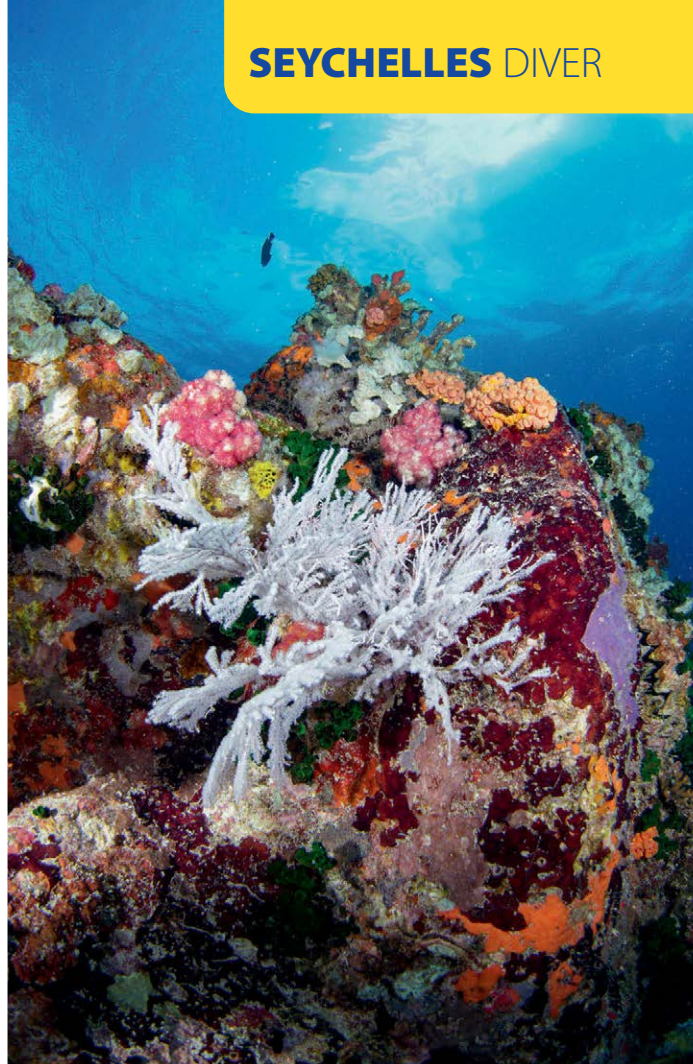
The rocks were so colourful, filled with sponges and the sort of soft-coral abundance I hadn't seen on reefs in many years. Unfortunately, the hundreds of sea urchins also present would turn out to be a feature on all our dives.

Although not so good for divers and underwater photographers trying to avoid getting too close, they are essential for keeping algae from growing and destroying the coral.

ON OUR GROUP STOP we drifted at speed over the boulder formations. The dive-boat had followed our bubbles, quickly picked us up and covered the short distance to Low Channel Rock.

During our surface interval, as the boat drifted over the rocks and white sand we saw the colour of the ocean changing constantly, from pale turquoise to deep indigo blue.

The verdant peaks of both Praslin and La Digue, fringed by glowing white beaches, looked like fantasy islands from a dinosaur movie, intriguing and beautiful.



Opposite page: Schooling fish dominate most of the dive-sites.

Above: Colourful coral-filled boulders at Channel Rock.

Left: Redfin butterflyfish, one of many species in the Seychelles that were new to Lisa.

Right: Cuts through the boulders are a feature at Channel Rock and Low Channel.

Below: The surf zone at Cote d'Or beach, where the dive-boats are moored.



We could still see current at Low Channel, but less so than at the deeper Channel Rock. The topography proved very similar to our first dive site.

At our maximum depth of 17m we felt a more pronounced surge. We navigated around the boulders, mostly foregoing our cameras but enjoying the scene, full of colour and life. Cyril pointed out a small turtle feeding, and a nurse shark sleeping in a cut in the rocks.

Nearing the end of the dive, I struggled to stay in place while photographing a strange-looking grouper with a bright yellow moustache at a cleaning station.

Nearby was a juvenile oriental sweetlips and an unusual, very fancy, shell. I had seen these in books, and occasionally in shops, but never live under water.

WE DROVE BACK to our little self-catering villa, one of three less than five minutes' drive from Cote D'Or, and owned and run by Debbie and Michel, a couple from the Seychelles.

Michel had sold two dive-centres on the island on retirement 18 months before, and built the villas.

He delighted us every afternoon after our dives with his tales of 2.5m grouper and massive schools of oceanic fish.

He said we should try to get out to the South Mariana dive-sites, which he considered to have the biggest and most prolific fish-life, but the wind during our trip would rule those out.

We were visiting in the rainiest month, December, but it was sunny every day and with hardly a cloud. Michel explained that there were three tropical cyclones: one off the tip of Madagascar, one off the Seychelles' southernmost chain Aldabra, some 600 miles from Praslin, and one to the north off Somalia, all drawing the clouds away from us.

For once, the weather was our friend. Those who follow my articles will know that this is very unusual!

Waking to a clear, deep-blue sky, we drove to the dive-centre. The ocean had calmed somewhat, and a gentle swell made carrying our kit to the boat much easier than before.

Today, again with Cyril, we were to dive White Rock and around Ave Maria, a tiny picturesque rock island with a single tree growing on top of it. We had three French divers with us, and Cyril said we would



Above: Turtle at Ave Maria.

Below, from left: White-mouthed moray eel; octopus sitting on the shallower of the Two Barges.

stop at La Digue to pick up three German divers who had chartered a catamaran with five friends to sail around the islands.

By the time everyone was on board, with the captain and two divemasters, the boat was almost at capacity.

The dive-site was only 10 minutes from La Digue. We had to drop in one by one almost on top of each other to keep everyone together.

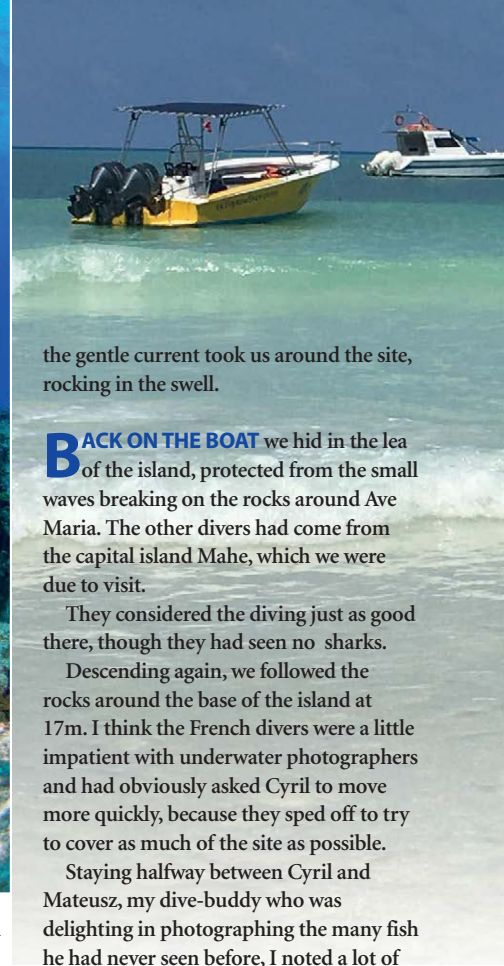
I'm not that tall, and found it difficult to climb onto the side of the boat to backroll, so just kind of tumbled over the side in a haphazard but effective way.

There was a small current and swell, much less than the previous day.

The topography had an unworldly feeling. Massive smooth rocks, carved with long grooves formed over millennia dominated the sandy bottom. A whitetip shark was swimming over the seabed. Moving from one rock to another at 18m proved far easier than the day before.

Again, we were amazed by the amount and variety of marine life. A big school of snapper formed a ball between the rocks, dispersing as I swam slowly towards them, then enveloping me. A small turtle ignored us as it fed on a sponge.

In the 29°C water with 25-30m visibility, we felt soothed and relaxed as



the gentle current took us around the site, rocking in the swell.

BACK ON THE BOAT we hid in the lea of the island, protected from the small waves breaking on the rocks around Ave Maria. The other divers had come from the capital island Mahe, which we were due to visit.

They considered the diving just as good there, though they had seen no sharks.

Descending again, we followed the rocks around the base of the island at 17m. I think the French divers were a little impatient with underwater photographers and had obviously asked Cyril to move more quickly, because they sped off to try to cover as much of the site as possible.

Staying halfway between Cyril and Mateusz, my dive-buddy who was delighting in photographing the many fish he had never seen before, I noted a lot of big yellow starfish and bright orange cushionstars, which I had never seen in such abundance, and another feeding turtle. Between the hard corals, schools of anthias, damselfish and cardinalfish danced. I saw a couple of anemones, but fewer than expected.

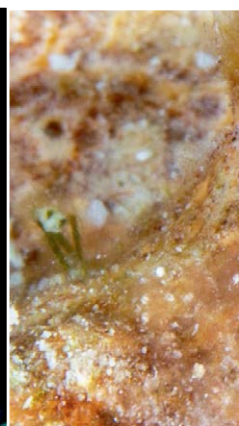
As we closed the gap with Cyril he spotted a reef octopus which, spooked by him, swam almost directly towards me before squeezing into a gap in the boulders. A large pufferfish, curious of its reflection in my dome-port, let me take one or two photos.

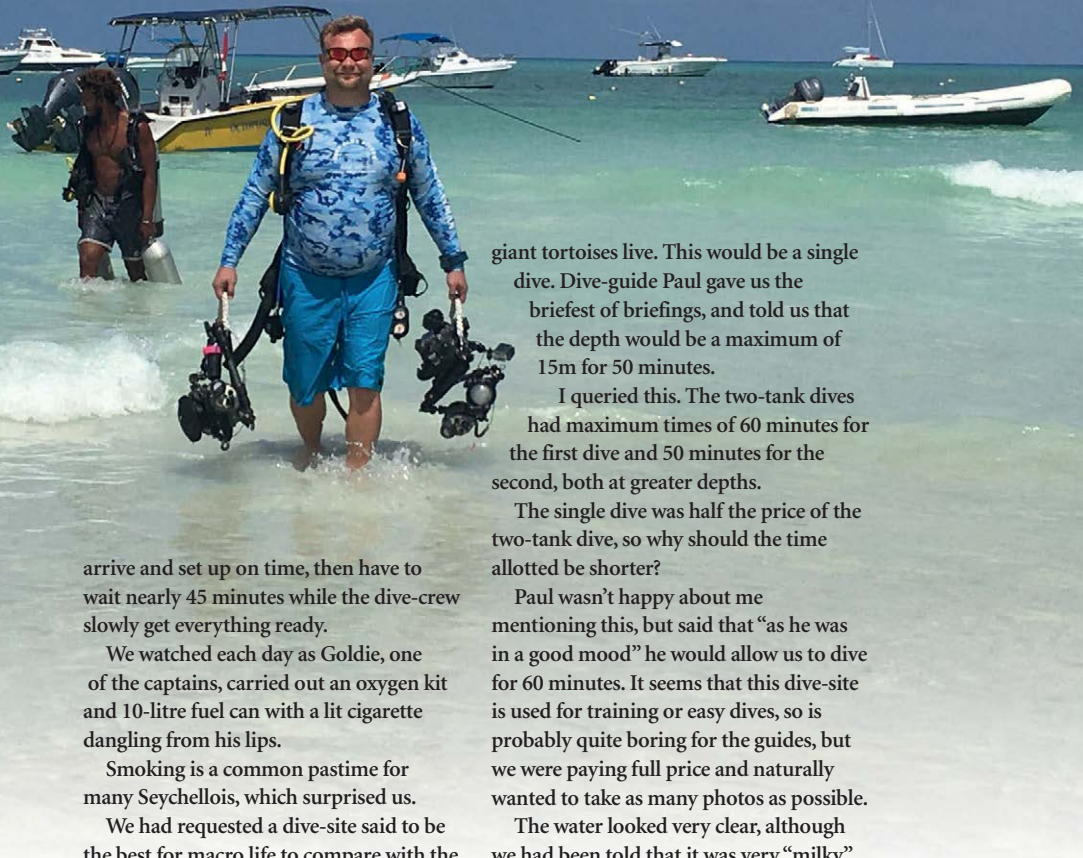
Mateusz and I later agreed that it was an amazing dive-site and hoped that our other dives would be just as good.

ON SUNDAY, when the dive-centre closes, we visited the beautiful Vallee De Mai national park, a primaevial palm forest and home to the endemic *coco de mare* tree found only on Praslin.

The female nut resembles a woman's private parts and the male plant a man's. Perhaps this is why the Seychellois call Praslin the "Original Garden of Eden"!

Our last day of diving saw continuation of a pattern we had noted – we would





arrive and set up on time, then have to wait nearly 45 minutes while the dive-crew slowly get everything ready.

We watched each day as Goldie, one of the captains, carried out an oxygen kit and 10-litre fuel can with a lit cigarette dangling from his lips.

Smoking is a common pastime for many Seychellois, which surprised us.

We had requested a dive-site said to be the best for macro life to compare with the previous sites. Coral Gardens was only 15 minutes' boat drive from shore beside Curieuse Island, where a population of

giant tortoises live. This would be a single dive. Dive-guide Paul gave us the briefest of briefings, and told us that the depth would be a maximum of 15m for 50 minutes.

I queried this. The two-tank dives had maximum times of 60 minutes for the first dive and 50 minutes for the second, both at greater depths.

The single dive was half the price of the two-tank dive, so why should the time allotted be shorter?

Paul wasn't happy about me mentioning this, but said that "as he was in a good mood" he would allow us to dive for 60 minutes. It seems that this dive-site is used for training or easy dives, so is probably quite boring for the guides, but we were paying full price and naturally wanted to take as many photos as possible.

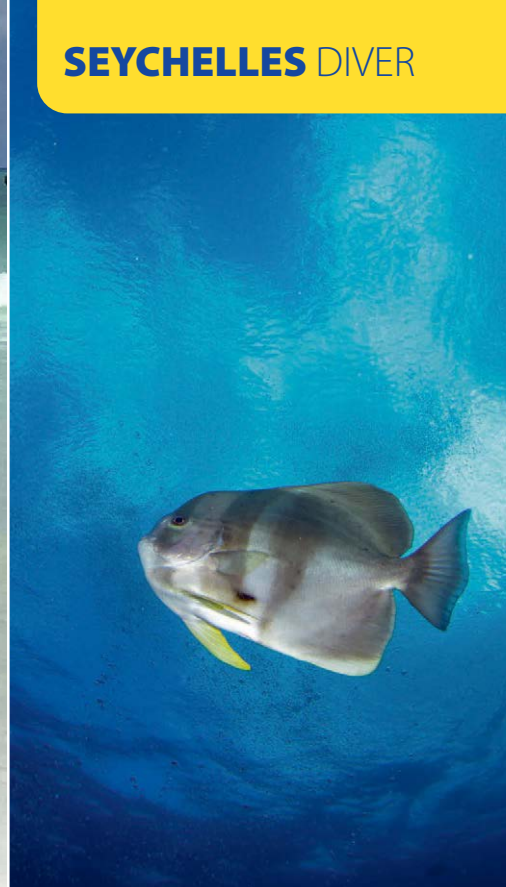
The water looked very clear, although we had been told that it was very "milky" and not the best site to visit. The sandy bottom was at 13m and the topography very different to that on previous dives, with coral rubble and small rocks scattered about. Fish were everywhere, and there were many cleaning stations.

A bright-red coral grouper was being cleaned by a bright blue wrasse under an overhang.

Looking more closely, I saw that it was squeezed up against a large white moray eel feeding in the reef.

It poked its head out briefly and its face bore a dark grey dotted pattern – I hadn't seen a geometric moray before!

Exploring the nooks and crannies of the



reef was a delight, with so many unusual species darting about. We spotted a much smaller geometric moray and the elegant variety too. Exactly on the 60th minute, Paul had us back at the surface.

THE FOLLOWING afternoon we took the Cat Cocos ferry back to Mahe, where the international airport is located.

We were staying at Eden Island, a 25-minute drive from Big Blue Divers at the end of Beau Vallon beach.

We had arranged four dives over two days, starting with its 11am and 1.30pm dives the next day.

We loaded our kit onto a pick-up truck and sat on the sides of the loadspace with two other divers for the 10-minute drive to the other end of Beau Vallon.

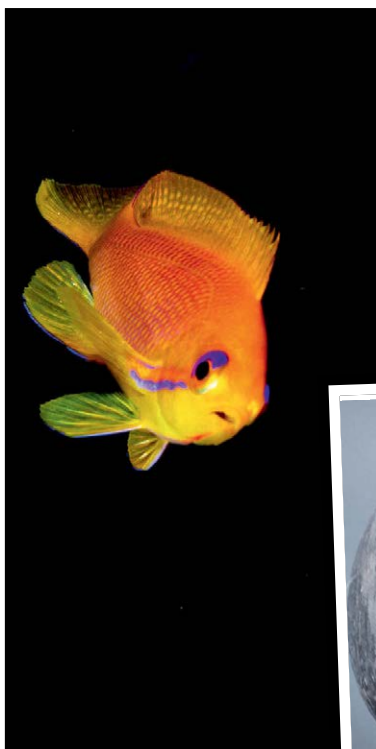
Above: Lugging equipment across the sands from the dive-boat.

Above right: Batfish enjoying the divers' bubbles.

Far left: Anthias school at Chuckles.

Left: Female *coco de mer* fruit.

Below from left: Tiny blenny; whip gobies; and a mantis shrimp, all seen at the Chuckles site.





The first dive, Chuckles, was a 20-minute drive away. Already on the boat were four other divers who had done the 8.30am dive. The boat always returned to the jetty to load more passengers during surface intervals.

Dive-guide Oliver said he trusted us to stay together as a buddy-team while he

Above, from left: Endemic semi-circle angelfish at Two Barges; the Zanzibar shrimp that had Oliver excited; batfish being cleaned at Two Barges.

Below, clockwise from top left: This rockover wrasse was busy preparing a nest in the sand beside the barges; nudibranch; this damselfish was said to be endemic, but its name was unknown; Winston on Big Blue's jetty, waiting for more DSDs.



took two people on a Discover Scuba dive.

There was a slight current and surge, and the topography was similar to that at Praslin. We descended to 17m, where we spotted morays, tiny blennies and gobies, a mantis shrimp running over the reef and many unusual shells, some quite large.

Towards the end of the dive Oliver joined us, having taken his DSDs back to the boat. I spotted a Zanzibar shrimp on a whip-coral, showed Oliver and was surprised when he went crazy, gesticulating and punching the air.

Back on the boat, he explained that he had only ever seen them in books and had always wanted to see one. I explained that they could be found fairly frequently on Indian Ocean whip-corals.

We had to wait for more than an hour

in the heat at the jetty while the pick-up took the 8.30am divers back and returned with an Indian honeymoon couple who wanted a try-dive. It seems that this is the bread and butter of Mahe dive companies.

PARTLY BECAUSE of the try-dives and also because it was the third dive of the day, the next dive site, Fisherman's Cove, was only just outside the harbour in water less than 10m deep.

A rubble bottom greeted us, with lots of broken coral, sea urchins and little else. I was shocked. The abundant life seen on all our other dives in the Seychelles was absent.

Winston, our guide, disappeared almost as soon as we had descended to take care of the Indian couple, but there wasn't much he could have shown us.

There were many large cone-shells and Mateusz finally managed to find a moray – a very disappointing dive!

Two days later we turned up for the 8.30am and 11pm dives. Asked for our preference, I requested a wreck-dive, and we were lucky enough to be taken to Two Barges – two wrecks for the price of one!

We were left to our own devices again as Oliver took two more DSDs to a shallower part of the site.

Fantastic dive! The first barge sat at 16m, and its fishlife astounded me.

Huge schools of fish populated the deck as we swam over it, heading for the deeper wreck at 21m.

Both barges were intact and more or less upright. Swimming over the deck to the hold, I could see pompano circling just inside the entrance. A large school of jack and bigeye circled the wreck.

Brightly coloured parrotfish and wrasse of many types and sizes pecked at the wealth of coral on the deck.

Back on the shallower wreck we found much macro life. In the sand between the two we saw a small black damselfish with a white patch around its eye that we later learnt was endemic, and a pretty rock-





mover wrasse busy moving stones to make a nest.

A reef octopus sat proudly on the deck. The corals were spectacular, healthy and varied. It was my favourite site of the trip.

We were the only divers on the second dive, and Oliver took us to one of his favourite sites, around 25 minutes away, a tiny island with a tree on top called L'ilot.

We moored in its lea and dropped to the bottom at 16m. As we swam over large smooth boulders covered in corals, we hit strong current on the corner. Pushing

through it we rounded a corner and found a gentle current on the other side.

At the other end the current picked us up and shot us round the corner and back

FACTFILE

GETTING THERE ▶ BA flies direct from London Heathrow to Mahe, or fly via the Middle East with Emirates, Etihad or Qatar.

DIVING ▶ Praslin: Octopus Diving Centre, Côte d'Or, octopusdiver.com. Mahe: Big Blue Divers, Beau Vallon, bigbluedivers.net

ACCOMMODATION ▶ Les 4 Etoiles Holiday Villas in Praslin and Eden Island in Mahe, both booked through AirBnB.

WHEN TO GO ▶ Year-round, but April, October and November are calmest. Late May-September is cooler and visibility less, but this attracts whale sharks. December-March is the warmest but wettest. Sea temperatures 26° in July to 30° in April. Tropical cyclones can occur from November to mid-May, but this affects the outer islands more than Praslin and Mahe.

MONEY ▶ Seychellois rupee.

PRICES ▶ Return flights from £500. Les 4 Etoiles £88 per night, Eden Island £120 for one-bed villas. Octopus charges £225 for five dives, with Big Blue £275 for eight dives.

VISITOR INFORMATION ▶ seychelles.travel



almost to where we started. We were enveloped and became one with the schooling fish around the island – a great finale to our diving in the Seychelles. ▶



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THE ELEPHANT IN THE POOL

If buoyancy control is the key to good diving, why is it not a core component of commercial entry-level diver training?

JOHN KEAN airs his views



THE “ELEPHANT IN THE ROOM” is the term used for an obvious flaw that’s blissfully ignored for long periods of time. Eventually the elephant makes its presence known, at the worst possible moment, at the greatest possible cost and causing maximum inconvenience to those on the wrong side of its trunk.

Two examples were *Piper Alpha* and *Deepwater Horizon*. The big grey things in the shape of overlooked safety procedures, complacency and commercial greed bit the offshore deepwater drilling industry in the rear harder than a Rottweiler with stainless-steel dentures.

Scuba beginner training doesn’t so much have an elephant in the room as a full-grown rogue mammoth in the swimming pool, swaying its huge tusks and trumpeting loud enough to crack the tiles the length of the pool.

What grand delusion is it trying to reveal?

In most sports, mastery is observable. Spectators at a tennis match can watch a ball being hit skilfully. A series of back- and forehands, serves or volleys culminate in a victory, or at least a visual display of prolonged competence.

The same goes for other sports, such as golf with its drives, chips and putts.

The evidence can be seen in how well the ball is

struck, how straight and near to the hole it goes, and how few shots are taken to complete a round.

Over the past 20 years, parts of the new-diver training community have diluted and reframed what constitutes hard evidence of competence, distracting entrants from noticing its absence – the elephant in the pool. It’s inconceivable that vast sections of the industry are producing people who can’t dive properly – isn’t it?

Cert cards, wall certificates, graduation photographs, fridge-stickers, new equipment and logbook entries are all useful but they’re not direct evidence of a mastery of buoyancy control.

Sometimes we have the appearance of a competently completed beginner scuba course, but not always the hard visual evidence one might expect in other sports.

DURING AN INTENSIVE entry-level scuba course we’re busy creatures. Look at all the necessary components: classroom or online theory absorption, extensive briefings and demos, kit set-up, donning and doffing, paperwork, admin and transport to and from locations.

There are the in-water training sessions in both confined and open water. Add the surface skills, quizzes, exams and multiple de-briefings and

nearly a week has passed. At the end we’re safe and legal but... can we actually dive properly?

Among that list are some 25 inwater mandatory skills. They’re vital. Here are a few: descent and ascent procedures; out-of-air emergency protocols; clearing water from flooded masks; equipment removal and replacement; entries and exits; navigation skills; fin-pivoting; surface skills; finning techniques; cramp removal and assisting tired divers.

Lurking in there is the development of neutral buoyancy control. For me it’s the main event, not just a box on the instructor’s plastic skills slate to tick to fulfil legal and course standard requirements. It’s the most important skill to master because it defines what scuba is – diving!

Diving is controlled movement through water, and all the other skills, frills and social diversions in the world will never substitute for its absence or lack of development.

Neutral buoyancy control is used throughout all dives by all divers, yet its developmental associated skills on a beginner course are often the least practised. Why is that?

With about nine dives in the pool and open water adding up to nine hours under water, the grand total of mandatory neutral buoyancy

skills with some agencies is not measured by hours or even barely minutes. It can be just – 90 seconds. Within that short time, the longest minimum requirement of a single buoyancy skill might be only 60 seconds.

A student can wing these 60sec “freeze frames”, much as a broken clock is right twice a day.

Some mandatory skills such as mask-clearing or cramp-removal might take only a few seconds to demonstrate, then copy.

Such skill-processing might tempt instructors to treat all the listed skills speedily, even though some require greater attention.

Worse still, nearly all the skills are done on a pool floor, rather than being repeated or additionally mastered in midwater, where a certified diver would typically be.

The way the world learns to... kneel?



CONSIDER WHAT GOES into mastering neutral buoyancy control: BC operation, lung-volume control, correct weighting, trim achieved through sensible positioning of those weights and, finally, combining all these under a watchful eye through set skills and motion.

This evolving sequence should take several minutes per student and be an ongoing process, but how many professionals give it the attention and respect it deserves?

The cynical might blame the training agencies' limited mandatory inclusion of this vital skill, but is it really limited?

Here is a sentence accompanying a neutral buoyancy skill from the instructor manual of a leading training agency: "...inflate the BC to hover for at least one minute without kicking or sculling".

Two words there are often overlooked by the impatient and agenda-driven resort instructor: "at least".

During the swim-around part of the dive, it is encouraged that students be further exposed to isolated and deliberate development of neutral buoyancy-related skills over and over again.

So duration is left to chance, rather being a stated and required standard.

The "chancing" of diving's most important skill is impossible to spot before booking a lesson, because a beginner doesn't know it matters; many courses look the same in their marketing and course descriptions; and you might not know which instructor you'll get and how seriously they take buoyancy control development until you complete the course.

Instructors in a hurry are prone to either rush this development or to believe that a few minutes is enough, despite visual evidence to the contrary. And how do they defend themselves? Easy.

They tell their less-than-neutrally buoyant ex-students that it's... *their fault!*



'I NEVER HEARD OF A FIREMAN SIGNING UP FOR A PEAK-PERFORMANCE HOSEPIPE COURSE'

"You passed, but now go away and work on your buoyancy control." But, of course, that's the instructor's job from the outset.

Completing the mind-control exercise, additional courses are recommended to make up for the deficiency, offloading the consequences of failure onto other instructors.

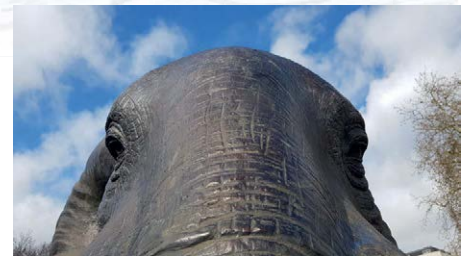
These courses have names like "peak buoyancy control" and are often classed as "specialities", courses intended to provide additional knowledge rather than to cover flawed entry-level training.

Not even the most short-sighted supermarket would offer "one for the price of two".

Add-on extras in place of core areas of basic training appear not to exist in other fields of excellence. Graduating medical students are not told to "work on your transplants".

Military passing-out parades rarely include soldiers who are rotten shades.

And I never heard of a fireman signing up for a peak-performance hosepipe course.



THE ELEPHANT GROANS with incredulity when such instructors swap war stories about their students' buoyancy-control woes, labelling them a "student from hell", "bolter" or "human anvil".

They blame drop-outs on "ear issues", even though the real problem was caused by a lack of buoyancy control resulting in late equalising and damage to the middle ear.

With an unholy reverence for the authorities who sanctioned their own professional activities,

few instructors will figure out that their basic training is the beginning, not the end.

Leading sports instructors study feedback and with a little reverse-engineering make the required adjustments to the learning process to achieve success. Following a script is useless if they don't occasionally "look out the window".

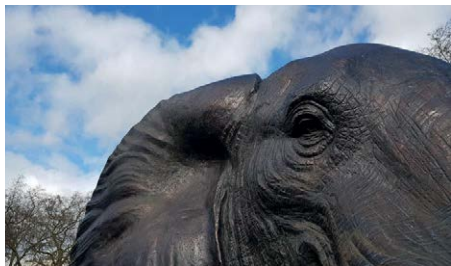
Technical-diving instructors frequently spot the elephant in the pool, because students arriving on their tech courses with sub-standard buoyancy-control development are either turned away, learn quickly or don't get certified at all.

In the tech-instructor's environment, good buoyancy control is not treated as just a "nice idea" but as a life-saver. An uncontrolled ascent from depth or the omission of multiple decompression stops with a body full of inert gas is game over, and it's difficult to complete a peak buoyancy course when in a wheelchair or a coffin.

One would think that the knowledge-bank and vast experience of the tech instructor would be welcomed, but many resort recreational dive operations banish their "antics" from sight for fear of scaring their all-inclusive customers: "He's on the dark side."

One sees the light when tech-diving because the increased risk that comes with greater depth and time is matched with knowledge, skills and discipline and neutral buoyancy mastery is at its core. That knowledge is easily transferable to recreational diving.

For example, recreational diving's "Win it in a Minute" for neutral-buoyancy hovering has an equivalent in the first technical-diving course of a mandatory 20-minute simulated decompression stop to within a metre of deviancy.



THE RECREATIONAL-DIVING industry has a small portfolio of tools and diversionary props to both accommodate and mitigate the effects of sub-standard divers.

Rarely do these include any form of improvement, and are more akin to railway buffers or motorway hard shoulders.

A private guide often becomes a private aquatic bouncer, keeping the "offender" arm's reach away in non-challenging environments and at a safe distance from coral.

Further mitigation practices include the diver being relegated to "local sites" instead of the premier league iconic ones where the less-skilled would inflict more damage.

Fifteen-litre tanks are frequently requested or even "prescribed" in resorts because the guest is "bad on air and needs a bigger tank".

Learner car-drivers who are bad on driving aren't issued with an air-bag or sin-binned to a disused car park... they are taught to drive

properly and pass a test under the evaluation of an external examiner.

Some experienced divers feel resigned to a life of short dives and a short leash, erroneously believing they are not among the chosen ones.

With the acquisition of some dive-centres by large travel and resort operators, the focus has been on volume rather than enhancing what is essentially a specialised sport.

Plane-seats, hotel rooms, beachside animations and excursions have been the mainstay of these corporate giants, and attempts at forcing the beginner dive-training industry into an image of its larger self hasn't worked.

The "intro" dive, while satisfying the operators' volume quotas, further removes the acquisition of skill, leaving just a momentary glimpse of life under water while securely attached to an instructor.

Because of the social, travel and community nature of scuba-diving it is also full of frills, attractions and diversions from achieving what really matters... the true mastery of neutral buoyancy control.

In many quarters the industry has sacrificed independence to unity, value to cost, quality to speed and professionalism to package.

The image they see around them is the product of ideals that have demanded more sacrifices at each successive disaster. High-quality resort diving is now a shadow of its former self.

The VIP luxury resort sector is also frequently oblivious to the elephant in the pool. While smart staff uniforms, good manners, polished service skills and reduced class sizes are marketed and welcomed in these gold-plated environments, neutral-buoyancy skill development can still be subjected to the Sixty Second Challenge.

I was once asked to supply a luxury resort's dive-centre with an 18-litre scuba tank because its heavy-breathing billionaire diving guest was a demanding and valued customer.

I explained that its bulkiness was likely to cause yet more excessive air consumption. It's a bit like running out of oil and using a longer dipstick.

The last time I saw any of these monsters, they were strapped to the back of world-record-breaking deep divers. "How about you teach him to dive properly?"

"We're a 5* resort and we always give the guests what they ask for."

The tail wagged the dog; two industries under one roof; room service competing with specialised instructional sports advice – a grey area?

It's big and grey all right!



VISITING DIVERS, in these circumstances, experience but a snapshot of what's possible on their one-week diving holidays.

They might experiment on-the-fly with weighting, trim and position, only to crack it on the final day before flying home.

This is in blatant contrast to their guides, who flawlessly glide and hover motionless throughout the dive before surfacing with near-half-full tanks.

Are they gifted? Do they walk with the gods? Can they impart just a little of their heavenly knowledge during those multi-hour surface intervals?

The industry is still largely responsible for not only turning out thousands of divers who can't dive properly but sustaining their continued lack of quality with props, diversions, illusions and little willingness to intervene and improve the status quo. So who is to blame?

No one and... everyone.

The offender is a mindset, a viral belief even, not an individual or entity that might accept or reject that mindset. If time and direct input is devoted to the problem, the results will show.

The solution requires nothing new. No gizmos, gadgets or "special training". The professionals, agencies, dive-centres and equipment already exist and are well structured to provide the solution. All they have to do is... their job.

Unearned certification represents abdication of the responsibility that is the professional core of nearly any other field of education and training.

The alignment of agencies that don't put





neutral buoyancy development at the forefront, instructors who simply follow the printed word and decades of unsuspecting customers has created the perfect storm of cognitive dissonance, grand-scale Stockholm syndrome and perhaps the longest example of psychologist Solomon Asch's Conformity experiment ever.

The result is a tightly woven tapestry of monumental illusion with few noticing that the aquatic Emperor really has no clothes. Scuba's equivalent of "The Big Short"? It's taken a very big shortie to keep this elephant insulated for so long.

DESPITE ATTEMPTS to shoehorn dive training into the same buying process as Amazon orders, an entry-level scuba course that you can now "add to basket" is a service, not a product.

It might have an identical name and technical script to that offered elsewhere but its method of delivery and execution can be worlds apart.

If the existing gatekeepers have failed, the job falls to those who have already seen the elephant,

whether they're agencies, dive-centres or individual professionals. But is it all worth it?

In my long experience, here's what happens when divers develop great buoyancy control:

- * They feel good. Great diving experiences are not just about seeing, they're about being.
- * Their sense of safety and control is elevated; their air consumption drops.
- * They dive more often, spend more, are easier to manage and less stressed. They tell others.
- * You can take them to more interesting and exciting dive-sites. The underwater environment improves.
- * They recognise value against cost. They'll support your business.

Those outside the industry need to be presented with the information that lets them know they have a choice, what that choice is and who can deliver it. It's not difficult and I believe all divers are entitled to it.

The elephant never forgets but after 20 frustrating years it's getting rather impatient. I think it's time to drain the pool. █



John Kean is a 22-year veteran diving professional, guest speaker and author of five best-selling scuba-related books. He has completed more than 10,000 dives and trained more than 2000 students from beginner to professional and advanced trimix level.

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Mangrove splits

MANGROVE FORESTS are ideal environments for split-level photography. First, the calm waters and shallow depths make it easy to control the water surface on our dome-port. And if we do have water-droplets, they don't really show in the mass of leaves.

Splits work best when there is interesting subject matter both above and below the surface, and in a mangrove this is almost always guaranteed by the trees.

The leaves and roots are often enough, but the photos become even more captivating when we have fish or corals to combine with the trees.

These shots are more easily constructed in open areas of the mangroves, away from the shade of the trees, because it makes it easier to illuminate everything with the help of the sun.

The technical challenge when shooting split-level images is to get both halves in focus. It is easy to take these shots with only half in focus!

The key to the technique is to focus on the underwater section, then lock our focus.

I just switch my camera to manual focus after carefully focusing. If we focus above the surface the underwater section won't be in focus, whatever we do.

Then we need to shut our aperture right down to maximise depth of field, to keep everything sharp above the surface. I usually boost my ISO up a little to make this easier, otherwise we can end up with a very slow shutter-speed, or find our strobes are not powerful enough to be useful.


We don't always need strobes in the middle of the day, but we do when the sun is low in the sky.

Trees and Corals, taken with Nikon D850 and Nikon 8-15mm. Subal housing. Seacam strobes. 1/60th @ f/20, ISO 400.





THE LUCKY SHOT



TIM LAWRENCE was part of a technical team exploring a Japanese ship that fell victim to a submarine in the Gulf of Thailand during WW2. Photography by **MARIO MERIUS** and **MIKKO PAASI**





IN 1941 THE ATTACK ON Pearl Harbor opened Japanese hostilities in World War Two. Japan's military planners wasted no time, identifying the mines of northern Malaysia and the sea-lanes around Singapore as secondary targets.

Control of these would guarantee a source of materials to feed the nation's war machine and its ability to move freely around the region. The sun was rising in south-east Asia.

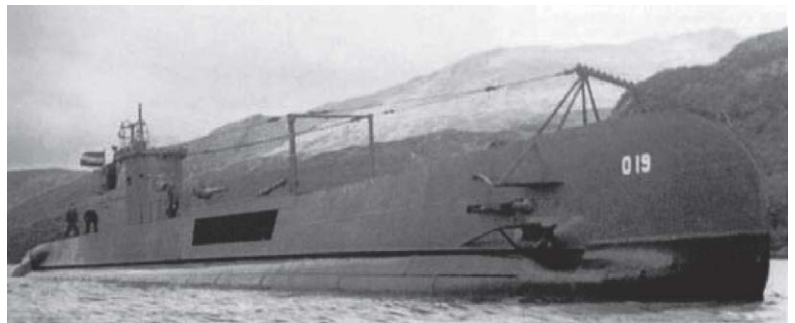
In early January 1942, a Japanese invasion force was building up at a remote location in the Gulf of Thailand.

It was tasked with seizing control of the mines and attacking along the soft underbelly of Singapore, moving rapidly.

Admiral Tom Phillips, Commander of the Royal Navy's Asian fleet, was forced to act fast, committing his flagships HMS *Prince of Wales* and HMS *Repulse*. They bravely put to sea without waiting for the necessary aircraft-carrier support.

HMS *Indomitable* ran aground and the remaining carriers were too slow to join the action, with devastating consequences.

Unable to locate the invasion force, both warships were sunk by Japanese



aircraft north of Tioman Island.

The war at sea had changed forever.

Only a thin line of submarines was left to oppose the Japanese invasion force. Ltz Hendrik F Bach on Royal Dutch Navy submarine *O-19* found his command thrust into the front line.

Commander Bach set his periscope sights on two Japanese military cargo ships in a convoy. It was late in the day and the humidity was almost unbearable – January in the tropics was the worst time to be a submariner.

Alone and surrounded by the enemy, *O-19's* crew were tense. Bach assessed the bearing, speed and distance of the convoy and positioned the submarine so that its torpedoes would have the greatest chance of causing damage.

Time slowed as the periscope tail-ripples betrayed *O-19's* position and it launched three torpedoes. Bach followed the path of two of them as they ripped into the engine-room of the first target, while the third torpedo headed towards the smaller of the two ships.

There was no time to wait for the outcome – having overstayed his welcome, Bach ordered a crash-dive.

O-19 retreated below the safety

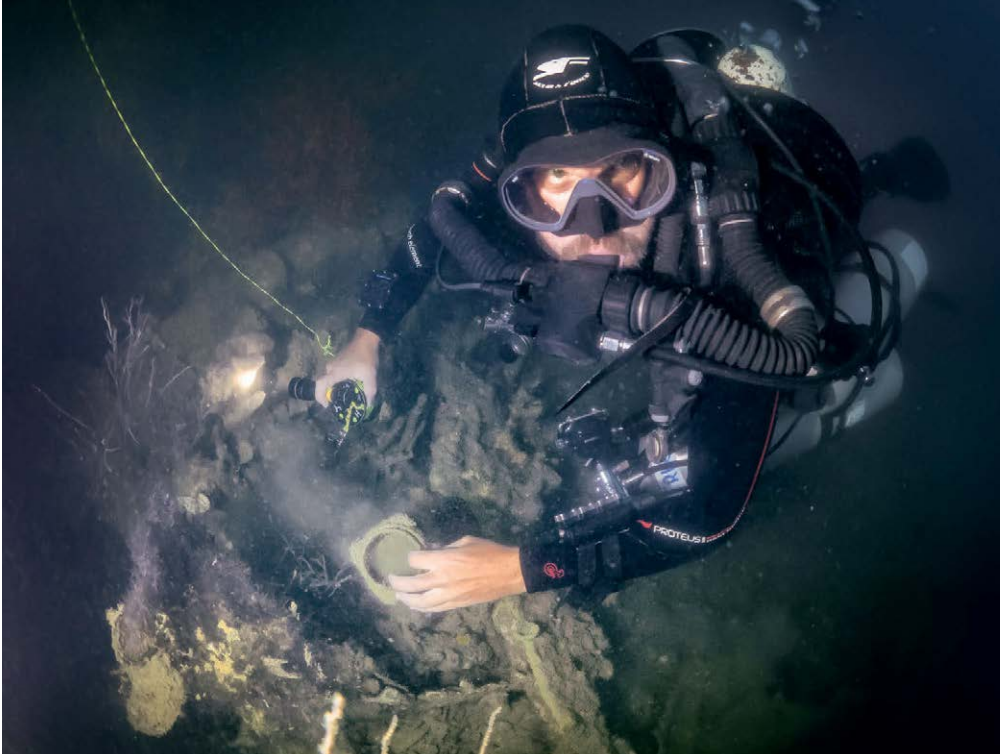


Top: Team divers Erik Brown, Chris Haslam and Mikko Paasi prepare for their descent.

Above: Royal Dutch Navy submarine *O-19*.

Left: Tim Lawrence and Erik Brown descending to the wreck.

Far left: IJN *Akita*.



screen of the thermocline to await the retaliation that would surely follow.

There was silence among the crew – and then a third explosion was heard. Had the last torpedo found its target, or was the ghostly rumble the result of a secondary explosion aboard the IJN *Akita*? Caught by surprise, the destroyer escort for the cargo ships was left searching frantically for a target.

O-19's duty done, it slipped silently away with the setting sun.

A KITA'S HULL had been laid at the Mitsubishi shipyard in Japan in 1915. Built for the NYK Line, the 105m-long vessel had the central bridge common for a passenger and cargo ship of that time.

The Imperial Japanese Army requisitioned *Akita* in mid-1941, and on 10 January, 1942, she had been carrying a large amount of timber, bridge-building

Above: Erik Brown searches for details to help identify the wreck.

Below: One of the divers explores the deck.

Below right: Erik measures the length of the wreck.

equipment and troops to Songkhla in southern Thailand.

The 3800-ton ship was not big enough to survive the torpedo strikes on her engine-room. The explosions had created havoc, killing four crewmen instantly.

Akita settled, listing heavily, and late in the day the remaining crew abandoned the stricken ship to her fate.

As the sun rose the next day, the Japanese sailors in their lifeboats were stunned to see their ship appear, wallowing in the swell.

The large amount of timber in her holds had managed to stop the rising sea water from breaching her freeboard.

The crew rushed aboard in an attempt

to save the ship, but the damage was too severe and again they were forced to leave.

The final blow was dealt by gunfire from the destroyer *Fubuki*, and *Akita* slipped slowly beneath the waves on an even keel.

LAST APRIL OUR TEAM of technical divers loaded the trucks and headed towards a fishing village south of Songkhla in southern Thailand, not far from the Malaysian border.

Our target had been located two years earlier at a depth of 65m by a team including my friend and dive-buddy Mikko Paasi. It had been presumed from its position to be the 5000-ton IJN *Tairyu*, the second ship the Royal Navy Command in Singapore had claimed as sunk by aircraft the day *Akita* went down.

But we were doubtful, because Imperial Japanese Navy records contained nothing about a ship of that name being sunk in the area.

Those two years had passed before we had been able to secure a fishing vessel with a captain willing to take us to this remote part of the Gulf of Thailand. We were as keen to get underway as Admiral Tom Phillips had been 77 years before.

Was the wreck that of the ship sunk by a lucky shot? Our mission was to find out.

AVOIDING THE HOLES in the pier as I helped load the fishing vessel, it crossed my mind that the timber in *Akita*'s hold would have gone to good use there! We settled down in our chosen



spaces on the deck – this was going to be a long voyage.

At 4pm the next day we reached the first mark, but our crew fumbled the shotline, and with darkness fast approaching, valuable time was lost.

Too late to put divers in, we decided to move straight on to our primary target, which was still six hours away, and plan to return to this mark on our next trip.

At sunrise the calm swell belied the intensity of the action that had played out there all those years before. But there was the wreck, showing on our sounder.

This time our team took control of the helm and of placing the shotline, which we did on the shallowest sounder return.

Our luck was changing. We split into three dive-teams to maximise our chances of success, hoping that this would help to avoid any jam on the ascent-line and afford good surface-support.

Our first dive took our sub-team towards the bow. Passing deck machinery, we descended into the huge multi-level holds – impressive but, sadly, empty.

Images of that pier again jumped into my mind. Erik Brown gave me the turn signal, and I recovered the distance-line.

Our 30-minute bottom time had passed quickly. Completing our decompression requirements, I wondered if the other divers had enjoyed better luck.

Back at the surface, we compared notes. Our shotline was on the starboard side forward of the bridge, a good position for memorable dives, but so far the ship's identity still eluded us.

On the second dive Mikko headed to the engine-room, while we focused our efforts around the bridge.

A telegraph pinned under the debris taunted us, but it was impossible to move and the maker's plate lay out of sight.

A large number of portholes lay in a line along the remains of a walkway – could they be a clue to the ship's identity?

Back at the surface, we again swapped observations. Ed Bosworth had recovered some bottles featuring Japanese writing –



a clue to the ship's origins?

Mikko confirmed that he had found heavy damage around the engine-room, consistent with a large explosion. The evidence was mounting, pointing us towards the *Akita*, but still not solid.

WE HEADED FOR PORT, my mind running back over the dives and that unusual quantity of portholes lying loose on the deck.

Back home, we did more research. IJN *Tairyu* had been built in Newcastle at the pinnacle of British shipbuilding, when vessels were built to last. All porthole windows and inner and outer fixings would have been made of brass.

The *Akita*, on the other hand, had been built in Kobe, Japan, using more modern techniques, which meant brass windows attached to the hull using steel fixings.

This would also mean that, given time,



Top: The deck is covered in artefacts and also fishing net.

Above: Chris Haslam and Tim Lawrence during decompression

Left: Returning to the boat.

the submerged hinges would corrode, leaving the porthole windows lying around the submerged walkways.

Was this the smoking gun?

The evidence certainly points towards this wreck being the *Akita*, but without a nameplate or serial number its identity will remain a mystery.

The dive-team was Erik, Mikko, Chris Haslam, Mario Merius, Oliver Zaiser and me on rebreathers, and Ed, Dennis Funk and Klaus Kononen on open circuit. Julia Alberione was our support diver. ▣



DUSTY MILLER'S **SECRET WAR**



PETER SVATT



How did the British obtain such accurate intelligence about German WW1 U-boats? It wasn't down to a band of elite secret agents, but rather the skill and bravery of diver Dusty Miller. Wreck-expert **KENDALL MCDONALD first told the story to great acclaim in *DIVER* in 1998, and now we present this extended read once again, in memory of a true underwater hero**

THROUGH THE WINDOW of his helmet, Dusty Miller was pleased to see that the charge he had set a few minutes earlier had neatly blown the conning-tower hatch-lock and the cover was now sagging free.

As he pulled the cover up and made to descend into the U-boat's control room, he jerked back. A German officer came up the ladder and, poking his head above the lip, peered wide-eyed round about him.

Though Dusty Miller was known for his nerve, he almost panicked as the German kept on coming up out of the hatchway.

Within seconds, however, Dusty had himself back under control. The man was dead and it was only a small amount of air still inside the sub that was pushing the body up at him.

Dusty pulled the officer's body free and saw it float, rather than fall, downwards over the hull by the gun and then merge into the gloom of the seabed. Only then did he go down into the dark of the U-boat's interior and begin searching by the light of his lamp for the iron box containing the boat's code and signal books.

By this third year of World War One, Warrant Shipwright Ernest Charles Miller had carried out this kind of search many times before and had thought that nothing he saw in the sunken U-boats could upset him.

But this time, as the bodies of the U-boat's crew crowded around him, seeming to cluster closer at his every movement, he felt, as he said later, a bit twitchy.

HE FOUND THE CODE-BOX on the floor of the control room without much difficulty and dragged it towards the hatch ladder. He was about to hoist it upwards when he suddenly heard the engines start up. But that was impossible – the sub had been sunk a fortnight ago!

Mental pictures of crazed engineers trapped for all that time in the engine-oom of the U-boat flashed into his mind.

It says a lot for his strength of will that, instead of making a hasty exit, Dusty hauled more line and airpipe into the control room and, with only his torch to light the way, set off towards the engine noise.

It was with great relief that he saw that the engine-room's watertight door was open and, shoving it wider, he could see that the engines were still and the compartment completely flooded.

His mad engineers were dead, their bodies floating up in the top of the hull. But the sound of running engines still vibrated through the boat!

Even Dusty had now had enough. He returned to the control room, hoisted the code-box up ahead of him and dragged it along the hull towards his shotline near the bow.

It was as he finished pushing the box securely

into a hoist-net that he realised where the engine noise was coming from. Hanging down from one of the damaged bow torpedo-tubes was a torpedo with its engine running flat out.

When Dusty Miller had blasted the hatch open, the shock had started the torpedo's engine.

At any moment the torpedo would succeed in breaking free and driving down into the seabed under the hull.

Then the explosion would blow Dusty, his code-box and much of the submarine to pieces.

Dusty cracked. He jerked the "emergency up" pulls on his signal rope, at the same time yelling "up, up, up!" into his helmet telephone.

Even so, he was only just out of the water and not even properly on the deck of the trawler when the torpedo explosion surfaced in an eruption of white water.

WHATEVER DUSTY'S feelings about it, the Admiralty thought the dive had been very worthwhile. The iron box, which was recovered unharmed, contained not only the latest code signal books but a complete set of blueprints of the U-boat, which, as she was the latest type of minelayer, were also gratefully received by their Lordships.

Dusty Miller's undersea war against the German U-boats led to many other narrow escapes. For



EC 'Dusty' Miller.

'HIS INSTRUCTORS EXPECTED LITTLE OF HIM. HE WAS THIN AND PALE-FACED'

Royal Navy divers this was a war fought out in clumsy helmet diving gear, sometimes almost on hands and knees, inside the shattered and crumpled compartments of more than 50 sunken submarines around the coasts of Britain.

Signs of that undersea war can still be seen today. If you dive a WW1 U-boat and find its hatches open, don't think that this must mean that the crew tried to escape.

Open hatches might well indicate that Dusty Miller was there more than 100 years before you!

ERNEST CHARLES MILLER'S war began at midnight on 4 August, 1914, at the same time as for all the rest of Britain's armed forces.

But the excitement of the declaration soon died away, and Shipwright Miller found his Naval life as boring as it had been in peacetime. So he took a diving course.

His instructors expected little of him. He was thin and pale-faced, but he was keen and turned out to be surprisingly wiry.

His end-of-course report said that he was very proficient, cool and courageous and able to withstand pressure better than most.

His marks on the underwater explosives course were very high too. So it is not surprising that Dusty Miller quickly became an instructor at the Navy diving school at Whale Island, Portsmouth.

German U-boat attacks on Allied shipping soon began to take effect, with the largest and most controversial (was she or was she not carrying munitions?) the sinking of the 30,396-ton liner *Lusitania* in May 1915.

But the Navy began to hit back and sank nine U-boats during the first 11 months of the war at sea. The 10th U-boat to be lost in the war was, however, the result of an accident. And it was to change Dusty Miller's life.

On 2 July, 1915, *UC-2*, one of the smallest of the minelayers and commanded by Oberleutnant Karl Mey, was on her first voyage across the North Sea when she was hit, while at periscope depth, by the almost equally small coastal steamer *Cottingham*.

After the steamer's captain reported hitting something that might have been a submarine, minesweepers dragged the Yarmouth Roads area with nets and sweeping gear, and hooked into an obstruction.

Later that evening, there was an explosion from the buoyed position, which suggested that

the sweepers had shaken something loose.

When this report reached the Admiralty, someone had a brainwave. Why not send a diver down? Perhaps he could tell them about the U-boat – was she really carrying mines? If so, how many? What sort of periscopes was she using?

The list of questions was almost endless, because the Navy knew very little then about Germany's undersea fleet.

The diver chosen to be the first man to dive a sunken German submarine was Dusty Miller.

Together with his helmet, an air-pump, all his other diving gear and two attendants, he was rushed by Naval lorry from Portsmouth to Yarmouth.

There they were joined by Commander Guybon Chesney Castell Damant, a famous Navy diver who, nine years before the war, had carried out research into Haldane's decompression tables for the Admiralty.

He was also a former deep-diving world-record holder (64m in 1906) and the fact that he was now put in charge of this U-boat diving operation shows how important the Admiralty considered it.

A T DAWN, THEY WENT by trawler to the scene of the sinking. It was not an easy dive. The buoyed line led down through almost pitch-black water to a tangle of netting and weed, and it was some time before Dusty could be sure that he was on a submarine and not an old shipwreck.

However, he finally found the submarine's conning-tower, which had its hatch firmly shut.

Diver Miller then moved along the hull towards her bow. He had gone only a metre or so before he discovered a huge hole in the sub's starboard side.

He examined the hole carefully by the light of his torch. Though he feared for his airpipe against the jagged edges, he could not answer any of the Admiralty's questions by staying outside.

To add to his problems, the tide was starting to run. He tied off his airline to a projection near the hole with a lanyard so that the only pull on it once he moved into the hull would be his own.

Afterwards, he was unable to say why he knew he was in the officers' quarters as soon as he moved carefully in over the inner hull plating.

He had found himself up against a closed, but unfastened, watertight door. He forced it open.

As he went through, he fully expected to come face to face with the bodies of the crew and had steeled himself for the shock, but there was no one in what was clearly the U-boat's control-room.

He took his time studying the periscopes and other equipment, and committed as many details to memory as he could. He was about to leave when his torch shone on an iron box on the floor.

It was unlocked and opened easily. Too easily – for the disturbance of lifting the lid sent a cloud of loose papers floating out, up and around him.

Left in the box were several books. Dusty gathered as many of the papers as he could and stuffed them, together with the books, into his canvas pouch before making his way back to the shotline and so to the surface.

COMMANDER DAMANT did not try to conceal his delight with Dusty's haul. He had



UB-4's strong-box contained details of two newly laid German minefields.

little doubt that two of the books contained secret codes and that the third book was the current German High Seas Fleet signal manual.

He was right. The loose papers turned out to be part of a plan of a minefield laid only hours before and showed that the submarine was part of the new Flanders Flotilla. She had cleared Zeebrugge only three days before.

Unfortunately, the exact position of the new minefield was on one of the papers that had floated clear of Dusty Miller's grasp. But that seemed a minor point.

The Admiralty was over the moon about his haul and Dusty Miller became the founder diving member of the Royal Navy's U-Boat Flying Squad.

'HE WAS ABOUT TO LEAVE WHEN HIS TORCH SHONE ON AN IRON BOX'

Commander Damant and Diver Miller were now given priority access to all sinkings of U-boats around the coast of Britain, and Damant was also given powers to commandeer any suitable ship for use as a diving tender.

UC-2 had apparently sunk herself with one of her own mines. This was confirmed a short while later when the U-boat was raised and found to have six rearward-sloping chutes for dropping 12 mines. One of the chutes was blown wide open, and had made the hole in the hull through which Dusty Miller had entered.

The mine in the chute had exploded when its arming device was triggered by the minesweeper's efforts to hook the sub.

The next call for the diving flying squad was not long in coming. In fact it was only a month later that Damant again took his little command to Yarmouth and put all their gear aboard a trawler.

They had been asked to examine a submarine reported sunk off Smiths Knoll Spar Buoy by the gunfire of a decoy vessel, but for three days the weather put an end to any chance of going out.

On the fourth day, despite the heavy sea still running, Damant decided to risk putting his diver down. Dusty had his doubts, but after something

of a surface struggle he went down a line hooked into the sub as fast as he could.

In fact, he reported reaching 30m in less than a minute with his ears giving him hell. His boots clunked onto the sub near the conning-tower.

It was lying over on its port side amid thick kelp that, despite the depth, was swaying madly in the surges from the swell up above.

Although there were rather graphic reports of the sinking by a decoy vessel – the gunners claimed that their three-pounder shells burst right in the conning-tower – Dusty Miller could find only one hole in her hull, a hole much too small for him to wriggle through.

The conning-tower hatch was sealed, so he decided to blow it open. He placed a gun-cotton charge rigged with firing-circuit wiring that he had taken down with him, and then surfaced and somehow got back aboard the trawler.

The charge was then detonated.

Dusty went down again through a cloud of dead fish and tied off his airline by a lanyard to a rail near the conning-tower, leaving himself about 9m the other side of the tie. Then through his phone he ordered: "Haul taut!"

His attendants pulled the airpipe and his line as nearly straight as the tide and surge would allow. The lanyard took the strain off Dusty and ensured that there was no loose pipe to thrash around and get entangled in the wreck. He then set about entering the sub through the blown-open hatch.

IT WAS A GRISLY EXPERIENCE. As he lowered himself gingerly down through the opening, he was immediately surrounded by bodies.

So closely did they press in on him that he had to tie them to the roof of the control-room with lanyards before he could search the interior with his torch.

It took him some minutes to find the strong-box, which was identical to the one in his first sub except that it was locked.

It took him more minutes to manoeuvre the box up through the hatch, attach a line to it and give the signal to haul it up.

Now he had to look after himself. He released the lanyard holding back his air-line and gave the order: "Up pipe!"

The pipe lifted clear and Dusty throttled back the air-vent on his helmet. As the air started to fill

his suit, he slid up the shotline towards the surface.

At 9m he swapped from the shotline to a short, heavily weighted line waiting for him.

While hanging there, he swung his arms and legs about in exercises that he had been trained to use to aid his decompression by increasing his blood circulation.

Then after five minutes he moved up to 6m for 10 minutes, and then up again for a final 15 minutes before surfacing.

Long before he reached the open air, another smaller block of gun-cotton had burst open the recovered strong-box, revealing that Dusty had hit the jackpot once again!

Sodden but still readable were books of new codes, a complete blueprint plan of the sub, which was revealed as *UB-4*, and a bonus – plans of two new German minefields in the North Sea.

UB-4 is today at 52 43 00; 02 18 00E at a depth of 30m. It is well broken and it looks as though some salvage has been done in recent years. It is well into the sand-silt seabed.

UB-4 was commanded by Oberleutnant Carl Gross and was one of the new small attack boats. On 15 August, 1915, Gross made the fatal mistake of surfacing close to Smith's Knoll, Yarmouth, intending to sink by gunfire an apparently harmless fishing smack called *Inverlyon*.

She might have looked harmless, but in addition to her normal crew of three she carried a three-pounder and five naval ratings to man it.

Gross had barely shouted his command for the *Inverlyon* crew to abandon ship when he was hit by six shells rapid-fire.

Holed by at least two of them, *UB-4* sank swiftly, and there were no survivors.

Inverlyon had her trawl down when attacked and then made sure that she hooked fast into the U-boat wreck. It was one of those trawl-lines that was used by Dusty Miller to get down to the wreck

THOUGH DUSTY was obviously winning his war, it had to be kept top secret. Only Dusty, his diving attendants, Commander Damant and a few very senior Naval officers knew how it was that the Royal Navy seemed so incredibly well informed about German submarine activities.

As Dusty dived to more and more U-boat sinkings, junior RN officers too were puzzled when told that a minefield had been laid in such and such an area, and would they please go and sweep it up. Sometimes the mines had been down only for a day!

Soon German U-boat crews were saying that British Naval Intelligence knew more about their movements than they did, but they blamed the British Secret Service, which they credited with having agents everywhere in Germany.

If he had known what they were saying, Dusty Miller would have been pleased, but so many U-boat wrecks now needed searching that he was diving almost every day in the hunt for more of their secrets.

Life as the Chief Diver of the Royal Navy's U-Boat Flying Squad was not

a settled one. Every report of a submarine sunk meant being rushed with his helmet and all his gear from one end of the country to the other.

It was a good thing that Dusty Miller liked diving, even though it meant squeezing in the dark past bodies and other firmer obstacles in the flooded compartments of the Kaiser's tin coffins.

Even so, some of the things that he saw clearly shocked him. We do not know the number of the next U-boat he dived, and though Dusty Miller undoubtedly knew its identity he never revealed it outside the Admiralty.

All he would say about it was that he knew that mutiny did sometimes occur on board the U-boats, despite the bravery of their crews.

He told of entering a submarine through the

'RECOVERY OF THE LAURENTIC GOLD WAS TO BE HIS TOP PRIORITY'

conning-tower hatch and finding the commander caught up on the handle. He had clearly been shot three times from below with a revolver, as he either tried to seal the hatch or open it.

Promoted to Warrant Shipwright, Dusty Miller was to remain the lone ordinary diving member of the U-Boat Flying Squad for several months, but his successes and the increasing number of submarines being sunk soon meant that Commander Damant, as well as diving himself, had to ask for more divers.

Two of those who now joined the squad were Leading Seaman Ernie Blackford and Able Seaman Tom Clear. Later in the war, these two were to hold the record for the shortest time taken to reach a sunken submarine, *UB-109*, which they dived only two hours after she was sunk.

They found that the water inside the sub was quite hot, because it had been mixing with the sulphuric acid of its batteries.

ON 23 JANUARY, 1917, Dusty Miller's life took another violent change of direction, for on that day the 14,892-ton liner *Laurentic*, which had been converted into an armed auxiliary cruiser, hit a mine off Northern Ireland while taking 43 tons of gold in 3211 gold ingots, valued

then at £5 million, to the USA to pay for the food, steel and munitions that Britain needed to continue the war against Germany.

Laurentic sank so swiftly that 354 of the 745 men aboard were lost, and there was certainly no time to worry about the gold in the strong-room.

As a direct result of that sinking, Damant was told that he could have as many divers as he wanted straight away. The recovery of the *Laurentic* gold was to be his top priority and he was ordered to start work immediately.

So instead of probing the interiors of sunken submarines, Dusty Miller and the rest of the U-Boat Flying Squad were now set to work to prise gold ingots from the *Laurentic*.

And they were to do it as quickly as possible, because the British Government feared that aid from America would dry up if there was no gold to back the buying power of the British pound.

On the 14th day of diving, after blasting their way through to the strong-room, Dusty Miller smashed open its steel door with a sledgehammer and a chisel. On entering, he found himself facing stacks of bullion boxes, each weighing 63kg.

Even though he was over his bottom-time, Dusty manhandled one of the boxes back to the deck and the next day on his 60-minute shift he got out another three. He had almost single-handedly recovered £32,000-worth of gold!

THEN CAME A SERIES of northerly gales. After a solid week of huge winds and seas, the divers returned to the wreck. Damant went down himself. He found that the storm had turned, twisted and folded the wreck almost in half.

The passageway that Dusty had used to bring up the gold boxes was now only 45cm high and the depth of the entry point had increased from 19m to 31m!

After weeks' more work with explosives, Dusty re-entered the strong-room. It was empty! All the gold ingots had slipped through holes torn in the walls and floor and had tumbled down into the tangled and twisted wreckage of the bilges.

More explosives were used to cut a hole down to the gold's new resting place, and by September the divers had recovered more than £800,000.

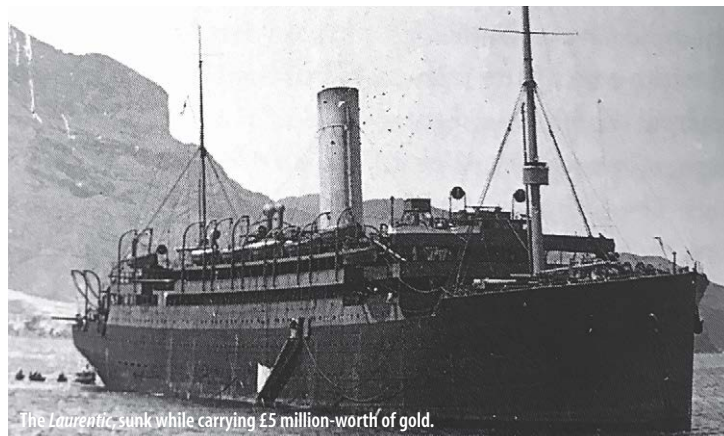
In April 1917, the USA entered the war, so the urgency of recovering the gold eased. The Admiralty ordered work on the *Laurentic* to be halted for the duration.

(In fact, though Damant and the team started

work again in the spring of 1919, the divers did not complete the job until 1924, and they missed only 25 bars after cutting up the whole ship with explosives. They each received a bonus of two shillings and sixpence for every £100 raised.)

So, before the end of 1917, Dusty Miller was back working on what he and his mates called "tin-opening". His first tin-opening on his return from the *Laurentic* was *UC-47*, sunk off Flamborough Head on 18 November, 1917.

Dusty proved that he had not lost his touch by entering through



The *Laurentic*, sunk while carrying £5 million-worth of gold.

the conning-tower hatch and, after tying the bodies out of the way, got the iron box out of the control-room in just under 10 minutes.

It was an even better haul than usual. Inside the box, in addition to the codes and logs, were detailed plans of two minefields that the submarine had laid that week!

UC-47 was commanded by Oberleutnant von Wigankow, who was lost with all his crew when he was caught on the surface while radioing his base.

He was rammed by the sub-hunter patrol boat *HMS P-57*, which also dropped depth-charges. Dusty Miller was inside the sub only a day later.

(In 1997, Shaun Carr and a team of local divers found *UC-47* in 51m at 54 01 00; 00 20 00E, in an area of sandhills. It was nose-down into the sand, with only the conning-tower, gun and its fully extended radio mast clear.

The stern was 6m clear of the seabed, with both props (marked *UC-47*) still on the shafts. The

stern torpedo tube was blown off and lies empty on the starboard side.

More depth-charge damage could be seen at the stern, where a large hole had been blown in the port side. The aft hatch was closed, but Dusty left the conning-tower hatch open and the control-room was now full of sand and silt.)

THE SECOND SUBMARINE that Dusty visited after his return to tin-opening was one that had been forced by patrol vessels to dive into one of the minefields of the Dover Barrage, which was rightly called the Submarine Graveyard.

At first, Dusty's dive went well. The U-boat *UB-56*, which had been sunk three days earlier on 19 December, 1917, was down at 37m. But, even so, Dusty found the visibility good, light reflecting well from the whitish sand of the seabed.

He landed on the wreck near the stern, which was badly damaged where the submarine had hit

a mine of the deep net-barrage across the Dover Straits.

Dusty noted that it had net and mine-wire wound around one propshaft, and this had obviously pulled a mine into the stern.

As he moved forward towards the conning-tower, he was alarmed to see a second mine streaming out in the tide and swaying within an inch of the sub's hull!

Any diver would have been forgiven for abandoning the dive at once, but not Dusty. He pulled the mine away from the sub by its mooring-wire and, ever so gently, removed the detonator!

He then entered the sub through the conning-tower, but could not reach his main target, the code-book box, because it was buried under wreckage from the mine damage.

However, sketches he made later of equipment in the interior of the boat and other new items he brought up pleased the Admiralty no end.

One small wooden box and its contents gave the Royal Navy its first-ever sight of a magnetic pistol-firing mechanism for a torpedo, which would detonate the warhead when close to or under the metal of a ship's hull.

It was the forerunner of the magnetic devices to be heavily used in the torpedoes of WW2.

THE U-BOAT FLYING SQUAD was kept hard at it by the growing number of submarine sinkings. But it was never easy work. Here, for example, is Commander Damant's report of the diving on *UB-109*:

"She is lying in 14 fathoms on a sandy bottom, heading NE, 30° list to starboard. Fore hatch and conning-tower open, no buoyancy remaining, about 20ft abaft conning-tower the damage begins and from there aft the vessel is shapeless wreckage.

"The damage is far more severe than that generally met with in deep minefield cases.

"The forepart of the boat is quite intact, for instance the large mirror on door of captain's wardrobe is not even cracked.

"For this reason and because the depth was moderate I decided to work aft from the fore hatch without cutting any plates by explosives.

"Owing to muddy water, it is generally quite dark on the highest parts of the wreck. While inside it is of course always so and all work must be done by touch and hand lamp.

"To get to their objective, divers had to negotiate a chain of five narrow apertures:

- (1) fore hatch;
- (2) watertight door in fore bulkhead of officers quarters;
- (3) partition between officers' and captain's quarters;
- (4) watertight door in fore pressure bulkhead of control-room;

'HE WAS ALARMED TO SEE A SECOND MINE STREAMING OUT IN THE TIDE'

PETER BRYANT

(5) door of watertight cabinet. Between 4 and 5 are awkward obstacles formed by the compass and steering pedestals in the control room.

"Afternoon on day of sinking, fore hatch was cleared of bodies, bedding etc, and some personal material sent to the Admiralty. On 30th and 31st, much important material was recovered, although weather allowed work only on one tide. Divers had by now got as far as the control-room.

"On 1 September, again only one tide could be worked, but the control-room was passed, the watertight cabinet entered and much valuable material found.

"On 2 and 3 September, weather remained unfit, but on 4 September a whole day's work was got in, completing first part of the programme.

"I do not propose sending men inside during spring tides, but there is work outside the hull that can be done then.

"The inside divers Leading Seaman E Blackford and Able Seaman T Clear have shown much skill and determination in squeezing through these narrow places and making such a cool and thorough search."

In fact, the two divers brought up the sub's entire stock of charts, complete with new amendments, one of which marked her last cruise from the Channel to the Azores and back up the coasts of France and Spain and into the Straits where she was sunk.

UB-109 was commanded by Kapitanleutnant Ramien who, having sunk nearly 100,000 tons of shipping, was rated by the German High Command as one of its aces.

He was sunk on 29 August, 1918, after being detected moving through an electrically controlled minefield off Folkestone.

When the mines were fired, only Ramien and seven others out of the 34 men aboard survived a free ascent from the conning-tower.

(Club divers recently found her at 51 03 41; 01 14 14E, blown in two with the stern section 9m to the west of the main part of the wreck. Its hatches were open and its periscope fully extended. Its props had been salvaged. One bore the number *UB-109*; the other was marked *UB-104*.

This shows that the Germans were so short of spares by this stage of the war that they were replacing damaged propellers with any that would fit.)

WHETHER HE WAS PLAYING the old salt to impress some inquisitive landlubbers, or whether he was passing misinformation to the Germans long after the end of WW1, Dusty Miller told this strange tale in 1926 to a journalist who had been given permission to interview him about his exploits.

He says he was told to dive on a submarine sunk in the northern mine barrage off the Orkneys. The weather was bad and the "electric instrument" for locating metal at the bottom of the sea gave no result for some unaccountable reason. (This would seem to be a reference to the new Anglo-French invention of echo-sounding called ASDIC, first used in 1917.)

However, two trawlers working together made figure-of-eight sweeps for the whole of the next day until they caught into the submarine.

Dusty Miller went down. He said he blasted open the conning-tower hatch and then went inside. It was pitch black, and he kept bumping into bodies.

His torch lit only a few feet ahead of him, but something about the bodies was more worrying than usual.

It was some time before he realised what it was. All the bodies were in officers' uniforms, and he thought the whole crew were officers.

Near the control-room, he found a stack of neat leather suitcases. He prised open several of them

'NEAR THE CONTROL-ROOM, HE FOUND A STACK OF NEAT LEATHER SUITCASES'

and was surprised to find that all the contents were the same: a couple of suits of smart civilian clothes, shirts, collars, cravats and shoes, together with sums of money and other things.

Infuriatingly, Dusty Miller said little more about this, except that his Admiralty masters were just as puzzled as he was when he reported it to them. The journalist adds in his article that it was obviously the intention of the mysterious crew to land somewhere on the British coast, but their motive remains a mystery.

He hints at some great plot, perhaps an attempt to bring the war to an end by assassinating the King!

However, it is more likely that the German crew, knowing that Germany was on the brink of defeat, intended to try to get their boat interned in Spain once they had completed their mission, and that the civilian clothes were for a return overland to Germany.

NOT SURPRISINGLY, the Admiralty and German archives of the time do not mention the incident. Commander Damant's log says that cases were recovered, but were taken away by the

WAR GRAVES

It was not possible to guide divers to all the U-boats explored by Dusty Miller, because the Official Secrets Act and Admiralty instructions made him reluctant to give the identity and number of some submarines when recounting his experiences. However, many were later pinpointed and were named in this article. They should not be entered because they are considered war graves.

local Naval authorities. He made no mention of an all-officer crew, and names the U-boat with the suitcases as *UB-116* – the last U-boat to be sunk in WW1.

Commanded by Oberleutnant Hans-Joachim Emsmann, with a crew of 35, *UB-116* was a new boat with a new skipper.

Fully laden with 10 torpedoes, Emsmann was told to enter Scapa Flow by Hoxa Sound, which he was also told wrongly was not mined or netted. When he sailed, on 24 October, Emsmann told a colleague ashore he knew he would not return.

The Hoxa entrance was both mined and netted, and Emsmann was spotted on the surface to the west of the Orkneys before he attempted to enter Scapa Flow. They were waiting for him when he did come in.

They picked him up on the hydrophones, waited until he was right over a line of mines, then just before midnight pressed the button.

At dawn, oil globules laid a trail back to the grave of *UB-116*. And though there is a tale that tapping noises were heard from the submarine that morning on hydrophones, the duty destroyer dropped depth charges on her.

(The wreck of *UB-116* at the entrance to Pan Hope Bay could hardly be called a great dive. It was sold for salvage in 1969 and later its own torpedoes were used to blast it apart.

Sections of plating, twisted out of shape, together with pipes, wires and broken switch-boxes are all that remain and are unlikely to be much help in solving the mystery of *UB-116*.)

WITH THE WAR OVER, Dusty Miller returned to recovering the *Laurentic's* gold, but the work he had done down in the dark interiors of Germany's U-boats was not forgotten.

In the New Year Honours List of 1 January, 1919, Warrant Shipwright Ernest Charles Miller RN was awarded the MBE, but more importantly in July that same year he was awarded the Distinguished Service Cross for distinguished services in connection with dangerous and important salvage work.

Dusty, now Commissioned Shipwright Miller, went with his wife to Buckingham Palace to receive his decorations from King George V.

But this was no quick pin-on-and-out investiture. Dusty had to answer question after question from the King before being allowed to leave.

Did he tell the King about the mystery suitcases of the crew of *UB-116* and the possibility that their real target was the King himself? If he did, Dusty Miller never told anyone else!

KENDALL MCDONALD

Kendall McDonald chronicled scuba-diving and shipwrecks for more than 50 years.

The former managing editor of the *London Evening News*, he became hooked on diving in the early 1950s, became one of the earliest BSAC members and went on to be the club's chairman and a life vice-president.

He wrote and presented Britain's first TV series about diving and was one of the first journalists to dive the wreck of the *Mary Rose*. And he wrote for *DIVER* from its earliest incarnations until 2011.

He was also author of around 30 books, including the *DIVER* Guide series on wrecks around Britain. He died aged 86 in 2014.



© SCOTT PORTELLI / UNDERWATERCOMPETITION.COM

SPLITTING IMAGE AT THE **MASTERS**

THE PHOTOGRAPH ABOVE, entitled *Spurt* and taken by Australian diver Scott Portelli, was named Best in Show in the annual DPG (Dive Photo Guide) / Wetpixel Masters competition. The international online contest is described by its US organisers as “the Super Bowl of underwater-imaging events”.

Portelli’s split-shot of spitting fish came first in one of the five competition categories, Wide Angle Unrestricted.

The other categories are Macro Traditional, Macro Unrestricted, Wide Angle Traditional and Video, the “unrestricted” categories having no specific rules regarding digital manipulation. The competition is open to underwater photographers and videographers at all levels.

The judging panel, consisting of eminent underwater photographers David Doubilet,

Stephen Frink, Erin Quigley, Scott “Gutsy” Tuason, Keri Wilk and Tony Wu, were impressed by Portelli’s entry. It shows emperorfish off Lord Howe Island jostling for position among a school of silver drummer. One is spitting water to distract other fish from nabbing food fed to them by tourists.

“This is that moment we might see but rarely capture,” said Doubilet. “This is literally crystal-clear behaviour.”

“Nailing a split-shot is difficult, and adding

a behaviour is the cherry on top,” said Tuason, while Wilk described the image as “what we all strive for as photographers: a painfully common subject, captured in an absolutely unique way.”

“The combination of eye contact, dynamic behaviour and technical excellence make this a clear winner.”

The Masters sees some US \$55,000-worth of prizes awarded to the winners, and Portelli won a 12-night cruise for two to Triton Bay in West Papua on the *Seven Seas* liveaboard.

The winners were announced live on stage in March during the Wave Film Festival in Chicago. Fifteen per cent of entry proceeds of the contest are donated to marine conservation causes.

The first three in each category (other than video!) are reproduced in the following pages...



WIDE-ANGLE UNRESTRICTED



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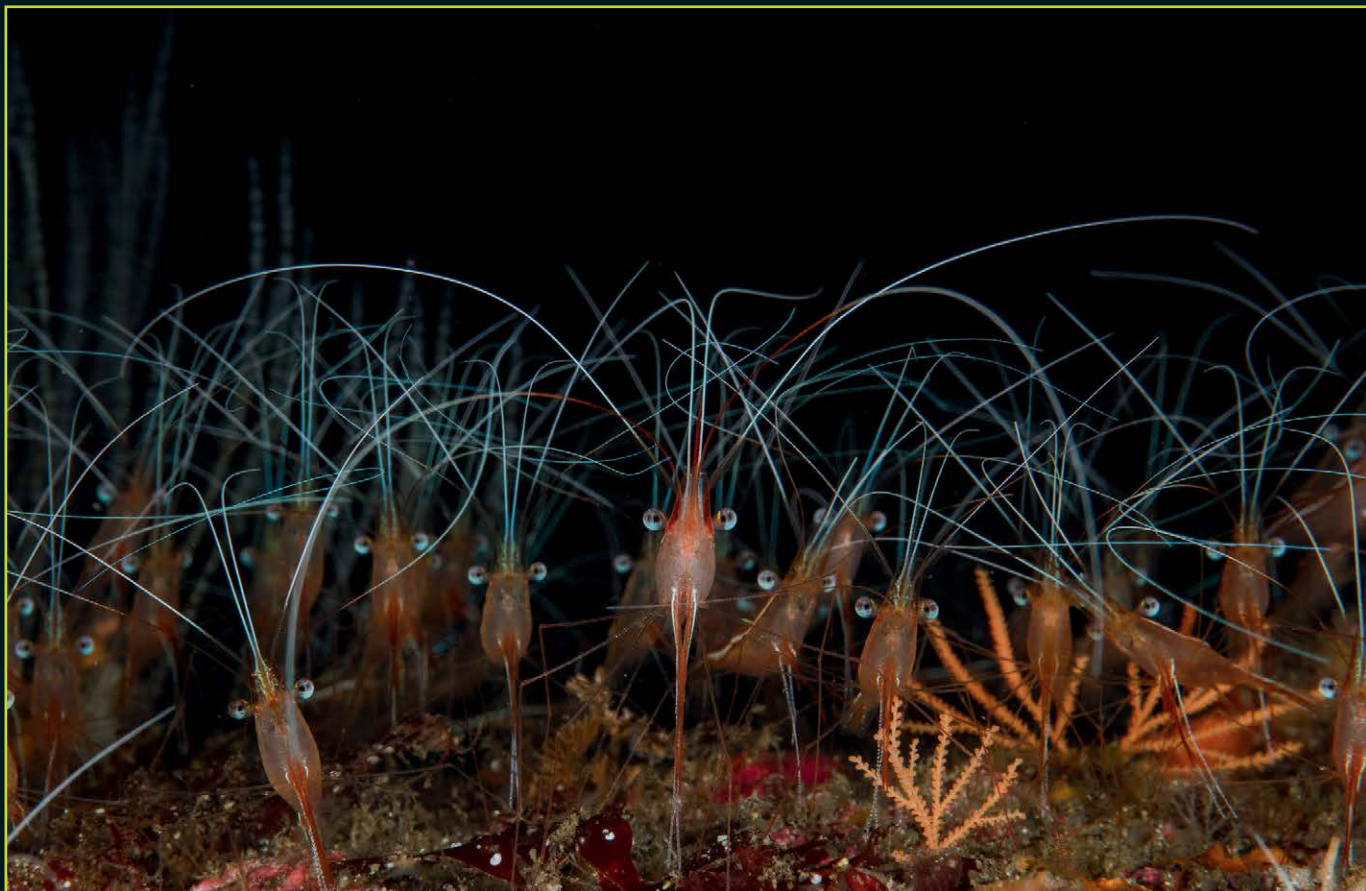
© GINO SYMUS / UNDERWATERCOMPETITION.COM

Left: SILVER, *Frozen* (freediver under ice in Tasilaq, Greenland) by Alex Dawson.

Above: BRONZE, *Mating Toads & A Frog* (Belgium) by Gino Symus.

Below: GOLD, *Eyes* (shrimp gathering at Izu Oceanic Park, Japan) by Keigo Kawamura.

MACRO UNRESTRICTED



© KEIGO KAWAMURA / UNDERWATERCOMPETITION.COM

MACRO UNRESTRICTED contd



© KATHERINE LU / UNDERWATERCOMPETITION.COM

© ENRICO SOMOGYI / UNDERWATERCOMPETITION.COM

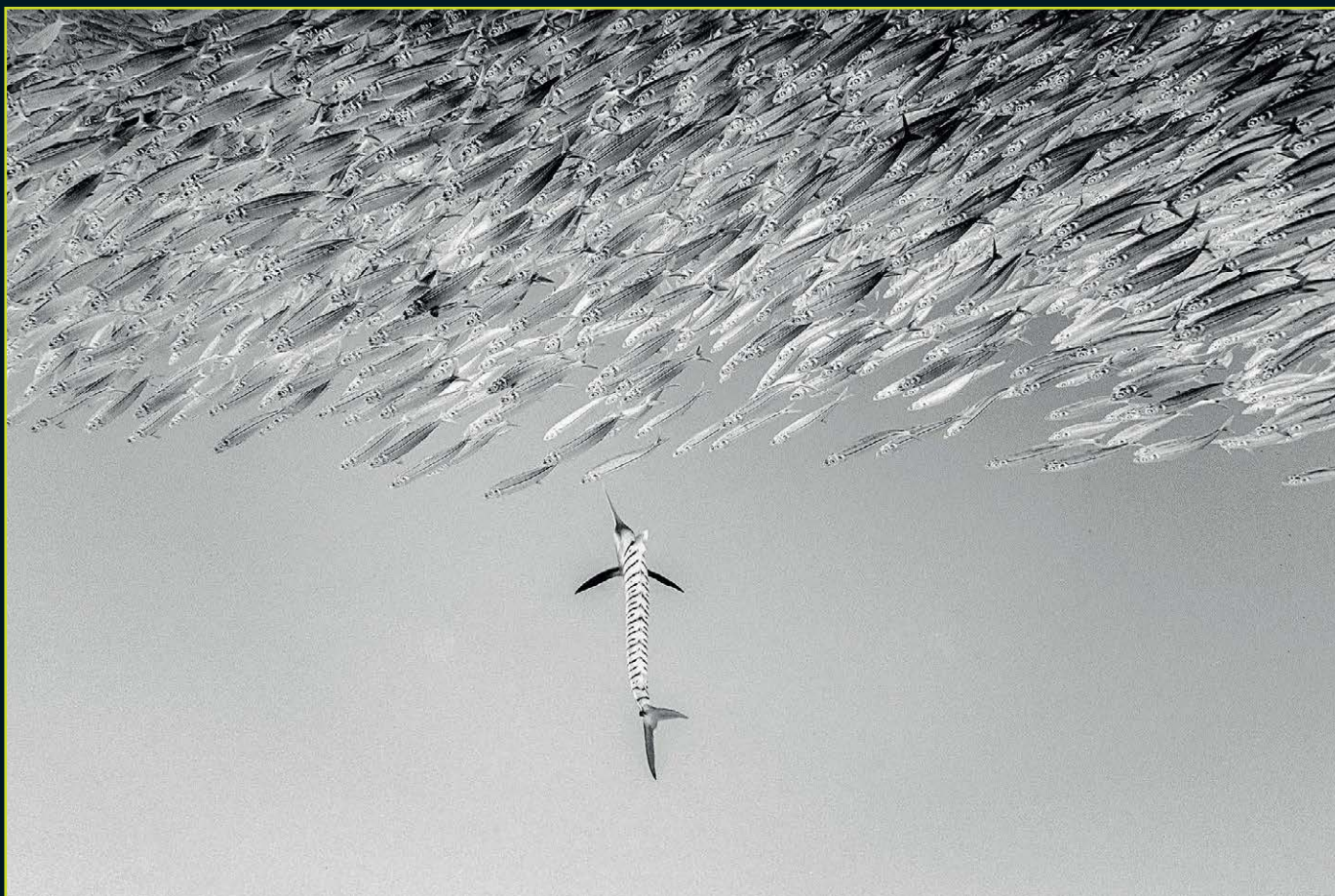


Above: SILVER, *Female Blanket Octopus* (Anillao, Philippines) by Katherine Lu.

Right: BRONZE, *Garden Eel in the Sun* (Anillao, Philippines) by Enrico Somogyi.

Below: GOLD, *Strange* (marlin with sardines, San Carlos, Mexico) by Yung-Sen Wu.

WIDE-ANGLE TRADITIONAL



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© PETR POLÁCH / UNDERWATERCOMPETITION.COM

Above: SILVER, *Dragon's Teeth* (Vaca Ha Cave, Yucatan, Mexico) by Petr Polách.

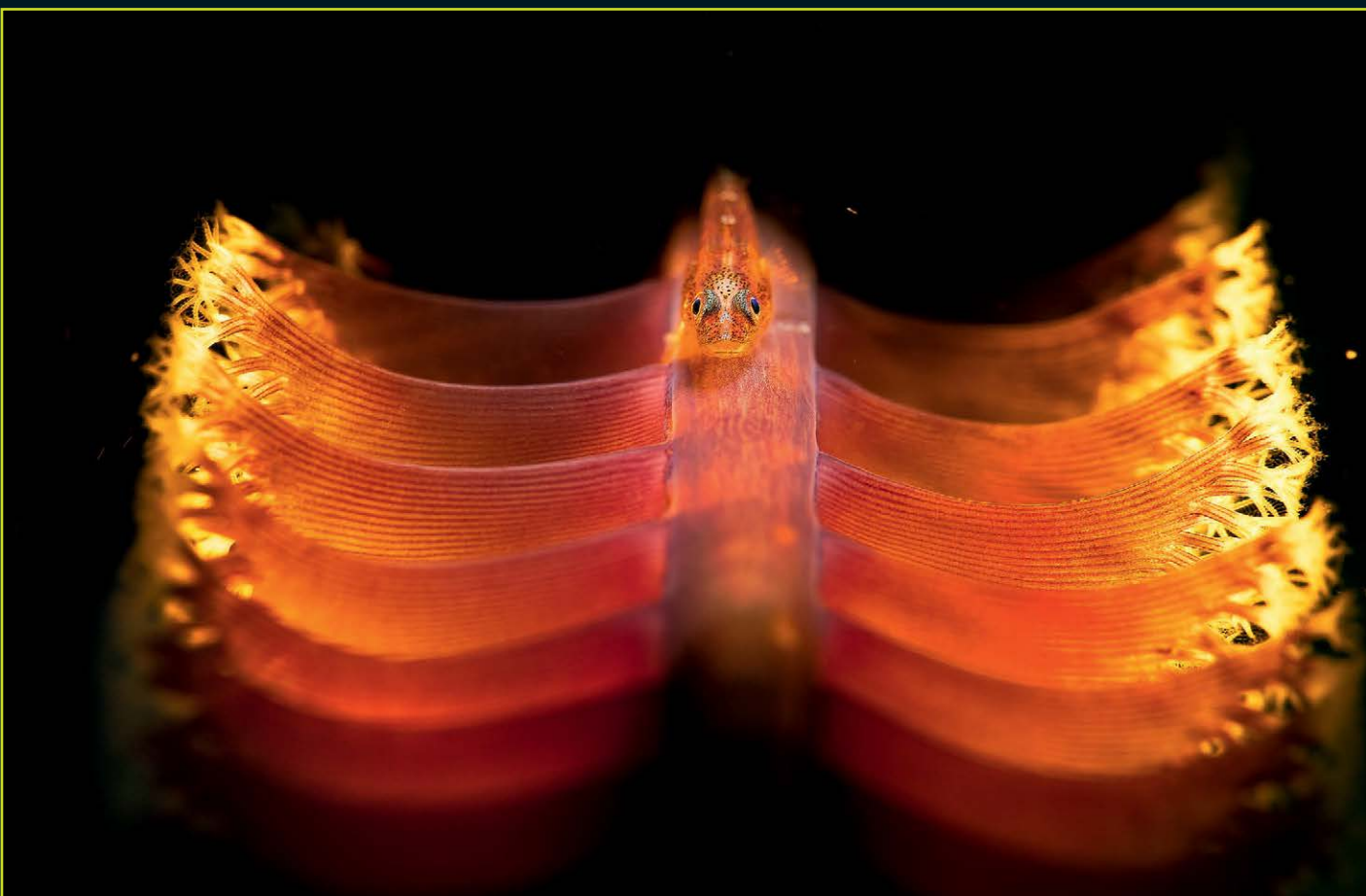
Right: BRONZE, *Under the Pier* (blenny on seapen, Anilao, Philippines) by Jose Antonio Castellano Garrido.

Below: GOLD, *Red Carpet* (shrimp gathering at Izu Oceanic Park, Japan) by Yatwai So.



© JOSE ANTONIO CASTELLANO GARRIDO / UNDERWATERCOMPETITION.COM

MACRO TRADITIONAL



© YATWAI SO / UNDERWATERCOMPETITION.COM

MACRO TRADITIONAL contd



© ENRICO SOMOGYI / UNDERWATERCOMPETITION.COM

Above: SILVER, *Friends* (yellow goby with lionfish, Anilao, Philippines) by Enrico Somogyi.

Right: BRONZE, *Xenia pipefish* ('high-key' pipefish in polyps, Rombion, Philippines) by Yung-Sen Wu.

Video category winners:
GOLD, *The Calling* by Evan Sherman; SILVER, *Diving into the Underwater Galaxy* by Ping Fan; and BRONZE, *A Snorkel Venture in Komodo* by Alex Lindbloom.



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Rescue divers

WHEN I FIRST ENQUIRED about learning how to dive, I thought I'd be taught about the equipment and then we'd go in the pool to have a practice. And then we'd go out diving. Simple!

Well, it turned out not so simple after all. It also turned out that learning how to dive involves being capable of rescue. Firstly there's self-rescue, from seemingly innumerable hazards. Mask flooding, losing your regulator, getting a cramp, running out of something to breathe, getting lost and needing a wee – to mention but a few.

In addition, you require some basic skills to enable you to rescue another diver. The bottom line is that they won't sign off your qualification until you demonstrate that you're willing and able.

Whatever shenanigans you might imagine you're capable of getting yourself into, your buddy will be capable of so, so much more. You're now faced with the number of imaginable incidents to the power of 2. Plus a generous uplift for the number of unknowns. Squared.

It's now your responsibility to be alert to whatever kind of incident might be going down, so that you can rescue both your buddy and yourself. Small wonder this process is known as "getting certified".

Of course, in reality most incidents are irritations at best. You're so awestruck at what you see under water that you mostly use your buddy as a sounding board to share the joy of the experience. However, the idea – the possibility – of "rescue" is deeply ingrained.

It should be no particular surprise that whatever the scenario or disaster, you will often find divers coming to the rescue.

Entire enemy fleet scuttled in your waters? Send in divers to carry out salvage. Bunch of people stuck in a cave system by rising water? Call in divers! Nuclear power plant about to melt down and contaminate the entire water-table for millions of people in eastern Europe? Send in divers to sort out the flooded pipework.

ON A MORE CONTEMPORARY NOTE: Do you need people who understand how to deliver a consistent flow of oxygen at the correct pressure? Look for divers and their compressors. Need some airtight full-face masks? Guess who will have those.

Are you desperately searching for durable waterproof fabrics? Looking for breathing equipment that could be quickly adapted for use on a ventilator? These are all areas of expertise for divers and dive-kit manufacturers. Our kit is all field-tested at 30m-plus of seawater, which provides some pretty robust quality control.

There's so much that divers can offer, so think on.

Sometimes in an emergency, the person needing rescue simply doesn't recognise the offer of help in front of them. Often they might be too busy trying to thrash their way out of trouble.

When this happens, you can only safely perform a rescue after they've finished panicking. That's the reality.

Beyond the grimness of the emergency front-line, there's another form of rescue being offered by divers. Stunning images being shared here and on Instagram and Facebook accounts remind me how much beauty there is, almost within reach. Another world is beckoning.

Soon I'll open my eyes, and be forced to clear that annoying pool of spit and seawater from the bottom of my mask before being wowed by those sights again.

LOUISE TREWAVAS





For a long time Bunaken and Lembeh have drawn the divers in North Sulawesi, but there is a third way. **PENELOPE GRANYCOME** reports, with underwater

photography by **MORGAN RIGGS**

MORE **BANGKA** FOR YOUR BUCK



THE GUIDE BENEATH US tapped his tank and motioned my buddy and I to approach. Descending to the gorgonian, I strained to see what he was indicating, my eyes searching through a wash of colour.

My buddy handed me a magnifying glass and there, barely a centimetre long and disguised among the polyps it mimics, was a tiny bargibanti seahorse. I marvelled at the creature's tiny vulnerable beauty. Seeing my first one was a thrilling welcome to Indonesia's waters.

Bargibantis are one of the smallest seahorse species in the oceans and have the ability to change their colour to blend with their host fan. They do this so efficiently that they kept themselves hidden from humans until 1969!

So delicate that they can hardly withstand current or swim far, their mating process involves the females depositing eggs on to the body of the male, which he carries in a pouch for several weeks before giving birth.

I had never previously considered flying halfway across the world by myself to go diving but, needing a break and aware of the rich marine biodiversity of the Coral Triangle, I made the long journey to a tiny but charming island just off North Sulawesi.

I had chosen Bangka, between Bunaken Manado Tua Marine Park and critter-packed Lembeh Strait, because it felt as if it might provide a perfect introduction to Indonesia for a solo-diver.

As the week unfolded at the Murex dive resort I met many similarly minded divers coming and going from around the world.

With the option of combining Bangka diving with that of Manado and Lembeh, it provides considerable flexibility – and the chance to make many friends.

I had elected to stay put to explore the pinnacles and reefs at the many sites near the island.

Weary with jet-lag after the 24-hour journey, I had a fresh juice and cold towel pressed into my hand as I stepped barefoot onto the picture-perfect sandy beach. It would have been so easy to crawl into a hammock and not move, but I had only six diving days and no time to lose.

The Bangka dive-centre is efficiently overseen by technical instructor Mike Savelberg, who did not join us on our excursions but whose dry humour was

Left: Bargibanti pygmy seahorse.

Above: The Bargibanti's home, colourful Sahaung reef.

Below: Peacock mantis shrimp.

appreciated. The generous ratio of guides to divers meant bespoke attention, and they were not only excellent spotters but also trained in marine biology and how to best to work with photographers.

The first dive (like descending into a warm bath) was on a healthy verdant reef at a site called Sahaung, which that pygmy seahorse called home.


As the world's worst spotter I'm in awe of the experienced when it comes to finding small creatures, and I was lucky to be able to dive with Morgan Riggs, a dive pro passionate about macro photography.

A PEACOCK MANTIS SHRIMP put in an appearance on our second dive at Sabora. These powerful predators are equipped with hammer-like appendages known as dactyl clubs. They can move at a bullet-like 23 metres per second to deliver the world's fastest punch. Lucky that they're no bigger than they are!

Map pufferfish and common stonefish are both endemic to the Indo-Pacific. While beautiful, the former is covered in a not-so-beautiful toxic mucus that can be fatal to humans if consumed.

The stonefish, that master of disguise of shallow reefs, always provides a jolt of joy for the diver who distinguishes it from its perch.

Proof of how venomous this and other scorpionfish family members are came recently when a friend accidentally stepped on one in the Philippines.

He described the pain as agonising, 





Above, from left: Map pufferfish; blue-striped pipefish; *Hypselodoris bullocki* nudibranch with eggs.

Left and below left: Giant sea-pen; warty or clown frogfish; dragon shrimp.

Below right: The Murex dive-centre.

Bottom, from left: Mating cuttlefish; Poss's scorpionfish with a nudibranch on its face.

and couldn't be given an anaesthetic until his heart-rate and blood-pressure fell.

It took him about two weeks to recover, and he said he had been incredibly lucky that the hospital had the correct anti-venom in stock and treated him quickly.

Even in the calmest waters "danger" is never far away but, as in this case, not necessarily when diving!

A less poisonous master of disguise is the frogfish, with its lugubrious expression and bulk not stopping it from having the fastest strike-speed of any animal on Earth.

Rather unkindly declared "the spawn of Satan" by the mayor of Bitung, frogfish are always a popular subject for underwater photographers and, as captured by Morgan at Sabora, even a warty frogfish can look attractive!

A night-dive initially proved less exciting than my buddy and I had hoped, but this was due to impatience as much as anything else.

The sandy-bottomed site was called Peter Sponge and the first 20 minutes consisted of a warm drift-about, but eventually plenty of creatures came out to play – an octopus, a blue-spotted ray, crab and seahorse all put in appearances.

A vivid green moray eel also appeared in the distance in my torch-beam.

It felt as if we were in a giant fish-tank at a site called Tiga Batu, a storeyed pinnacle made for finning around. Stars included a pygmy seahorse at 29m, leaf scorpionfish, ubiquitous but always delightful chromodoris nudibranchs, whitetip reef sharks and many cuttlefish, some of them the largest I've seen.

They can appear romantic but, to initiate sex, the male spreads his arms around his partner's head and squirts sperm into her mouth from one of his

tentacles. She stores this around the lining of her mouth or in a receptacle below her beak.

Cephalopod research has shown that males show a strong preference for new partners, while females who have not been lucky in a while display a receptive posture – a pretty effective love situation.

WITH SO MUCH TO TAKE IN and the heat of the afternoon sun strong, there was plenty of time to retire and rest, the sound of the breaking waves amplified at night in my beachfront cottage.

Although there's a fan in each room, during the day electrical power is switched off until 5pm to save energy, and filtered water is supplied to negate the use of single-use plastic bottles.

Conservation is a priority, and on dives closer to the mainland we would grab any bit of floating plastic we saw.

A rather unusual dive came with a new buddy enjoying a site I had heard much





about, a hot underwater spring at Sampiri 3. As we approached the shimmering water at about 20m I lowered my body horizontally over the bubbles welling up from the rocks, a wave of intense warmth enveloping me.

Basking, I placed a tentative finger on the sand and recoiled, such was the heat. It was a sharp reminder of Indonesia's wonderfully messed-up geology, with the Pacific, Australian and Eurasian plates all colliding there and making wrinkles.

Indonesia lies in the Ring of Fire and a 7.1-magnitude earthquake near the Moluccas to the east had been felt in North Sulawesi not long before my visit.


As my week approached its end, a new influx of visitors was arriving, Swiss and German as well as from the UK.

A boatful of us headed to a site called Sahaung 1, where we spied broadclub cuttlefish, hairy squat lobster, raggy scorpionfish, fire gobies and a painted rock lobster, not to mention several

varieties of frogfish. There was also an orangutan crab, part of the decorator crab family and known for its compulsion to attach seabed debris to help it blend into its surroundings – though still perversely inclined to rest on pale bubble coral.

A relationship that hits symbiosis perfectly is that of an emperor shrimp on a solar-powered nudibranch, the host providing sanctuary and the shrimp able to hide under the slug should a predator appear. As the host moves and churns up sand, food is provided to the shrimp!

I regretted not booking for a longer stay, especially after hearing from others about the "Passport to Paradise" option of diving on the walls of Bunaken and/or Lembbeh's black lava sands.

I felt that familiar pang of wanting to see and experience what others had, but I had been able to unwind and savour a single relaxing location, the diving, the tasty and fresh Indonesian cuisine and the hospitality. Simple barefoot luxury. 

Above: Emperor shrimps aboard a solar-powered nudibranch.

Above right: Harlequin crab.

Right: Orangutan crab.

Below right: Pontohi pygmy seahorse.

Below left: Relaxed on the Murex dive-boat.

Bottom left: Sexy shrimp.



FACTFILE

GETTING THERE ▶ Fly into Manado via Singapore with Silk Air, the regional carrier of Singapore Airlines.

DIVING & ACCOMMODATION ▶ Murex Bangka Dive Resort, murexdive.com

WHEN TO GO ▶ The driest of North Sulawesi's two seasons is from the end of March to the end of November. The rainy season is slightly cooler. Generally humid, mosquito repellent and appropriate clothing are recommended. Water temperature is 28-30°C year round.

MONEY ▶ Indonesian rupiah.

HEALTH ▶ Manado has a recompression chamber.

PRICES ▶ Scuba Travel offers a seven-night full-board stay at Murex in an ocean-front cottage with 10 dives (air) and airport transfers for £850. Return flights from £580.

VISITOR INFORMATION ▶ indonesia.travel





Last month **JESPER KJØLLER** recounted the loss in 1564 of one of the world's most iconic wrecks, that of the Swedish warship *Mars*, and how it was discovered in 2011. Now in Part 2 it's time for him to join the divers.



Underwater photography by **KIRILL EGOROV**, photogrammetry by **OCEAN DISCOVERY**

THE **MARS** EXPERIENCE

2019: Two Weeks on Mars

JULY 2019 IS A WET, COLD and windy affair on the Swedish Baltic Sea coast. The dive-team arrive from many parts of the world over a few days and immediately begin equipment preparation and setting up of the tent that comprises the *Mars* Expedition headquarters.

Gradually, the diving shed is also readied, the compressor is set up, the diluent cylinders for our JJ-CCR rebreathers are filled with 12/65 trimix, the deco cylinders are labelled and a charging station for the huge number of batteries that feed our lights, cameras and drysuit heating systems are set up.

We are ready for the first *Mars* dive of the year, but the weather forecast is not promising. The planned daily rhythm – an early-morning dive and an afternoon spent preparing for the next day – is disrupted by the weather gods, and we simply have to adopt a mindset of constant alertness, and be ready to dive at short notice when a sufficiently promising weather window appears in the forecasts.

Mars is situated 60 minutes' cruise east of the port of Böda at Öland, Sweden's second-largest island, and is



in a relatively exposed area. A typical *Mars* dive last up to three hours, and with one hour back and forth, we need a five-hour window with fairly gentle winds.

The dive-team consists of a dozen specially selected divers, all trained by Global Underwater Explorers (GUE) on JJ-CCRs.

There are divers with extensive project experience who can dive under difficult conditions while being productive, efficient and, above all, safe. Most of them are experienced underwater video- or photographers.

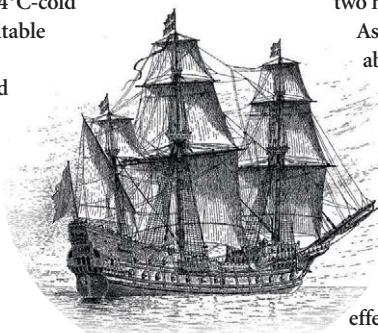
Rookie

I had already been warned that the first dives on *Mars* can be confusing – and they are! I am overwhelmed by the grandeur and complex nature of the shipwreck.

At this 70m-plus depth in the Baltic it is always pitch-black, and you can see only what you can illuminate with your dive-light. At first glance, the wreckage resembles a lumber-yard gone berserk, or a giant pick-up sticks game. The 4°C-cold Baltic, the darkness and the inevitable narcosis add to the challenge.

Frankly, I'm a little intimidated by it all. After all, I am the rookie on the team and I would like to be able to contribute positively to this year's expedition.

Eventually I start recognising details and, after getting a few reference points, my situational awareness improves.



Left: The larger cannon on *Mars* have a characteristic set of handles shaped like dolphins.

Above: 3D models of *Mars* are studied by scientists and historians all over the world.

Right: Expedition divers getting ready for the next dive.

The wreck is spread out over 500m and it's possible to follow the last hours of the battle step by step, following the tracks it has left on the seabed.

Cannonballs, parts of the hull and masts as well as personal artefacts bear testimony to the brutality of that battle.

The main wreck, including both hull sides, are relatively intact in the middle of the wreck area, where guns of various dimensions and calibres are sprinkled across the seabed in unprecedented quantity.

The Deep Freezer

After 40 minutes on the bottom, about two hours of decompression awaits.

As soon as we rise just a few metres above the wreckage, the visibility becomes clear as gin.

On the other hand, the temperature drops to just 2°C, and we can think only about moving quickly through the freezer while spending as little time as possible on the deeper deco-stops.

After the first hour in the water, the effect of our heated Santi-suits begins to

drop off. There is still juice in the battery-pack, but the body has been cold for a long time.

It can be hard to grasp the fact that two hours of decompression time still looms. Fortunately, the rebreather technology is on our side.

On open scuba, you breathe cold, compressed gas, which is heated in the lungs and then breathed directly into the water. It's a big waste of heat energy.

A rebreather-diver, on the other hand, inhales his own warm exhalation gas, which even has added heat energy from the process that takes place when the carbon dioxide in that gas is purified in the rebreather's scrubber material.

Around 30m, the decompression stops begin to get longer and the temperature increases accordingly.

On the last shallow stop the visibility gets worse again, and we move closer to





the ascent line. It's important not to lose it and have to shoot a bag.

The last stop at 6m lasts about an hour and I usually try to turn the brain off and zone out while the minutes tick away.

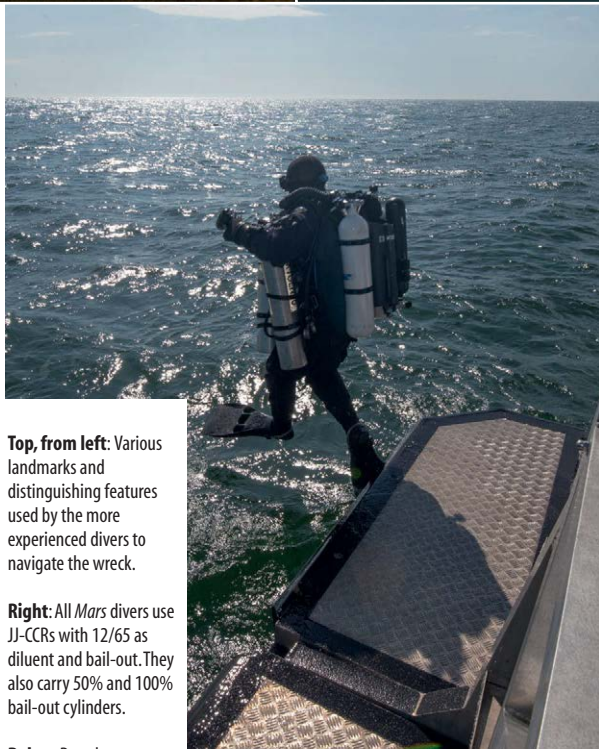
Fortunately, the surface water is around 17-18°, but at this point we're all cold. However, it helps to visualise the barbecue that we'll be enjoying in a few hours.

Photogrammetry

Following the discovery of *Mars* in 2011, a special law was quickly passed to protect the wreck-site. It's illegal and impossible to dive *Mars* without special permits, and the area is monitored 24/7 by the Swedish Coast Guard. It is prohibited to fish, stop or use sonar within a one-mile diameter of the wreck.

However, each year a special permit has been granted to a select group of divers who, in collaboration with international and Swedish researchers and experts during the 14 days the permit lasts, conduct field studies at the unique archaeological site.

During the first few years the main focus was to map the wreck-site and to obtain an overview.



Top, from left: Various landmarks and distinguishing features used by the more experienced divers to navigate the wreck.

Right: All *Mars* divers use JJ-CCRs with 12/65 as diluent and bail-out. They also carry 50% and 100% bail-out cylinders.

Below: Based on photogrammetry data, models of *Mars* can be rendered for scientific or – as here – more illustrative purposes.

The iconic mosaic image, created from 640 images painstakingly assembled in Photoshop, went around the world and was on the cover of several magazines,

including *National Geographic*.

The mosaic assembly, which visualised *Mars* in a way no one would be able to see in reality, introduced a new approach to underwater archaeology. It had been clear from the start that salvaging the wreck was out of the question.

Bringing it onto land and preserving it would be impossible and too costly.

In addition, the oxygen-poor, brackish and ice-cold Baltic Sea at a depth of 72m is in fact the optimal place in which to store ancient woodwork. The absence of woodworm in the almost-fresh water offers the best possible conditions.

Instead of salvaging objects from *Mars*, the Lundgren brothers and their team began developing and refining digital documentation techniques, such as 3D scanning and photogrammetry.

The *Mars* exploration began parallel to the maturing of technologies that achieved a precision that supports serious scientific studies.

But it's one thing to carry out photogrammetric documentation of smaller objects in the controlled environment of a photo studio, and quite another to document large shipwrecks at a depth of 72m and in darkness.





EQUIPMENT

All *Mars* divers use JJ-CCR rebreathers in the special GUE configuration, the major difference being that the GUE version has two seven-litre steel bottles connected with a flexible Lola-manifold.

This means that divers can each carry 14 litres of diluent compared to the standard three litres, and don't need to include a deep diluent gas as a separate bail-out because they have enough on their back.

At the same time, there is enough gas to share with an unfortunate team-member if needs be.

The GUE configuration also features a long hose for open-circuit gas-sharing, and the cylinders are turned upwards so that valve shutdowns are done similar to open system.

Everyone uses Santi electric heated undergarments – at least a heated vest or a full suit, but most also have heating in the gloves.

GUE divers are specialised in working efficiently with documentation methods, and photogrammetry techniques are now part of the course curriculum.

Digital Excavation

On the basis of the photogrammetric 3D models, the ship can be digitally rebuilt and the models provide a fantastic overview of the entire wreck-site and allow researchers from all over the world to participate in the archaeological studies of this battlefield frozen in time.

For example, an expert in 15th-century weaponry can study the digital models and make measurements with accuracy to the centimetre. Experts can discover contexts or details that divers can't see with the naked eye under water, and scientists can participate in the research without ever leaving their office.

Photogrammetry also makes it possible to reconstruct or 3D-print artefacts such as small guns – or make scale models of the entire wreck.

It has been claimed that *Mars* is one of the world's most significant wreck finds, and the series of parallel scientific projects focusing on the wreck's many different aspects is proof of that.

Life on a warship in the 16th century, shipbuilding techniques, metallurgy studies of cannon and the role of warships in society are just a few examples of these ongoing scientific projects.

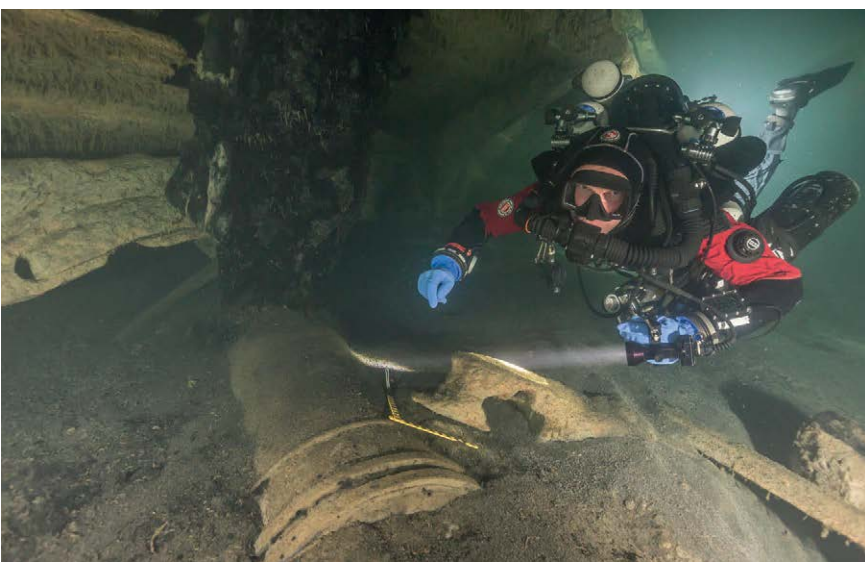
Mars sank with more than 800 soldiers and sailors on board. They have left many artefacts that allow experts to reconstruct and describe life on board, so providing an insight into life in the 16th century.

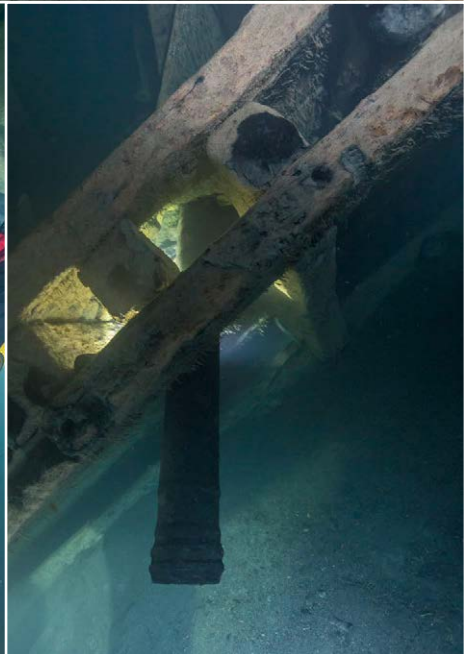
Mars is an undisturbed time-capsule that can provide answers to an ever-growing number of questions.

Above left: The capstan anchor winch.

Above: Jesper carries out last-minute checks before a *Mars* dive.

Left and right: Measurements are made to verify the accuracy of the photogrammetry data, so all *Mars* divers carry folding rulers.





NatGeo

We know that in a few days our camp will get a visit from a British production team working on an episode for National Geographic's series *Drain The Oceans*.

Although I usually take still photos while diving, I am tasked with recording video sequences on *Mars* that NatGeo can use as material for the show.

I also make photogrammetry recordings with macro lenses of, among other things, coins, a mould used to forge small cannonballs and details on bronze cannon.

Above, clockwise from top left: Every detail of the wreck tells a story not always understood by the divers. Photogrammetry models enable scientists to unlock the mysteries.

Below, from left: Detailed 3D model of cannon found on *Mars*. The models contain great detail, which it's possible to zoom in to investigate.

My images are used for photogrammetry renderings and these details have never been documented with such precision and resolution in 3D.

Otherwise, the most important outcome of the 2019 expedition is the expansion of the mapped area around the wreck itself.

Many more details are added, but much work remains to be done if we want to cover the entire fallout area around *Mars*, where numerous effects and their relative placement can provide important information to the researchers.

If, at some point, it is decided to salvage more objects, it is also important to document their location and context before moving them.

The mapping is done by a photogrammetry diver swimming steadily above the bottom and shooting multiple images with a certain overlap. This is then digitally assembled into a 3D model.

This laborious work could be done far more efficiently with a remote-controlled underwater video robot (ROV) that doesn't have to decompress after 30-40 minutes on the bottom.



GUE

Global Underwater Explorers was formed in 1998 by a small group of ambitious divers who strived to develop projects that made it possible to explore underwater environments. GUE has always been based on three pillars: education, exploration and conservation.

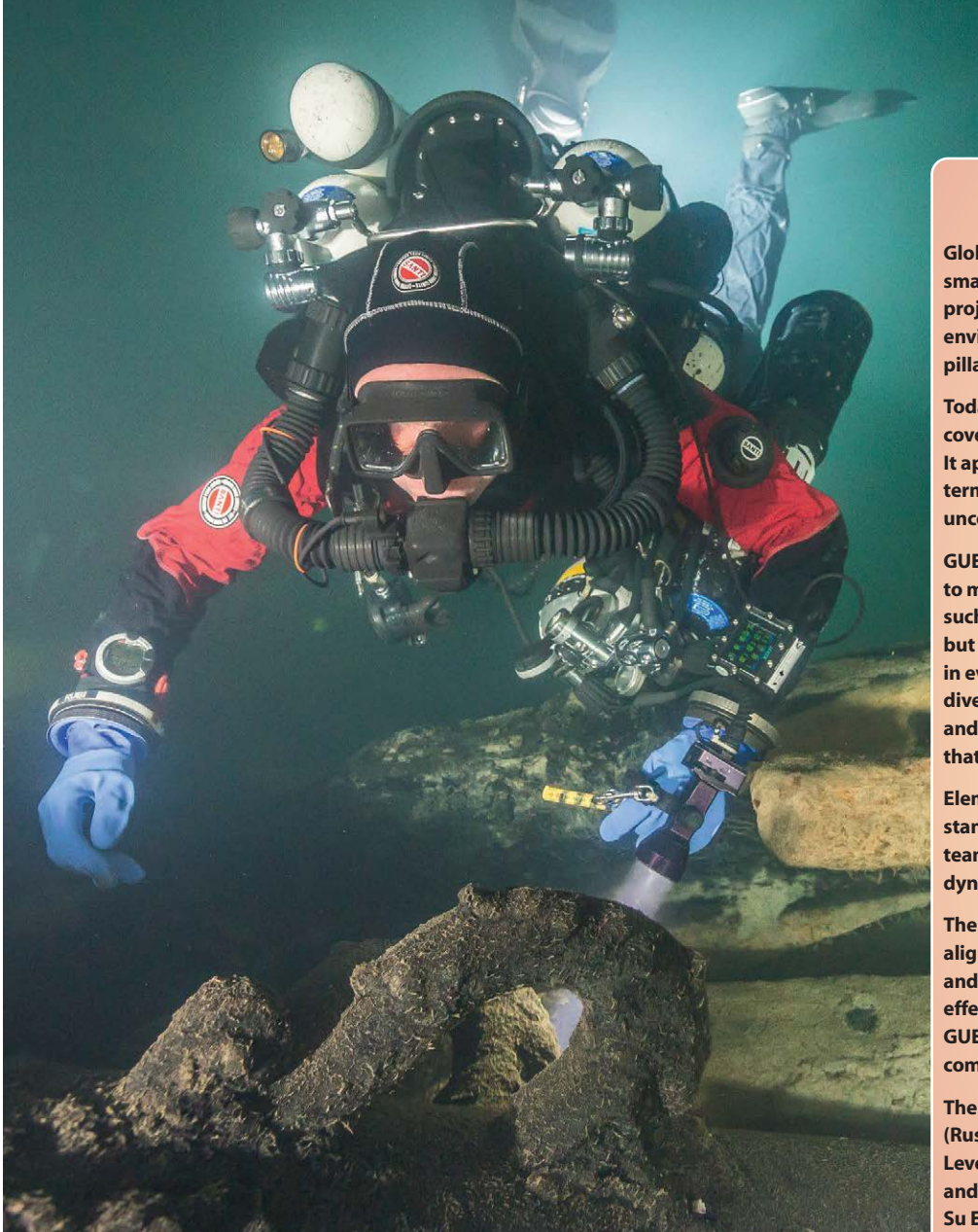
Today, it has a complete educational programme that covers all areas from GUE REC1 to instructor-trainer. It appeals to divers prepared to go the extra mile in terms of personal fitness and with a generally uncompromising approach to diving.

GUE is based on a holistic system originally developed to meet the requirements of complex technical dives such as deep wreck dives or extensive cave exploration, but gradually it adapted to include recreational diving in every conceivable environment. Although different dive situations require the addition of specific tools and techniques, there are a number of key components that ensure success and are the same on all platforms.

Elements such as precision buoyancy, stability, standardised equipment, swimming techniques, teamwork and a thorough understanding of gas dynamics are considered fundamental by GUE.


The comprehensive degree of standardisation and alignment of procedures, equipment configuration and dive-planning make the GUE diver an extremely effective project participant, because everyone in a GUE project has the same approach to diving and compatible configurations and procedures.

The *Mars* 2019 dive-team consisted of Kirill Egorov (Russia); Jesper Kjøller (Denmark); Kees Beemster Leverenz (USA); John Kendall, Rachael Kendall and Marcus New (UK); Oleksiy Sverdlov (Ukraine); Su Eun Kim and Kyungsoo Kim (Korea) and Richard Lundgren (Sweden).



This is expensive equipment, but efforts are underway to obtain funding through sponsorships, so that we divers can concentrate on the more specialised tasks on which it is advantageous to have a human in the water.

I look forward to being part of the team again in 2020, when we hope, among other things, to find answers to these two pressing questions:

Where are the remains of the more than 800 soldiers who perished in the sinking – and where is the missing wreckage located? 



Top: Another view of the dolphin-shaped handles on the big cannon.

Above: Scientists and divers meet in the HQ tent daily to evaluate results and outline goals for the next day.

Left: Deceptive rendering of *Mars* as it would appear in sunlight, shallow, clear water.

More on Mars:
mars-project.org



FEELGOOD SAIPAN

DIVE LOCATIONS THAT ARE just a bit off the beaten path are my favourites – the places people have to ask you where exactly that is, and perhaps how to spell it.

A small green speck in a map of blue, the island of Saipan can be found in the north-western Pacific, 125 miles north of Guam. Relatively close to Palau and Chuuk (Truk Lagoon), two islands frequented by divers, it is often passed over, despite having made huge efforts in protecting its impressive reefs and its WW2 wreck history.

Saipan's association with the USA is usually overlooked but it is a commonwealth of the States along with Tinian, Rota and 11 other islands that are often abbreviated as the CNMI (Commonwealth of the Northern Mariana Islands).

Along with Guam (which isn't part of the CNMI but is a US territory) these islands make up the Mariana Islands archipelago and are the northernmost islands of Micronesia.

Surrounded by fringe reef with offshore coral mounts, one would expect good things from the diving in the area, and it doesn't disappoint.

THE BATTLE OF SAIPAN occurred in June and July, 1944, and was a terribly bloody encounter for both sides.

More than 29,000 Japanese troops (along with many civilians, including 1000-plus suicides on the last day) and almost 3000 Americans died, and more than 10,000 were wounded.

The island of Tinian also played a role historically, serving as the launching

point for the atomic-bomb attacks against Hiroshima and Nagasaki.

Over the years Saipan and the CNMI have taken note of their valuable natural resources and strived to protect living, non-living, cultural and historical resources.

They educate and enforce protection of the ocean, preventing walking on or destroying coral and feeding of fish, and banning the taking of fish, shells or even sand in some areas, with dive-shops assisting in the education process.

Saipan has also factored in protection of several WW2 wrecks within protected areas.

This small island, only 12 miles long by six miles wide, has warm water, excellent visibility, fields of healthy hard corals and plenty of fish life, plus those wrecks. Sounds like a perfect dive location to me!

TAKE ME TO THE WRECKS! is usually my first request at a new dive location, and the crew at Fishguyz Scuba kindly obliged. We headed to the

Shoan Maru and *Kawanishi H8K Emily* plane, both located in the Mañagaha Marine Conservation Area (MMCA).

The two wrecks have become artificial reefs teeming with life.

Not a lot is known about what befell the *Shoan Maru*, a Japanese transport ship thought likely to have sunk in February 1944 while carrying conscripted Korean soldiers, although it is sometimes said to have gone down during the Battle of Saipan later that year.

It sits in only about 10m of crystal water and has plenty of marine life living on it. The ship is very much destroyed, but schools of snapper, goatfish and squirrelfish lurk in the shadows of the broken, twisted metal.



Pictured: A divemaster shows off his underwater tricks on a bike found in the sand off the Ice Cream site.

BRANDI MUELLER relishes dive locations that are off the beaten track and full of surprises. Cue a trip to the northernmost part of Micronesia





Below one section at least six whitetip reef sharks could be seen sitting in the sand. Hard corals have colonised the wreck, and shallow depths allow for very long dives, which is good because the ship is huge.

The Emily plane is broken into several pieces, also in about 10m depth. The engines with propellers stand out from the white sand, with coral encrusting the metal and fish swarming on the outside and living in the engines.

The wings, which sit nearby, host a school of squirrelfish, and there are many other fish in the hollows and voids of the broken aircraft. Also nearby are underwater memorials dedicated to the Korean and Japanese soldiers.

Although not a protected area, several American M4 Sherman tanks can be seen from the beach, as they never reached it completely in 1944.

Kids could be seen swimming around and climbing on them, and I must admit that it was pretty incredible to snorkel a Sherman tank.



MY DIVE-GUIDE told me that some days, when the ocean is doldrums-flat, you can just walk right into the Grotto. This was not the case the day I visited.

In fact, when we arrived another diving group was leaving without even trying

the dive, because the conditions were considerably less than perfect.

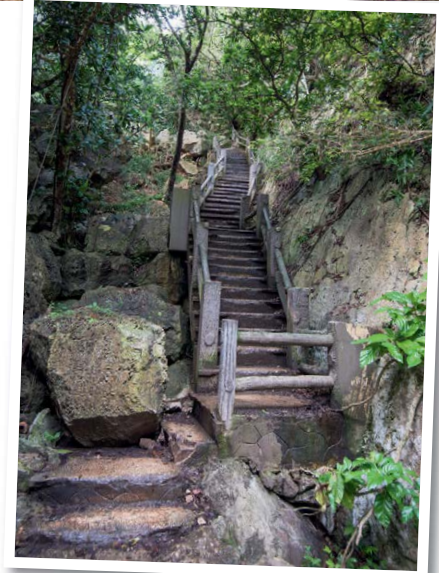
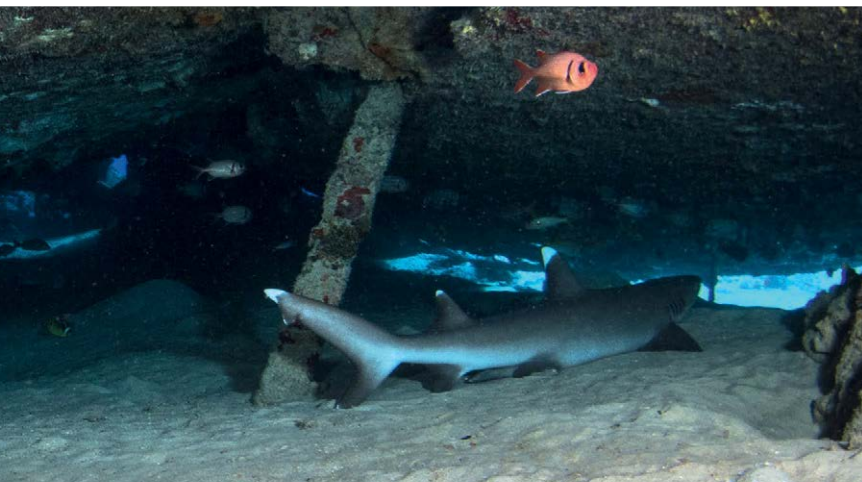
After gearing up on the tailgate of a pick-up truck, we made our way down the 112 steps leading to the Grotto.

Before even getting to the bottom I

Above, clockwise from top left: Half-in, half-out M4 Sherman tank from 1944; coral and fish on the gun-turret of the Emily plane; fish inside the *Shoan Maru*; propeller and engine of the Emily.

Left: Whitetip sharks under the *Shoan Maru*.

Right: Some of the 112 steps leading to the Grotto





could hear the rush and crashing of waves into the entry-point and once it came into view I started mentally saying goodbye to my camera, which I felt was sure to be smashed on the rocks when I tried to exit... or possibly my entire body.

Getting closer, we soon found ourselves inside a massive cavern with green vines growing around rocks.

An angry ocean swell was entering the cavern with as much force as it exited, making the water rise up and down several feet in large waves.

The entry-point was in the central area and a small stream of rushing water had to be crossed. My dive-guide Syd was a star and crossed the rushing water first, let me hand him my camera and fins and then waited for the perfect (and safest) moment to tell me to cross as he extended his arm and guided me over.

Now at the centre, we did a giant stride into the open cavern – it was a negative entry to avoid being thrown up on the rocks by the swell.

The sunlight that had lit the entry-point slowly disappeared and the cavern went dark except for three brilliant blue openings in front of us, leading to the open ocean.

Following Syd to one of the openings, I was mystified by the stacks and layers of pink sea fans. They seemed to be growing as close as possible to each other, just layers and layers of pink, slowly billowing back and forth with the water movement.

The sea was rough, and even under water we could hear the waves crashing

onto the rocks. Gazing up to the surface, all I could see was white water rolling in and out, as if I was under angry clouds.

The fish didn't seem to notice, however, and the mini-wall outside the Grotto had butterflyfish and angelfish swimming all around.

It was easy to see how this water power had led to the carving out of the Grotto and other caverns along this coast.

Even with the big waves, the visibility was still greater than 30m. Off in the distance I could make out a turtle swimming for the surface to get a breath.

And it was breathtaking being in the dark looking through this illuminated

blue window, with surging water curling and fluttering at the top.

Getting back out of the Grotto was my biggest worry but, again, my amazing dive-guide helped me with my camera and fins and told me exactly when to move across the rocks, and I made it out unscathed.

However, the hike back up the 112 stairs did give me greater appreciation for boat-diving. The Grotto is protected as part of the Bird Island Marine Sanctuary.

TO THE SOUTH of Saipan is the island of Tinian, known as the location from which the nuclear attacks on Hiroshima and Nagasaki were launched. Under water one finds a much more peaceful scene.

We dived in the Tinian Grotto, another cavern dive that's a smaller but similar version of Saipan's Grotto. Water visibility was fantastic as we swam into the cavern from the open ocean.

Inside there were more of the same sea fans I had seen in the Grotto, growing from the ceiling and walls like lace curtains. Lobster and different species of shrimp could be seen in the crevices of the cavern.

One guide pointed out a boxer crab in the stony floor as we swam through the back and out to the open ocean again.

We also visited Dump Cove, an area in which US troops dumped unneeded items into the ocean after WW2.

The more I travel around the Pacific Islands involved in that war, the more of these dump sites I come across. While it

Above, clockwise from top: Snorkellers entering the Grotto; seafan inside the Grotto; eagle ray swimming near the turbulent surface off Tinian; squirrelfish inside part of the Emily plane; marine life growing on the wall of the Grotto.

Below: Green turtle off Tinian.





was sad to see all this 75-year-old garbage still on the seafloor, it was exciting to swim over parts of aircraft, several tanks, ammunition including hundreds of bullets, tyres and... a ton of turtles.

The marine life had made homes in much of the left-behind war trash, making it an artificial reef of sorts.

IMPRESSED BY SAIPAN'S marine conservation efforts, I learned about two sanctuaries that were created to restore previous damage to the marine ecosystem.

A type of sea cucumber, the *Actinopyga mauritiana* population was drastically reduced by a commercial fishery in the 1990s, and now the Lau Lau Bay Sea Cucumber Sanctuary has been created off-limits to harvesters in hopes of restoring them.

Another sanctuary protects the topshell trochus (*Trochus niloticus*) which were harvested without restrictions in the late 1980s. There is now a moratorium on harvesting any trochus in the CNMI, but should that ban is lifted, the Lighthouse Reef Trochus Sanctuary will remain a no-take area.

Saipan and the rest of the CNMI reefs still face many challenges, not least large and more frequent episodes of coral-bleaching. Other threats include ocean acidification, coral disease, illegal fishing, pollution, destruction from tropical storms which might be occurring more frequently and powerfully, and shoreline change.

The development occurring rapidly on Saipan can cause problems to reefs from runoff and erosion, though monitoring by Coastal Resources Management helps.

Increased tourism can also lead to stress on the reefs but the MPAs play a role with tour operators in educating tourists.

Saipan is a beautiful island and it's fantastic to see the efforts being made to keep it in good shape for future generations and visitors.

It serves as a great example of the importance of reserves and how they can offer a win-win outcome for everyone involved.

Above, clockwise from top left: Bullets at Dump Cove; coral and fish off Tinian; wheels at Dump Cove; seafans growing close together in the Grotto.

Right: Anemones – and a little bleaching – at the Ice Cream dive-site.



FACTFILE

GETTING THERE ▶ Fly from the UK to Guam. United Airlines has daily flights from there.

Other direct flights via Hong Kong and the Philippines.

DIVING ▶ Fishguyz Scuba & Charter, fishguyzscuba.com

ACCOMMODATION ▶ Hyatt Regency Saipan, hyatt.com

WHEN TO GO ▶ Year-round. October-April has better visibility because of slightly cooler water (27°C) but it is windier. May-September is calmer but also the rainy season, with the water 1° warmer.

MONEY ▶ US dollar.

HEALTH ▶ No malaria, but mosquito-borne viruses such as dengue have occurred. Guam has the closest recompression chamber.

PRICES ▶ Return flights from £670. Hotel US \$187 per night. Two-tank boat dive trip £100, two shore dives £75.

VISITOR INFORMATION ▶ mymarianas.com



Booking ahead with no deposit



CA SCHUMACHER

With travelling divers naturally reluctant to pay deposits on holidays they can no longer be sure will go ahead because of the COVID-19 pandemic, one long-established dive operator was early to announce that it had taken steps to remove the risk.

Emperor Divers has a large fleet of liveaboards operating in the Red Sea, Maldives and Indonesia, and its simple solution was to allow guests to hold spaces on its boats without needing to pay a deposit.

Whether booking direct or through a preferred tour operator, it said it was prepared to hold any available date

from 1 July, 2020 onwards.

Once the current travel bans had been lifted and "normal service returns," it said that guests would be required to pay a deposit of £180pp and the final balance at the usual time.

Should the guest decide not to proceed with the booking at that point for any reason, Emperor would cancel the place at no cost.

There could still be pressure to find a desired slot: "Because our lives have been 'paused' by COVID-19, many 2020 bookings have rebooked for late 2020 and into 2021," warned Emperor. But it said it hoped that its offer would help

divers to be able to plan ahead and hold a place without risk.

UK tour operator Scuba Travel followed suit in early April when it introduced £0 deposits on selected future holidays, so that divers would "have something to look forward to."

"Once your destination is given the green light by the UK FCO, we will be in touch to re-confirm your trip and take your deposit as normal," it said, though if by then you could no longer take the holiday you would be able to release your place with no penalty.

► emperordivers.com,
scubatravel.com

Dive Worldwide flexi-booking

Dive Worldwide introduced a delayed deposit scheme in April to encourage divers to book ahead during the pandemic. Guests could book a selected range of holidays with no outlay, paying the deposit only once FCO travel restrictions to the destination were removed.

The tour operator offers resort- and liveaboard-based diving trips to more than 40 destinations.

Among those included in the scheme are Vilamendhoo Island Resort and Euro Divers dive-centre in the Maldives' South Ari atoll from £2450pp (two sharing) for seven nights' full board, six days' diving, transfers and return flights from the UK.

Also on offer is a stay at True Blue Bay Resort with Aquanauts on-site diving in Grenada in the Caribbean from £1695pp sharing for seven nights' B&B, 10 dives, transfers and flights.

► diveworldwide.com

Maldives gets first ENOS system

The DivePoint dive-centre on Rannalhi in South Male atoll, has become the first Maldives operation to invest in

ENOS, the electronic rescue and locating system for divers.

Owner Marcus Hauck purchased a



SeaReq ENOS receiver which is portable so can be moved between boats. With antennae mounted on top of a diving *dohni* his crew is enabled to receive alerts over long distances should the sometimes strong currents or sudden weather changes characteristic of the Maldives result in a diver separation.

The crew have been personally trained by Karl Hansmann, owner of the manufacturer Seareq, which was established in 2003, and inventor of the ENOS system.



The DivePoint dive-centre is attached to the Adaaran Club Rannalhi.

► divepoint-maldives.com,
seareq.de

BRANDI & TOBIAS HIT RED SEA

Two DIVER contributors and, we have to say, inspiring underwater photographers are combining for a Red Sea Underwater Photography Workshop later this year.

Brandi Mueller and Tobias Friedrich's trip is planned for 12-19 November aboard the *Omenia Spirit* liveaboard.

"The Red Sea has endless opportunities for underwater photographers, including a

variety of subjects from colourful fish and corals, wrecks, sharks, and more," says Brandi. During surface intervals guests can interact with the pros during lectures, editing sessions, and one-on-one training.

The trip is priced at 1699 euros plus 250 euros pp marine park fee – included is a shared cabin, board and nitrox.

► brandiunderwater.com



...OR AS SOON AS NORMAL SERVICE RESUMES!



European cave-training in 28°C water!

The Scuba Murcia dive-centre in southern Spain says it has been working closely with PADI and TecRec instructor Simon Townsend to become the only PADI dive centre in Europe to be able to offer the PADI Tec Full Cave Diver course.

It says that access to one of Europe's few warmwater cave systems, the hydrothermal freshwater Cueva Del Agua, makes this possible. The system has been continually explored by Spanish cave teams since 1972, in toasty-warm 28°C water.

The 10-day training course is carried out there and also in local sea

caves, with 16 dives building on strict cave diving standards, focusing on skill development, safety protocols, teamwork practice and execution. Scuba Murcia is based in La Manga Del Mar Menor. It costs from 1350 euros pp, assuming at least three people on a course, including gas and transport to sites.

The dive-centre can recommend accommodation from a diver hostel from 45 euros pp per night through whole apartments sleeping 3-5 guests from 35 euros a night to 4* hotel double-rooms from 120 euros a night. [▶▶ scubamurcia.com](http://scubamurcia.com)



Everyone's in at Sun Siyam

Family-friendly Sun Siyam Iru Fushi 5* resort in the Maldives is offering "book now and dive later" packages with a series of non-scuba dive incentives for both children and adults.

An SSI Mermaid/Merman programme gives guests aged 6-12 a chance to experience the underwater world in a confined-water setting and learn skills that enable them to be confident and safe in the water, using mer-fishtails and monofins.

The resort also runs SSI Basic and Level 1 freediving courses in breath-hold techniques to depths down to 20m. It also says it's one of the first in the Maldives to offer the Peter Diving System, designed to allow people with disabilities, non-divers and others to submerge to 6m on umbilicals.

The resort has 221 villas and 15 bars and restaurants and, based on May 2021 departures, a seven-night holiday

booked through Trailfinders costs from £1979pp. This includes flights from London, B&B in a beach villa and transfers, and is said to represent a 25% saving of £600-plus per couple.

The SSI Diamond Instructor Training Dive Centre charges US \$482 for a 10-dive package. Mermaid/Merman courses start from \$80 per child, and freediving courses from \$175pp.

[▶▶ trailfinders.com](http://trailfinders.com), sunsiyam.com

PORTUGAL PUTS ITSELF FORWARD

Portugal is keen that divers should put its mainland dive-sites as well as those in the Azores and Madeira high on their priority lists to visit when they are able to get back to diving overseas, and has a number of packages to tempt them.

The weather is moderate and diving possible year-round, points out Portugal Dive.

Packages include "Lisbon and Scuba Diving" from 999 euros pp for an eight-day programme with seven nights in a 3* hotel or apartment, 10 dives in areas such as Sesimbra, Cascais and Fonte da Telha, a hire car for five days to reach dive-sites, a night out with a meal in Lisbon and dive-gear.

Or how about eight days on Santa Maria in the Azores from 949 euros pp or, for 909 euros pp, a stay in Madeira?

Both trips include 10 dives, seven nights in a 3* hotel or apartment, transfers and dive-gear. Flights are not included.

Portugal Dive also points out that it supports technical (OC and CCR) and cave-diving and can offer exclusive itineraries for groups of technical divers.

[▶▶ portugaldive.com](http://portugaldive.com)

Join Socorro manta expedition

The Revillagigedos are a group of four volcanic islands in the Pacific Ocean that lie 250 miles off Baja Mexico and include Socorro. They attract schooling hammerhead, tiger, and silky sharks, dolphins, jack and barracuda, whale sharks and famously manta rays.

Next January sees a trip on the *Under Sea* liveaboard (formerly *Undersea Hunter*, which operated around Cocos) on which UK-registered charity Manta Trust scientists will be collecting photo-ID images of the rays, and guests are encouraged to participate and, it's hoped, add previously unknown mantas to the database and name them. New manta-matching software is to be unveiled on the trip.

The newest addition to the Nautilus liveaboard fleet, the *Under Sea* has undergone two refits, including stretching the hull by 6m, repowering, adding a new bow and full-width superstructure, hot tub, top deck lounge and stability system.



The manta-expert team onboard is led by marine biologist Robert Rubin and Dr Annie Murray.

The eight-night trip costs from US \$2595pp for a triple-shared stateroom, with four dives a day, full board and end of trip DVD.

In the meantime Nautilus Dive Expeditions has been inviting divers to "dive Socorro virtually with us" at youtube.com/nautilusliveaboards with new videos weekly.

[▶▶ mantaexpeditions.com](http://mantaexpeditions.com), mantatrust.org

WELL AND TRULY TESTED



STEVE WARREN does the honours this month (as **MIKE WARD** puts his feet up) with tests in Gibraltar of a



budget Mares regulator and a Hollis wing, with a pressure gauge for good measure

REGULATOR MARES DUAL ADJUSTABLE 52X 2004

WE'RE USED TO ELECTRONIC TECHNOLOGY

getting ever cheaper, even as it delivers not only bells and whistles but the whole damn Philharmonic Orchestra.

About the only thing a budget dive-computer doesn't do yet is play Paul McCartney's 3min 57sec hit *Coming Up* during your safety stop. But, in real terms, mechanical engineering has grown more expensive.

This is especially true of regulators, the manufacturing bases of which remain largely in the West, rather than the Far East.

My first regulator, bought in 1981, was top of the range and a superb breathe. It cost, in today's money, about £320.

In 2020, an equivalent recreational regulator from a major brand can easily nudge £600.

So at £332, the Mares Dual Adjustable second stage and 52X first stage combo is very much a budget regulator. But is it really a starter or an entry-level model?

As Mike Ward has mentioned before, regulator performance is now so good that such terms are misleading.

While we should expect to get what we pay for, even a budget valve is not going to leave most recreational divers gasping for breath, or feeling short-changed for features and benefits.

In the Dual Adjustable 52X there's a lot to like, something to which I'm becoming accustomed, having tested three other Mares regs spanning low to premium pricing.

First Stage

The 52X first stage is a balanced-diaphragm design, an approach favoured by Mares for more than four decades.

It is synonymous with easy breathing under high demand, even at depth and at low tank pressures. It's also mechanically easy to isolate the working parts from the surrounding water, reducing the risk of icing and damage from contaminants such as silt.



There are two high-pressure ports for mounting pressure-gauges or computer transmitters on either side of the first stage to help with hose management, and four medium-pressure ports.

Two of these are set on the right, fed by a system Mares calls Dynamic Flow Control.

DFC harnesses air-flow physics to help send the lion's share of air through these two ports with minimal inhalation effort on your or your buddy's part.

When you're not breathing in, air pressure inside the second stage builds up enough to close the valve against incoming pressure from the first stage trying to force it open.

Both second-stage and first-stage pressure are in balance.

When we inhale, pressure in the second stage drops below that in the first stage and is strong enough to open the second-stage valve, so air flows freely into our lungs.

Well, not quite freely – you might have to exert some effort to keep the valve open.

The dilemma for the manufacturer is how to keep this effort to an absolute minimum. DFC creates a slight vacuum in the first-stage air-flow, so the air behind is dragged along by the air already moving ahead in front.

The easiest analogy is a train passing through a tunnel – you can feel the air being dragged behind it.

This venturi effect reduces the mp drop as you inhale and minimises the lung-power needed to sustain air-flow from the first

to the second stage, easing inhalation.

Some Mares first stages offer DFC routing to all the mp ports but will cost more. The biggest demand for air during recreational dives is likely to be in an emergency at depth with two divers breathing heavily from one first stage using an octopus, with tank pressure rapidly falling, so primary and safe seconds should be connected to the DFC outlets.

The lower-performance ports can be used for direct feeds, where there's much less demand for high flow-rates and high volumes of air.

Using two DFC ports does restrict your choice



of hose layout if you want to be assured of the best possible breathing performance – which I would!

Mares expects you to run not just your primary second stage but also your safe second from the right. This is my preference but it's a contested view.

The 52X is EN250A certified. One of the tests it passed is for coldwater diving.

For EN purposes, cold water is defined as below 10°C – easily found in UK waters. To earn the rating, it is tested and certified for use at 4°C.

Water doesn't freeze at these temperatures, so why the fuss?

As air passes from your cylinder to your lungs, it drops in pressure, causing it to cool. It also cools according to the volume of gas flowing through the regulator, associated with working hard, sharing and diving deep.

Fast-flowing air, caused by rapid breathing, also cools faster than slower-moving air. Because of these factors, air temperature inside the regulator can be tens of degrees colder than the surrounding water.

This super-cooling can cause water in contact with the reg to turn to ice that can block the travel of moving parts and cause a first stage to freeflow, or even shut off the air supply.

Time is also a factor. The EN250 coldwater standard requires only that the regulator does not freeze within five minutes, but this is at a depth of 50m under a fairly high flow-rate.

The 52X protects itself from the cold partly by using an enlarged surface area around the first stage to increase its efficiency as a heat-exchanger. An additional coldwater kit, which dry-seals the exposed diaphragm spring, is optional for even more extreme conditions.

The 52X can be ordered with yoke, 300-bar DIN and nitrox DIN connectors. It is compatible with 40% nitrox mixes out of the box, so the nitrox connector is a bit of a red herring for recreational diving.

It's an EU standard, designed to avoid accidentally connecting a reg to a nitrox-filled cylinder without realising. I use nitrox a lot overseas and I don't think many dive-centres or liveboards have tanks to use with the nitrox connection, so you don't need it.

If you drop the 52X in the rinse-tank without its dust cap, its Auto Sealing Technology keeps the water out.

Second Stage

The Dual Adjustable second stage links to the first stage with a Superflex hose. This offers less restriction than conventional hoses under load, allowing you to turn your head more easily and to be able to coil up the set more tightly for easier transport and storage.

It is pneumatically balanced, a benefit once found only on premium models.

Air-balancing reduces the lung effort invested whenever you inhale to crack the second-stage valve and get the air flowing.



The valve is kept closed by a spring. Its strength can't be varied, even though it must cope with variations in pressure coming from the first stage as your diving depth changes, so it is often stronger than it needs to be, requiring more effort to crack the valve than is ideal.

In a balanced design, the spring is enclosed in an air-pocket. This air pressure automatically matches changes in depth, working with the spring to adjust cracking effort to the optimum setting for ease of breathing, regardless of depth.

Once cracked, the venturi takes over. Air is made to swirl through the second stage, causing a vacuum that does much of the work of holding down the diaphragm and keeping the second-stage valve open for you.

Its purpose is to minimise the amount of effort you have to make to keep the air flowing to your lungs. Mares' patented venturi system is called Vortex Assisted Design.

The VAD's air-routeing means that cooling takes place further away from the valve-seat than in other venturi designs.

Mares claims that this decreases the risk of ice forming on the seat and valve opening, which could freeze the mechanism.

Internally, the Dual Adjustable features additional anti-icing components such as non-stick surfaces and heat-exchanging metals, so it also meets the EN250 coldwater diving criteria.

Externally, it's conventional with an underslung exhaust T.

A side control knob lets you detune ease of breathing by increasing the lung effort needed to crack the second-stage valve. It also reduces the assist provided by the venturi, so you have to work harder to keep the air flowing.

Detuning any regulator should never be done without good reason. It won't prolong your air supply, because you'll burn more oxygen extracting it than you'll ever save.

It's for rare situations that might cause the regulator to freeflow – possibly while facing into a very strong current.

In Use

The DIN model first stage supplied was easy to fit and remove with wet hands. The second stage is only slightly negatively buoyant and has a comfortable mouthpiece.

The purge requires a comparatively deep press but is easy to use with or without gloves. The exhaust T does an excellent job of diverting bubbles from your field of view.

Clearing a fully flooded mouthpiece, even upside-down, is easy, either using the purge or exhalation method, and the exhaust T won't interfere with the seal on most masks. These points are relevant when sharing, in case the reg is accidentally inserted inverted.

Speaking of sharing, on our punishing 30m-deep octopus test there was no chance of outbreathing the Dual Adjustable 52X.

Dennis Santos and I hung onto a wreck and kicked as hard as we could to get our breathing rate up for two minutes, burning through around 500 litres.

The EN250 A suffix is awarded after an exhaustive machine breathing test, which can't be matched objectively by a manned dive, but our subjective test shows up breathing characteristics, such as how the inhalation feels, that a machine can't assess. The Mares delivered each breath with minimal cracking effort and very smooth air-flow.

We tested with the primary and matched Dual Adjustable octopus coming off the two DFC ports, as recommended by Mares.

A regulator gaining the A suffix indicates only that it has met the standard. The Mares Dual Adjustable 52X probably exceeds EN250A if you use the non-DFC ports, which you might do if you wish to run your octopus or a combi safe second/BC inflator from the left.

Using the DFC ports should further increase your safety factor when sharing, so it's no surprise that, for normal use, this regulator's inhalation is easy and smooth.

Conclusion

Mares continues to impress. Although an inexpensive addition to its range, the Dual Adjustable 52X delivers all the features and benefits a serious advanced diver is likely to ask of any regulator.

In addition to scoring the EU's top EN250A rating, it has also passed the Norwegian Norsak U-101 breathing standards at more than 200m using a helium mix. Highly recommended. ■

SPECS

TESTER ▶ Steve Warren
PRICES ▶ £332. Octopus £152
FIRST STAGE ▶ Balanced diaphragm
SECOND STAGE ▶ Pneumatically balanced
PORTS ▶ 2hp, 4 mp
WEIGHT ▶ Yoke 1002g, DIN 828g, Octopus - 359g
CONTACT ▶ mares.com

BC HOLLIS HD200

MY FIRST 65-MINUTE DIVE IN THE HOLLIS

HD200 wing turned out to be an hour-long commercial for the BC. Unintentionally, I had become the ultimate silent salesman.

I'd been cruising along the wreck trail that is a highlight of Camp Bay, Gibraltar, my usual testing ground. My buddies were old friends, Dennis Santos and Danny Freyone, both with decades of diving experience.

They had dived in the early horse-collar BCs before progressing to jacket models and then, for twin-set diving, to wings.

When we surfaced, Danny had immediately commented: "That's a great BC. Your trim was perfect."

"It floats you really high on the surface," Dennis added. Such accolades are almost embarrassing to report, because they make my reviews look like advertorial, and I have to try to find faults to balance them and prove that I'm not the dive industry's favourite yes-man.

Hollis was founded by Bob Hollis, who also created Oceanic, one of the world's biggest equipment manufacturers. Oceanic was born in the 1970s, long before the emergence of technical diving, and offers a wide range of products. Hollis is newer, with a narrower choice of kit, marketed towards tekkies.

At the end of the day, however, diving is diving and whether you're a newly minted occasional recreational diver or a hardheaded technical one, a lot of kit is interchangeable.

This crossover is very apparent in single-cylinder wing BCs, the category into which the Hollis HD200 falls.

The Design

The HD200 is a well-specified, weight-integrated, back-inflation BC. It's horseshoe-styled, meaning that the air-cell runs down either side of your tank, but, unlike a doughnut air-cell, does not connect at the bottom.

The penalty is that air cannot flow freely throughout the air-cell, but the gain, popular with some technical divers, is a gap into which you can tie accessories, such as light canisters.

Both horseshoe and doughnut-style wings are popular, suggesting that neither air-cell has an outright advantage over the other – it comes down to personal preference.

As the prefix HD suggests, this is no lightweight – it weighs in at 4.3kg.

But then it's expected to be used hard, serving, say, the UK diver who while at home is using a single backmount tank, plus a stage for deco, but then wreck-diving using a similar set-up in the Red Sea.

With 15-17kg of buoyancy,

depending on size, there's a lot of lift for such excursions.

The ability to shrug off abrasion from rusted metal for wreck ferrets and the accumulative day-to-day wear of regular use comes from Hollis's choice of a twin-bag design. The buoyancy cell itself is made from thick polyurethane.

This in turn is protected by an outer shell of 1000-denier Cordura.

The HD200 uses a rigid backpack with a nice wide hand-grip at the top for moving your rig around. There's a single camband for attaching your cylinder, with non-slip studs along the tank track for added security to prevent slippage.

An adjustable loop sits over your tank-valve to set the height of your cylinder, helping gear-handlers to assemble your rig correctly in your absence, for instance.

The backpack is well-cushioned. The harness comprises wide shoulder-straps with squeeze-buckle releases. Across your chest sits another strap, with two different height positions, so it won't interfere



Hollis HD200 padded back-pack.



with drysuit inflators.

The cummerbund is quickly adjustable for length simply by reaching in behind the backpack and tightening or slackening off the ends, which are held by a touch fastener.

This feature lets you keep the overlap of the cummerbund in front to a minimum. The benefit is a close fit, regardless of changes of suit or, within reason, fluctuations in your body mass.

A waist-strap sits over this, closed with a stainless-steel cam buckle.

Surplus strap can be adjusted by rethreading the nylon through the buckle slots and back on itself. So you should be able to achieve a very snug fit with the HD200 and still keep all your webbing neat.

Connecting to the waist-strap via another large squeeze-release buckle is the wide jock-strap, designed partly to prevent any cylinder or BC ride-up but also to take the strain of riding scooters, for which a large stainless-steel D-ring is included for a tether.

In fact the HD200 is festooned with D-rings, all sewn into fixed positions.

One of the two large ones that sit on the upper shoulders proved ideal for mounting my SPG where I could see it with just a downwards glance, while two other medium rings hang from the HD200's lower edge, where I might clip off a reel.

At the back is a huge D-ring to which the jock-strap attaches – I could see myself pressing this into use for carrying my main DSMB. Four small D-rings are arranged in pairs on either side of the Hollis, one sitting near your outer shoulder blade and the other a little lower.

These could be used to bungee in a rolled-up back-up DSMB or small lift-bag, for example.

The Hollis has quick-release pouches for your main weights, and these sit around your waist. Two zippered cargo-pockets sit on top of these.

Sandwiched between the backpack and wing are the trim-weight pockets.

In Use

The HD200 was one of seven weight-integrated BCs I was testing in Gibraltar. Each was dived in a 7mm coldwater wetsuit, enabling me to test their buoyancy characteristics at depth, where suit compression influences the results, so keeping it real.

But testing began with a half-kilometre walk to the dive-site with the Hollis loaded up with around 35kg of kit, including 10kg of lead and a 15-litre steel tank.

It was very comfortable, a benefit of the wide and generously padded upper shoulder panels and the well-cushioned backpack.

Once in the water, I fully inflated the BC and measured the distance from the waterline to my mouth. A diver who is out of air and doesn't have a snorkel in chop can take in a lot of spray and water if set low in the waves.

The HD200 let me ride high, clearing 17cm. This is a good performance, given the 4kg of air the BC had to lift, so an out-of-air diver would float even higher. Surface stability was also excellent, and I was kept vertical without having to fin. This position gives you a good view of your pick-up boat approaching, or lets you brief students comfortably.

As Danny pointed out, the HD200 held me perfectly horizontal under water. This greatly aids streamlining, saving you air, and means that there's less chance of you kicking up the silt when working close to the bottom.

It's great for photographers, as you can get really low to shoot subjects on flat seabeds.

Want to hover upside-down for a difficult shot? Easily done in the Hollis.

A further credit to the HD200 is that I don't like 15-litre cylinders because they tend to roll me. That never happened with the Hollis.

Controls

It takes around eight seconds to fill the air cell at 10m. The direct feed is progressive, meaning that air flows faster the harder you press the button. There's the usual oral-inflation pipette and a dump button. The buttons are not distinguished by shape or colour.

As usual, I wanted to confirm that if the direct feed jammed open, which can happen if silt gets into the mechanism or icing occurs – either usually a result of diver error – the upper dumps can vent faster than the BC can inflate to prevent a runaway ascent.

Both the shoulder-dump and rapid-exhaust

dump, operated by pulling down on the oral-inflation hose, performed flawlessly.

I also tested stopping distance, to see how fast a runaway ascent could be braked. I did this by fully inflating the air-cell while holding onto a shipwreck, then letting go. The shoulder-dump stopped the ascent within a metre, the rapid-exhaust valve within 1.5m, which is standard.

The toggles on the shoulder and single bum-dump are easy for the user to locate and operate by feel.

The main weights are easy to install after you've kitted up, if you prefer not to manhandle the fully loaded scuba system. They are released by squeezing pinch-clips.

Pinch-clips are used by many BC manufacturers; they prevent the accidental jettisoning that can happen with grab-handles that you have to pull. (Although these do have the potential to snag and self-release, I have to say that in more than 10 years of using them it has yet to happen to me.)

The HD200 weight-release is easy to use, although I'd have preferred it if the pouches didn't have what look like grab-handles. Paradoxically, the design does seem to improve on some other squeeze-buckle releases, which have a D-ring on a bit of loose webbing that you grab to pull out your weights should they stick.

With the Hollis, once you squeeze the buckle your hand naturally falls forward onto the grip, so you don't have to search for it and slip your thumb or fingers into a D-ring if a weight does stick in an emergency ditching situation.

Instead, your hand instinctively pushes the weight out, if it hasn't dropped clear.

The problem I can foresee, however, is a buddy mistakenly pulling on those grips in an emergency and overlooking the squeeze releases. I would also have preferred hi-vis colours to clearly identify the weight-releases, dump-valve toggles and direct-feed and dump buttons to an assisting diver.

The cargo pockets aren't bad, and will just about take a tightly rolled full-size DSMB.

Each has grommets to attach a knife for left- or right-hand use. They are a very similar design to those on my own wing, in which I tend to pack things I'm only likely to take out, such as a folding snorkel or buoy.

In practical terms, with so many D-rings, items you might want to use briefly during your dive, then restow, such as torches, would be much better clipped off to these anyway.

Conclusion

Overall, the Hollis HD200 is a very comfortable and capable BC, with lots of practical accessory

SPECS

TESTER » Steve Warren

PRICE » £520

SIZES » S, M, L, XL

WEIGHT » 4.3g

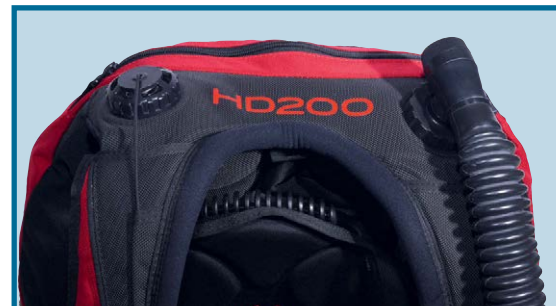
DUMP VALVES » 3

D-RINGS » 8

CONTACT » hollis.com

stowage options.

As Danny and Dennis pointed out, and I can happily confirm, the Hollis HD200 delivers superb surface flotation and perfect underwater buoyancy control. Recommended. ■



Rapid exhaust and shoulder dump.



Shoulder release, pre-bent D-ring and shoulder-dump toggle.



Weight-release.



Rear dump.

PRESSURE GAUGE

MARES MISSION 1 SPG 357

AS A KIT REVIEWER,

I commonly hit the water in a set of kit that's completely unfamiliar to me.

With the Mares Dual Adjustable 52X test regulator, the manufacturer also provided its Mission 1 analogue pressure gauge. Although I was also using a gas-integrated computer on that test trip, having a dial pressure gauge was reassuring.

That's because, on first dives with a test computer, I'm not always sure what the read-outs are telling me...

The Design

The Mares Mission 1 has a 40mm-diameter dial. The main body is brass, although you can't see this touch of quality because it's protected from shock by a sturdy rubber console.

The main dial is phosphorescent white with black needle and indices. There's a red caution zone from 50 bar to zero, plus two other coloured zones between 50-200 and 200-450 bar.

Although rated to 450, gauges are meant to have a 25% overspill safety factor, so it's really for use with 300 bar cylinders that have been "generously" filled.

As required by law, a relief port is built in. This vents automatically and safely if the internal bourdon tube fails and high-pressure air leaks out of it.

The most common cause for this problem with SPGs of any brand is a wet air-fill, or letting water into your first stage.

Under Water

I found the Mission 1 very easy to read under water, even though I should (but don't) have reading lenses in my mask, and light levels were low.

But what was really nice was that Mares has provided two attachment-points for clipping off the Mission 1.

The eyelets are quite large, so a medium bolt-snap connected perfectly. I found that using the lower eyelet, which rotates around the hose, and a bolt-snap to clip it to a shoulder D-ring on several test BCs placed the SPG in my ideal line of sight.

So air-checks could be at a glance, and hands free.

What more can you ask of an SPG? Highly recommended. ■



SPECS

TESTER ► Steve Warren

PRICE ► £86

CONTACT ► mares.com

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The Waterproof W5 is now on the market ready for your return to warmwater diving. The one-piece features 3.5mm neoprene that's said to be highly compression-resistant for increased warmth, less buoyancy shift and a long life. Back-entry, the W5 features wrist and ankle zips for easy donning and removal and has a non-slip protective finish to reduce abrasion on high-wear areas. Men's and woman's suits alike cost £259.

▶▶ cpspartnership.co.uk



INON UWL-95 C24 Wide-Angle Lenses ◀◀◀◀

This wet wide-angle lens system for large-sensor compact and mirrorless cameras uses anti-reflective coated-glass lenses in an aluminium body, and lenses as wide as 24mm. A 95° field of view under water can be expanded to 141° using an optional glass or acrylic dome-port. Prices start from £500.

▶▶ inonuk.com

Scubapro

Level BC ▶▶▶▶

Scubapro's £399 Level front-adjustable weight-integrated BC is claimed to combine ruggedness, light weight and comfort with excellent accessory storage. The 420-denier Endur ex bladder is said to expand away from the diver's body to prevent squeeze. A hard backpack assures tank stability, while a combination of two octo pockets, a pair of large cargo-pouches and four stainless-steel D-rings manage the extras.

▶▶ scubapro.com



Christopher Ward

C60 Sapphire Dive Watch ▶▶▶▶

Christopher Ward's £795 C60 Sapphire is a new addition to its Trident 3 line. With a clear back and, unusually, a translucent dial through which the Swiss automatic movement with its 26 jewels can be observed, this watch has Super-Luminova indices and hands and a one-way bezel. It's rated to 600m.

▶▶ christopherward.co.uk



Atomic Aquatics

Scuba Heat Exchanger ▶▶▶▶

Regulator icing isn't a hazard only when diving beneath polar ice-caps. It can occur in water of 10° or more, making it something of which to beware at, say, UK inland sites. Scuba Heat fits between most regulator first and second stages and is claimed to greatly reduce icing risk without impairing breathing performance. The unit, designed for easy installation and requiring no batteries, costs £360.

▶▶ atomicaquatics.com





Typhoon Berg Lite 2-Piece Midlayer Undersuit ★★★★★

The £138 Typhoon Berg promises to keep you warm inside your drysuit. It comprises a longjohn and long-sleeve top, with a fleecy inner lining and water-repellent outer shell.

▶▶ typhoon-int.com

Maurice Lacroix AIKON Venturer Dive Watch ★★★★★

Latest addition to the AIKON luxury-timepiece range is this Venturer model. It's rated to 30 atmospheres and has a Swiss-made automatic 26-jewel movement with 38-hour power reserve, stainless-steel case and uni-directional bezel. There is a date display and luminous batons. The price is £1650.

▶▶ mauricelacroix.com



Red Original Travel Cup ★★★★★

You can keep your personal drinks mug to hand for when you go back to commuting or for that long-awaited return to diving! Red Original offers this double-wall-insulated, marine-grade stainless-steel container that it says keep drinks hot for four hours and cold ones cool for eight.

The 580ml cup with no-spill top costs £20.

▶▶ redoriginal.com

WILL APPELBYARD



BACK IN THE UK

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Shark Behaviour

Who says one shark is very like another?

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Why Brandi Mueller keeps heading back

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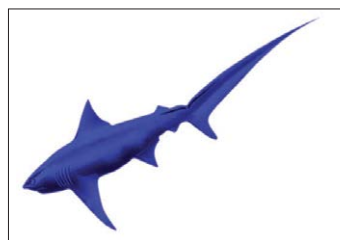
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HSE MEDICALS and phone advice - Poole

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Alfreton (Derbys) BSAC 302. Welcomes new members and qualified divers. A small but active club with own RIB, wreck diving a speciality. Contact Angela on 07866 799364. (68370)

Appledore Sub-Aqua Club (SAA 35) Friendly club welcomes experienced divers from all agencies. Regularly dives Lundy island, own hard boat / compressor. Contact Damian 07831 152021.

Banbury SAC. Friendly, active club with weekly meetings and training sessions, own boat, compressor and equipment. Welcome divers/non-divers. www.bansac.org or call 07787 097 289. (69308)

Birmingham Underwater Exploration Club. Friendly, active dive club. Weekly pool sessions. Regular trips. Own RIB based in south Devon. Training and equipment loan available to members. Tim 07775 580033. (65792)

Bracknell Sub Aqua Club welcomes new and experienced divers from all agencies. Meets poolside at Bracknell Sports Centre, Thursdays from 8.30pm. Diving, training and social calendar: www.bracknellscuba.org.uk or tel: 07951 855 725. (69397)

Braintree Riverside Sub Aqua Club based in Braintree, Essex. A friendly club, we welcome divers of all abilities and have an active diving and social programme. Come and join us! email: denise.f.wright2@btinternet.com www.braintreeriversidesac.co.uk (69397)

Bromley/Lewisham Active divers required. Full programme of hardboat diving throughout the year. Check out Nekton SAC www.nekton.org.uk or contact Jackie (01689) 850130. (68537)

Buckingham Dive Centre. A small friendly club welcoming all divers and those wanting to learn. We dive throughout the year and run trips in the UK and abroad. www.stowe-subaqua.co.uk Tel: Roger 07802 765366. (69433)

Chelmsford and District SAC meet at 8pm every Friday at Riverside Pool. New and qualified divers are welcome. See our website for details: www.chelmsforddiveclub.co.uk (68620)

Cockleshell Divers, Portsmouth, Hants. Small, friendly club welcomes new and experienced divers from all agencies. Meets at Cockleshell Community Centre, Fridays at 8pm. Email: cockleshell.divers@aol.co.uk (64762)

Colchester Sub-Aqua Club welcomes experienced divers and beginners. Sub-Aqua Association training. Diving at home and abroad. Meets at Leisure World Friday evenings. Contact Tony (01787) 475803. (68263)

Chingford, London BSAC 365. Friendly and active club welcomes divers from all agencies and trainees. Meet Wednesday 8pm, Larkwood Leisure Centre E4 9EY. Information: www.dive365.co.uk Email: loughtondivers365@gmail.com (69208)

Cotswold BSAC, a friendly club based at Brockworth

Pool, Nr Cheltenham, Fridays 8pm. Regular inland diving and coast trips. Tel: 07711 312078. www.cotswoldbsac332.co.uk (68577)

Darlington Dolphins Sub Aqua Club, small friendly BSAC/PADI, open to new and experienced divers. Meet Friday night in Dolphin Centre at 8.30. Tel: 07773 075631 or email robkilday@hotmail.co.uk (72665)

Darwen SAC, in Lancashire, with an active diving programme. Own RIB. New members welcome regardless of agency/training. We provide BSAC training. Weekly pool sessions. www.darwensac.org.uk (69161)

Dream Divers. Very friendly dive club in Rotherham welcomes divers of any level/club. Meet at the Ring O Bells, Swinton, last Thursday of the month at 19.30. Email: info@dreamdiversltd.co.uk (69699)

Ealing SAC. BSAC 514. Friendly, active club, own RIBs; welcomes new and experienced divers. Meets Highgrove Pool, Eastcote, Tuesday nights 8.30pm. www.esac.org.uk (68413)

East Cheshire Sub Aqua. Macclesfield based BSAC club. Purpose-built clubhouse, bar, two RIBs, minibus, nitrox, compressor. Lower Bank Street, Macclesfield, SK11 7HL. Tel: 01625 502367. www.scubadivingmacclesfield.com (65609)

East Durham Divers SAA welcome new/experienced divers of any agency. Comprehensive facilities with own premises half a mile from the sea. Contact: John: 07857 174125. (68663)

East Lancs Diving Club based in Blackburn. Friendly, active club welcomes new members at all levels of diving from all organisations. Tel: 07784 828961 or email: ELDC@hotmail.co.uk www.eastlancsdivers.co.uk (69411)

Eastbourne BSAC; RIB, Banked air (free) to 300bar, Nitrox, Trimix. Enjoy some of the best diving on the South Coast, all qualifications welcome. www.sovereigndivers.co.uk (65695)

Eastern Sub Aqua Club SAA 1073. We are a small friendly dive club and welcome new and experienced divers alike. We are situated north of Norwich for training. For more information please see our website: www.esacdivers.co.uk (65879)

Elton Sub Aqua Club, Aberdeenshire, welcomes newcomers and experienced divers. We dive year round and meet on Thursday evenings. Contact www.ellonsubaquaclub.co.uk (65523)

Fife Scuba Divers Tel: 07575 372575. www.fifescubadivers.com. SAA Club No203. Meetings: Thu 19.30, 81 East Way, Hillend, KY11 9JF. Training Club, Crossovers welcome. (72380)

Flintshire Sub Aqua Club based in Holywell, Flintshire, welcomes new and experienced divers from all agencies. Full dive programme. Meet Wednesdays. See us at www.flintscac.co.uk or call 01352 731425. (64293)

Guildford BSAC 53. Welcomes new and qualified divers. Friendly, active club with 2 RIBs, compressor, Nitrox, meets Tuesday at clubhouse with bar. www.guildfordbsac.com or call 07787 141857.

Hartford Scuba BSAC 0522, based in Northwich, Cheshire. A friendly, active diving club. Compressor for air and Nitrox fills. RIB stored in Anglesey. www.hartfordscuba.co.uk (67287)

Hereford Sub Aqua Club, is looking for new members. Regular diving off the Pembrokeshire coast on own RIBs. Training and social nights. Contact: rusaqua@googlemail.com (69146)

HGSAC, South Manchester based friendly, non-political club welcomes newcomers and qualified divers. Lots of diving and social events. Family. Three RIBs and compressor. www.hgsac.com (68501)

High Wycombe SAC. Come and dive with us - all welcome. Active club with RIB on South coast. Contact Len: 07867 544 738. www.wycombesubaqua.com (69131)

HUGSAC - BSAC 380. Experienced club, based around Hertfordshire, with RIB on the South coast. Members dive with passion for all underwater exploration. All agencies welcome. www.hugsac.co.uk (63275)

Ifield Divers. Crawley-based club. Twin engine dive boat with stern lift in Brighton Marina. Training for novices, diving for the experienced - all qualifications welcome. www.ifield-divers.org.uk Email: info@ifield-divers.org.uk or tel: 01883 731532. (64514)

Ilkeston & Kimberley SAA 945, between Nottingham and Derby, welcomes beginners and experienced divers. We meet every Friday night at Kimberley Leisure Centre at 8.30pm. Contact through www.iksac.co.uk (68559)

K2 Divers, covering West Sussex/Surrey. A friendly BSAC club, but all qualifications welcome. Training in Crawley, boat at Littlehampton. Email: k2divers@yahoo.co.uk or tel: (01293) 612989. (68335)

Kingston BSAC, Surrey. Two RIBs, clubhouse and bar, active dive programme, two compressors, Nitrox, Trimix, full training offered at all levels. All very welcome. www.kingstonsac.org or tel: 07842 622193. (69176)

Lincoln - Imp Divers. Small, friendly, non-political diving club with our own RIB are looking to welcome new and experienced divers. Contact Richard: 07931 170205. (69383)

Lincoln and District BSAC. Active club with own RIB, compressor and other facilities. Regular trips and training. www.lincolndivingclub.co.uk (69336)

Lincs Divers BSAC 1940. Friendly, active dive club offering dive trips and training for new/experienced divers. Lincoln based. www.lincsdivers.co.uk

Llantrisant SAC, two RIBs, towing vehicle, welcomes new and experienced divers. Meet at Llantrisant Leisure Centre 8pm Mondays. Contact Phil: (01443) 227667. www.llantrisantdivers.com (68519)

Lutterworth Dive Club, active, social, friendly. Own RIB, regular trips. Welcomes qualified divers, any agency. Training at all levels. Most Tuesdays, Lutterworth Sports Centre, www.lsaac.co.uk (70043)

Leeds based Rothwell & Stanley SAC welcomes new and experienced divers, full SAA training given. Purpose built clubhouse with bar, RIB, compressor. Meet Tuesday evenings: 07738 060567 kevin.odd@talktalk.net

Mansfield and District Scuba Diving Club. www.scubamad.co.uk. Sub Aqua Association - club 942, 8 Beech Avenue, Mansfield, Notts. NG18 1EY. (71643)

Manta Divers, Norfolk wreck & reef diving. Small, friendly, experienced club. All agencies welcome. SAA training. www.mantadivers.org (64088)

Mercian Divers (BSAC 2463) Active & Friendly club. New, experienced & junior divers welcome. Own RIB. Based in Bromsgrove, West Midlands. Tel: 01905 773406 www.mercian-divers.org.uk (65391)

Merseydivers (BSAC 5) Friendly & active club with 2 RIBs & Compressor/Nitrox/Trimix. Meeting every Thursday 7pm till late. All divers welcome. www.merseydivers.com or call Steve on 07570 015685.

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JO CAIRD has a beef. Too few drysuits are made to suit smaller women, and those that are produced can be difficult to buy or hire. Why, she asks on behalf of all petite female divers, should they have to pay more for a product that never quite seems to fit the brief?

Time to give 'cold shaming' the cold shoulder

FEEL THE COLD WHEN DIVING.

I used to be embarrassed about this fact. These days, however, I refuse to be shamed for something that is outside my control, and bears no relation to my skill or conscientiousness in the water.

When point-scoring dive professionals scoff at my decision to wear gear that they regard as excessive for the conditions – it happens on almost every trip – I simply shrug off their snide remarks.

So what if I choose to wear an undersuit in 23°C water? As long as I have the necessary experience and skill to dive with that particular kit – easily checked with a quick flick through my logbook – what is it to anyone else what I wear?

I wouldn't berate a divemaster for opting for fins that cost more than I earn in a month. Why should he – and it does tend to be men that are the worst culprits here – feel that it's appropriate to comment on my gear choices?

I wrote about the misogyny lurking at the heart of macho dive culture for these pages back in 2012, citing various incidents – sleazy glances or sexist language, for example – that made me feel unwelcome in this world.

The belittling I have experienced in relation to what I choose to wear while diving can feel like a further expression of that macho culture.

It's not only female divers who feel the cold, of course. And there are plenty of women for whom low temperatures aren't a problem at all.

But you're more likely to feel the cold as a woman, because body size is a major factor in how we experience temperature, and women tend to be smaller than men.

I'VE BEEN DIVING for long enough now that this "cold shaming" is nothing more than a minor irritation.

But those newer to diving – women and men both – could easily be intimidated into making equipment choices that will negatively impact their dive experience, and that of their buddy. It also risks putting them off altogether.

Leisure-diving is about enjoyment, and it's hard to enjoy yourself when cold. I've ended coldwater dives early several times because I simply wasn't having enough fun to make it worth continuing.

I'm comfortable doing that, as I know that my buddy will be understanding, but not everyone is in that position.

If you're buddying up with strangers you might be more inclined to dive outside your comfort zone to avoid disappointing them by finishing a dive earlier than planned.

And that way danger lies – hypothermia, where the body's core temperature drops below 35°C, is a potentially life-threatening condition if not treated quickly.

Let's imagine this particular problem



STEVE PRETTY

solved – that we live in a world where no one judges anyone else on their dive-gear. A major issue remains: which dive-gear is available to whom.

A quick tally of the drysuits available at a leading diving e-store reveals seven for men, five for women, three that don't specify, and six that are made to measure.

Not too bad, you might think – a fairly even gender split. Except that the unisex suits are always going to be a much better fit for men, because the male body is the default when it comes to design.

A bespoke drysuit is clearly the most desirable option but convenience comes at a price: up to double that of an off-the-peg suit.

So if, like me, you're a woman in the market for a new drysuit, with a budget of under £1000, you have only three options to choose between, while a man with the same amount to spend has six options.

I understand that dive-stores and drysuit manufacturers are only responding

to the market. Women made up just 38% of total PADI Open Water Diver certifications in 2018.

Even if all those women all took up drysuit diving – and that's a big "if" – the drysuit market is still going to be dominated by men.

But it's hard to see how demand for women's drysuits can be expected to grow when this lack of options functions as a disincentive to embracing diving at lower temperatures.

THE SITUATION IS compounded by the fact that it's rare to find drysuits available for hire. Very few dive-centres stock them, understandably opting for semi-dry wetsuits instead for cost reasons.

Plenty of divers will be fine in a semi-dry. But for those of us who feel the cold, a semi-dry just isn't going to cut it.

Essentially, if you want to dive in coldwater destinations, you need to bring your own kit.

As already discussed, that's a bigger hurdle for women than it is for men. Not surprising therefore, that coldwater diving remains largely the preserve of male divers.

Since buying my first drysuit five years ago I've dived in it in Egypt, Spain,

Gozo, the Canaries, Canada, the Faroes and here in the UK.

Had I been travelling at high season, when water temperatures were highest, I would have been fine in a wetsuit in most of those destinations.

By diving at low season, however – possible only in a drysuit – I was able to take advantage of cheaper deals.

Furthermore, on a lot of those trips my buddy and I were pretty much the only divers in the water.

Put simply, I've had better dive experiences through owning a drysuit.

EQUALITY OF ACCESS to coldwater dive gear obviously matters most to those of us who feel the cold, but it should matter to everyone else too.

Widespread availability of equipment opens up more diving in more destinations to more divers. That's something we can all agree is a good thing. ▣

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