BRINGING UP THE PAST: FIELD DAYS FOR ARCHAEOLOGICAL DIVERS

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FIRST IN

I LASTED ONLY 60 MINUTES on my university archaeology course. The professor was outlining what the future held for our small group and, looking round at the others, I decided that I couldn't face spending the next three years digging out muddy trenches with them.

They probably thought the same about me, but I'm not proud of the fact that after that seminar I went straight off to switch courses. I clearly wasn't sufficiently committed to the subject, and 18-year-olds often tend to act impulsively.

I might not have wanted to get my hands dirty at the time, yet I've always been fascinated by the echoes of the past conjured up by archaeologists with more grit.

I certainly wasn't aware then that underwater archaeology was a thing, and just how exciting it might be to combine excavations with diving. But a huge amount seems to have been going on in this field recently, and one story I heard as we were going to press sums up that excitement for me.

STEVE WEINMAN, EDITOR

Centuries ago, it seems, when so many folk were illiterate, ships would carry their name on the stern transom in the form of an engraved picture, along with the date the ship was built.

We think of ship's bells as a key identifier but on older vessels these transoms would do that job for divers – if they survived. Being timber they rarely do, of course, though it is possible in seas such as the Baltic: cold, dark and with low salinity.

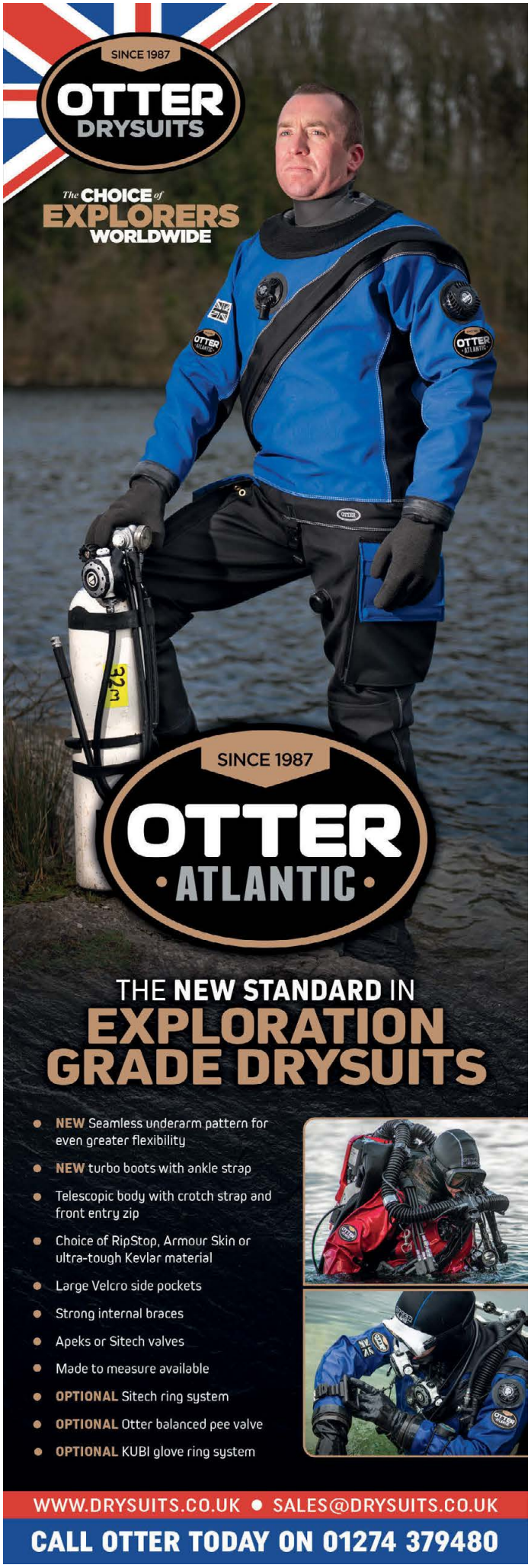
LAST SUMMER WE REPORTED on how a group of Finnish technical divers called Badewanne had found an incredibly well-preserved Dutch-style *fluyt,* upright and much of it intact. Working 85m down they could see that the top part of the transom had fallen to the seabed, but they didn't dare to disturb it for fear of damaging it.

Recently they returned to the site, following discussions with maritime archaeologists, and succeeded in safely flipping that transom. And it must have been one of those thrilling moments that makes all the hard work worthwhile when the flip revealed an engraving of a long-necked bird and four numerals. The ship was the *Swan* and the date 1636.

We celebrate such moments this month with a variety of stories of archaeological endeavour. Our cover feature concerns a group of Russian divers we have met before – their finding of the spearhead shown led to the solving of a 470-year-old mystery. We also visit the incredible Phoenician wreck-site off Malta, where rebreather divers toil at a depth of 110m to investigate one of the world's oldest ships.

And in *News*, in chronological order, we have a Neolithic cup find in Scotland, an ancient Egyptian galley destroyed by a falling temple, an 18th-century ship hidden in plain sight in Antigua, plans to finally nail Shackleton's *Endurance,* and bell finds on WW2 ships.

Do I regret the decision I made all those years ago? No, because I wasn't cut out to be an archaeologist. What I do enjoy is letting them do the hard graft and hearing the tales they have to tell.



DIVER

the magazine that's straight down the line…

SEPTEMBER 2021 Volume 66 No 9

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.

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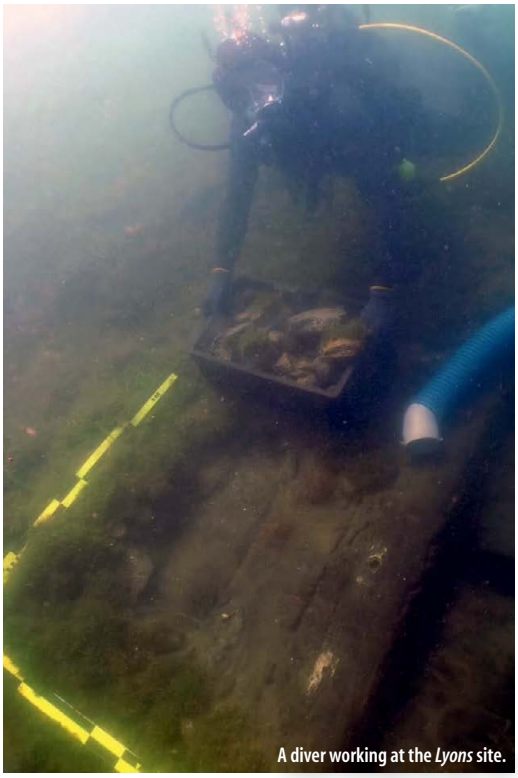
Antigua shipwreck could prove unique


A diver working at the *Lyons* site.

JEAN-SEBASTIAN GUIBERT

A SHALLOW 18TH-CENTURY wreck discovered off the Caribbean island of Antigua could be the only French East India Company ship with an intact hull left in the world, according to maritime archaeologists.

The 40m-long wreck lies less than 3m beneath the surface in Tank Bay on the island's south coast, at the entrance to the historic Nelson's Dockyard in English Harbor, a UNESCO World Heritage Site.

Its timbers appear to have been well-preserved by a layer of mud, and although the area is well-used the remains have escaped attention for more than 200 years.

A hydrographic survey some years ago had indicated that something might be concealed by the mud, and a local diver had reported seeing what appeared to be a timber rib, but it was only this June that French government funding enabled a six-day survey to be carried out.

Underwater archaeologists from the University of the French Antilles in Martinique led by Jean-Sebastian Guibert visited the site in collaboration with Antigua & Barbuda National Parks Authority. They used side-scan sonar and a magnetometer to pinpoint the area of interest before diving to inspect the wreck.

They found intact hull timbers and stone ballast, though were not expecting to find any artefacts if their theory about the ship's identity was correct – because its contents would have been stripped out by slaves before the sinking.

It is thought to be the *Lyon*, originally named *Beaumont* when the 900-tonne armed merchant ship was built in 1762.

It was one of many French East India Company vessels designed to compete with British and Dutch merchant fleets in south-east Asia.

The *Beaumont* served in the French navy for two years before being bought by a private merchant and renamed *Lyon*. During the American Revolution she was captured off Virginia by HMS *Maidstone* and was known to have been brought to Antigua in a badly damaged state, though her fate was not recorded.

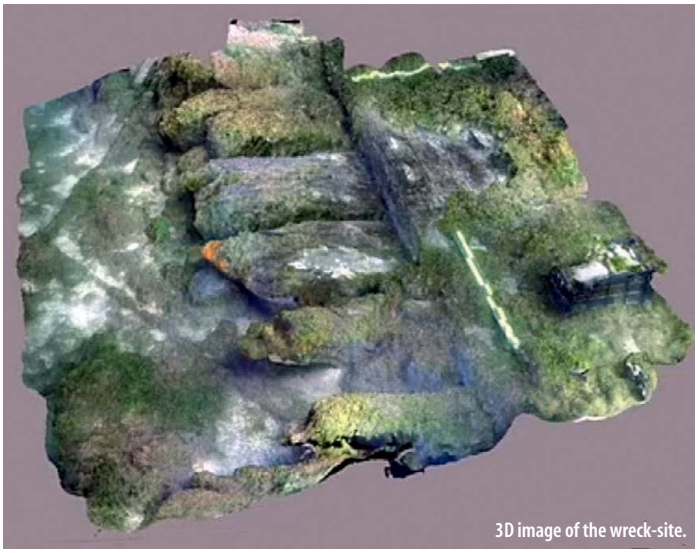
Guibert told the *Antigua Observer* that the discovery was "like hitting the jackpot… it's the largest wreck I've ever seen".

The case for the wreck being the *Lyon* was circumstantial but "compelling", parks authority archaeologist Dr Christopher Waters told the paper. He said that a 1780 map of the dockyard found in archives in London suggested that a French warship could lie at the site, and described the wreck's scale as significant because most such sites were of small merchant ships.

"This one is comparable to – if not quite – the *Mary Rose*, in terms of its size and the stories we may be able to tell of it," he said. "It's a mystery why it lay there for several hundred years and no one knew about it."

He said he had often snorkelled at the site and had sonar-scanned in the area but had "missed it every single time".

The team will continue to survey the site, while analysing the timbers and ballast recovered. ■


3D image of the wreck-site.

JEAN-SEBASTIAN GUIBERT


Endurance battling the ice.

FRANK HURLEY / STATE LIBRARY OF NSW

NEW EXPEDITION TO FIND SHACKLETON'S

A NEW SEARCH for Sir Ernest Shackleton's *Endurance*, the ship that disappeared under ice in the Weddell Sea in Antarctica in November 1915, is to begin next February.

Organised and funded by the Falklands Maritime Heritage Trust (FMHT) the Endurance 22 expedition will be led by Dr John Shears with maritime archaeologist Mensun Bound. 2022 sees the 100th anniversary of Shackleton's death from a heart attack in South Georgia, on 5 January, 1922.

Six years earlier *Endurance* had become trapped, stranding Shackleton and his crew and eventually sinking after 10 months of being crushed by sea-ice.

The crew escaped on foot and in lifeboats and famously, under Shackleton's leadership, survived their long ordeal.

They had recorded the ship's position and the wreck is now believed to lie around 3km deep.

A previous attempt by Shears and Bound to locate and survey it in 2019 aboard the South African research and supply ship *Agulhas II* had to be abandoned because of encroaching sea-ice and the loss of an AUV.

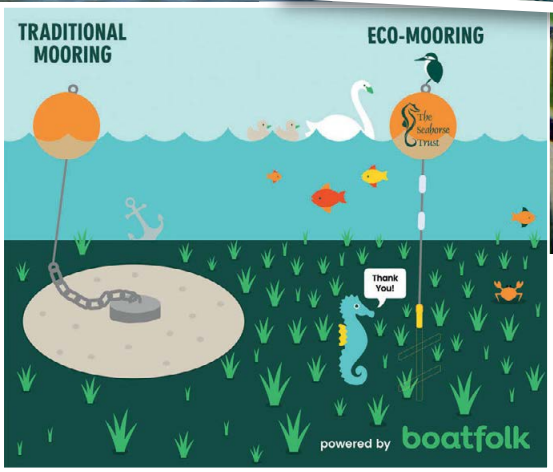
The 50-strong team now plan to use *Agulhas II* again and to deploy hybrid Saab Sabertooth AUVs equipped with HD cameras and side-scan imaging capability.

These can scan and map seabeds in real time down to 4km, says the FMHT.

If sea-ice should again prove problematic, the plan is to pitch one or more ice-camps and to

NEIL GARRICK-MAIDMENT / THE SEAHORSE TRUST

Eco-moorings can protect Studland's seahorses



CONSERVATIONISTS including scuba-divers have joined forces with the boating community in a bid to save the underwater environment of Dorset's Studland Bay.

The Seahorse Trust and boatfolk, a national marina group, are working together on a non-profit scheme to place an initial 10 "eco-moorings" – an environmentally friendly alternative to the damaging practice of dropping anchors in the bay.

The method involves a helical screw anchor being driven into the seabed, with an elastic rode or cable connecting it to the mooring buoy.

The rode stretches at higher tides and contracts at lower tides, preventing any of the equipment scouring the surrounding seagrass.

Boaters no longer need to drop their own anchors, which can often drag before taking hold.

Each eco-mooring costs around £2000, but it is hoped that funds will be available to install up to 100 in the next few years, possibly with the help of sponsors. West Country restaurant group Rockfish sponsored one of the initial 10 eco-moorings.

Studland's seagrass is a breeding ground for spiny seahorses, which are protected under the Wildlife & Countryside Act. The area was designated a Marine Conservation Zone (MCZ) in 2019, with the aim of returning both seagrass and seahorses to "favourable condition". The scheme has been approved by the Marine Management Organisation.

Seagrass meadows provide essential habitat for species such as seahorses but also store up to twice as much carbon per hectare as forests, helping to counter the negative effects of global warming.

"I am delighted to be working with boatfolk to develop a practical solution that allows boaters to continue enjoying this remarkable site, in a way that also enables the conservation of rare seagrass meadows and crucial seahorse breeding grounds," said diver and Seahorse Trust executive director Neil Garrick-Maidment.

"boatfolk is all about making it easy for people to get out on the water and to enjoy their time afloat," said the group's MD Michael Prideaux.

"Providing an alternative option at Studland that protects this incredible marine environment is about doing the right thing for boaters and for our planet.

"Financial return is not an objective here; we are committed to making Studland Bay a sustainable boating destination for generations to come."

The initiative forms part of a boatfolk sustainability strategy called Coastline Deadline. ■

DOOMED ENDURANCE SET FOR FEBRUARY

drill holes through which the AUVs can be lowered.

The wreck is expected to be "lying on flat terrain that has been undisturbed either by erosion or by underwater landslides," says Bound, adding that sediment "has probably been falling at a rate of less than 1mm a year."

Bound has a long history of success in locating and surveying lost shipwrecks. Most recently in 2019 he led a five-month search in the Southern Ocean for Graf von Spee's lost WW1 fleet and located the wreck of the armoured cruiser *Scharnhorst* 1.6km deep, as reported in DIVER.

The *Endurance* is designated a Historic Site & Monument, so any investigation has to be non-intrusive.

A primary aim is to find items of equipment that Shackleton was forced to abandon, particularly a below-decks biology laboratory containing a microscope and sample jars.

The team also hope to determine what happened to the expedition diary of ship's surgeon Alexander Macklin – and whether or not the ship broke in two on hitting the ocean floor.

"The 2019 Weddell Sea Expedition came so close to finding *Endurance* and I'm confident that we have learnt the hard lessons from our past experience," says Dr Shears.

"After two years of meticulous planning for the new mission, I believe we have a great chance of finally finding the wreck deep under the ice… if we do locate *Endurance*, it will be a fantastic moment." ■

ROYAL GEOGRAPHICAL SOCIETY

Endurance sinking in November 1915.

DAAN VERHOEVEN

Alenka Artnik dives on Day 7…

…rival Alessia Zecchini triumphant on Day 3.

DAAN VERHOEVEN

Five freedivers – 12 world records

NO FEWER THAN 12 world freediving records were broken during the nine-day Vertical Blue international competition at Deans Blue Hole in the Bahamas, with some marks switching back and forth between competitors during the event.

Among the women, Alessia Zecchini (Italy) and Alenka Artnik (Slovenia) set three records each and Alice Modolo (France) one.

For the men, Alexey Molchanov (Russia) made three world-record dives in different disciplines while Arnauld Jerald (France) set two records on his first appearance.

Four of the records were broken on the first day of competition, 13 July, which was when Molchanov dived to 126m in the Free Immersion (FIM) discipline in a time of 4min 45sec.

In FIM the diver uses a line but weight must stay constant and no fins are used.

Back-to-back women's records followed from Zecchini and Artnik in Constant Weight (CWT), with Zecchini's 115m (3min 22sec) being outdone minutes later by Artnik's 118m dive, carried out in 3min 26sec.

But Zecchini would roar back on day 3 with a new world record in Constant Weight No Fins (CNF) to a 74m depth in 3min 2sec, in a dive she dedicated to her friend and previous record-holder the late Sayuri Kinoshita of Japan.

The CNF discipline is described as the purest in freediving, with the competitor touching the line only at the turning point.

The final world record of the first day came from 25-year-old Jerald, who gained the Constant Weight Bi-fins (CWTB) record in his first appearance at the event.

His 116m dive took 3min 30sec, but he was to do even better on day 4, when he reached a depth of 117m in 3min 35sec. This was one of another four world records set on 17 July.

Artnik outdid her 118m CWT record of day one by diving to 120m in 3min 33sec, making her one of the top five deepest humans in the discipline.

"Not many men can dive that deep and the number is really crazy!" she said. "It's hardcore but I was just following my progress and I knew exactly what to do and it makes me really happy." On Day 7 she would be even happier, after achieving a depth of 122m in 3min 34sec.

Another of that five-human elite, Molchanov, reached 131m in CWT in 4min 33sec, also on day 4, to beat his own record.

The final day 4 world record went to Zecchini, who managed 101m in FIM in 3min 40sec.

On day 5 (18 July), Modolo became the first French woman to realise a freediving world record.

Her 95m CWTB dive lasted 3min 12sec, was a personal best and took away Artnik's crown.

"In France, it has always been all about the boys, but perhaps now they will realise that the women are also strong, beautiful divers who have so much to contribute – they can learn quite a lot from us," said Modolo, who only recently decided to step away from her career in dentistry to focus on her freediving. "I am so proud of all that the ladies have achieved at Vertical Blue 2021," she said.

"It is an honour to follow in the footsteps of Alenka Artnik, who held this bi-fins world record before me."

On day 8 the irrepressible Molchanov did it again when he capped Jerald's two CWTB records with one of his own, reaching his target 118m in 4min 38sec.

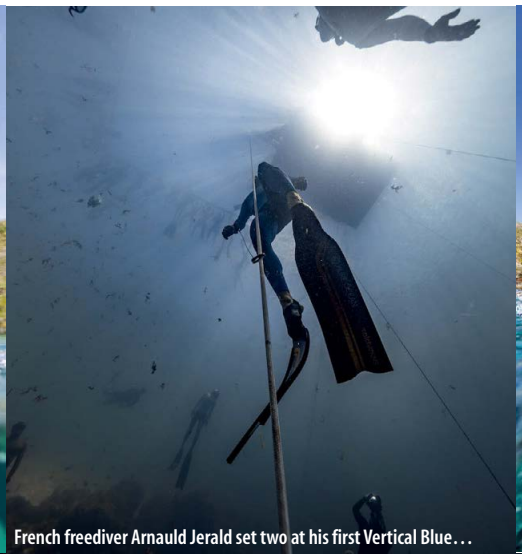
"I am very happy to have been able to take the bi-fins record deeper… I want to fine-tune some things to make the descent more streamlined, and to quicken the rate of my descent but I know what to adjust and I will," said Molchanov, already looking towards his next record bid.

An additional 53 national records were also set at Vertical Blue.

The event is judged by world governing body AIDA International and has been held annually since 2008, organised by freediver William Trubridge. The UK was not represented at this year's event.

DAAN VERHOEVEN

It was three world records for Russia's Alexey Molchanov.



French freediver Arnauld Jerald set two at his first Vertical Blue…

… as Alice Modolo became first French female world champion.

DAAN VERHOEVEN

Study shows freedivers outdo seals on deep dives


ERIC MULDER / MID SWEDEN UNIVERSITY

ELITE FREEDIVERS diving unaided in open sea have brain oxygen levels even lower than seals during their deepest dives, according to new research carried out at the University of St Andrews.

The divers tested reached depths of 107m and were measured exhibiting the sort of brain oxygen levels normally expected to induce unconsciousness, and heart rates as low as those of seals, whales and dolphins while in the water.

The new findings will help scientists to understand the physiology of marine mammals and to seek new ways to treat human cardiac patients, and also to increase the safety of freedivers, says the university.

Understanding how freedivers condition themselves to tolerate bouts of extremely low oxygen and brain oxygen delivery could help in developing pre-treatments to boost brain and heart protection during cardiac surgical procedures.

It could also help with therapies to apply following a heart attack.

"Before now, understanding the effects on these exceptional divers' brains and cardiovascular systems during such deep dives, and just how far these humans push their bodies, was not possible, as all research was done during simulated dives in the lab," said project leader Prof Erika Schagatay of Mid Sweden University.

She has researched freediving for three decades.

"The diver can reach a point where hypoxic black-out occurs, and the diver then needs to be rescued. One of the main aims of the research is to warn the diver and safety personnel of an imminent black-out."

This would be achieved by using a wearable biomedical device. For their research the team created one that works similarly to a smartwatch, using LEDs touching the freedivers' skin to measure heart-rate, blood volume and brain oxygen levels.

It was developed from an existing device using near-infrared spectroscopy developed by Dutch collaborators Artinis Medical Systems, but modified to withstand deep open-water dive pressures.

"The divers showed exceptional physiological responses during their dives," said lead researcher Dr Chris McKnight of St Andrews' Sea Mammal Research Unit.

"We measured heart rates as low as 11 beats per minute and blood oxygenation levels, which are normally 98% oxygenated, drop to 25%, which is far beyond the point at 50% at which we expect people to lose consciousness, and equivalent to some of the lowest values measured at the top of Mt Everest.

"Beyond the exceptional physiological responses that freedivers display and the extremes they can tolerate, they may be a very informative physiological group," said Dr McKnight. "Our instrument now allows us to study unique physiological responses while these incredible athletes do their maximal performances."

The team told **DIVER** that for now the wearable would be for research purposes only but that in future "one could think of commercial viability and integration into dive-watches to improve and monitor performance".

The study is in *Philosophical Transactions of the Royal Society B.*

Diver's $100k find runs in the family

A US SCUBA-DIVER has discovered a rare gold coin at 9m – the first to be recovered from Florida's 17th-century Spanish galleon shipwreck *Nuestra de Atocha* for 20 years.

Zach Moore was diving from the Mel Fisher's Treasures salvage vessel *JB Magruder* on 16 July, using an underwater metal detector. His find is believed to be worth US $98,000 or more.

Moore's father Bill was part of the crew that discovered and recovered what the divers term the *Atocha's* "motherload" in 1985. On one single dive they found 75kg of gold finger bars, chains, and discs.

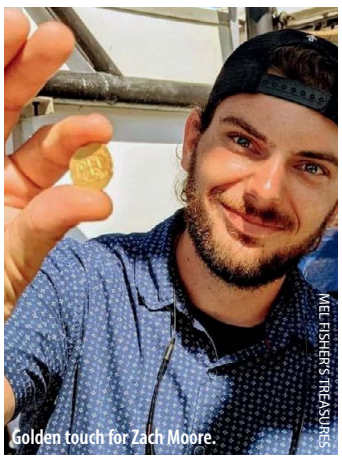
They would find 121 gold coins, but these had dried up by 2001.

Bill Moore also worked as chief conservator of the 1715 fleet at Mel Fisher's Treasure Museum for many years, and his wife Julie, Zach's mother, was another *Atocha* diver, recovering a number of emeralds from the wreck.

Zach Moore has previously worked on the 1715 Fleet wreck-site off Vero Beach, where he found a rare silver pendant and a rosary with a figure of Christ, which he conserved with his father.

Guinness World Records has recognised the *Nuestra de Atocha* as the world's most valuable shipwreck. When it sank in 1622 it was carrying in today's terms some $400 million worth of gold, silver, gems and other valuables from the New World to Spain.

The *JB Magruder*-based 10-day search also turned up two silver coins and a musket-ball.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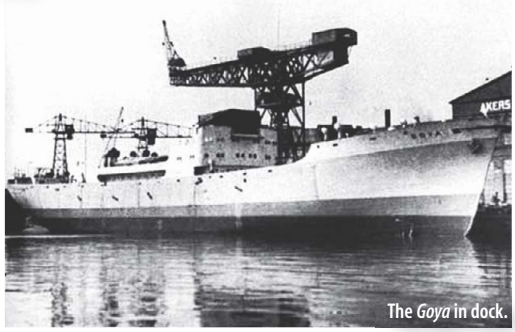
MAREK CACAJ / BALTICTECH

The ship's bell that clinched identification of the *Franklin*.

Smaller dinner bell on the *Goya*.

MAREK CACAJ / BALTICTECH

Baltic divers find two deep 'Hannibal' bells



The *Goya* in dock.

DIVERS WITH the technical group Baltictech have located the wreck of the steamship *Frankfurt*, a vessel involved in one of the world's biggest maritime evacuations.

Operation Hannibal involved evacuating more than a million German troops and East Prussian civilians during the first five months of 1945 towards the end of WW2, in the face of advancing Soviet forces.

The Germans lost 247 vessels during the operation, and Baltictech says that in 2020 it set itself the objective of finding the last five still undiscovered. Last year they found the first of these, the *Karlsruhe*, at a depth of 88m, as reported in **DIVER** (*News*, November).

Sunk by Soviet aircraft off the Polish coast, it had been the last vessel to leave Koenigsburg. The divers found at the wreck-site a number of crates with unknown contents, raising the possibility that they might contain parts of the priceless Amber Room looted from the Catherine Palace near St Petersburg. They have been awaiting the opportunity to return to investigate further.

The *Frankfurt* was also sunk by Soviet aircraft but the month before the *Karlsruhe*, on 22 March. It was not carrying any cargo and all those aboard were reported to have survived. The divers located the wreck 40 nautical miles north of Rozewo in north-western Poland at a depth of 82m, and were able to confirm its identity after finding the ship's bell.

"Wreck is in good condition, stern slightly buried in the bottom," reported the team.

"The rest is heavily settled but it looks beautiful. The unit is 'militarised', meaning it has nests of anti-aircraft guns on the bow and stern."

The remaining three vessels the divers hope to find are the auxiliary cruiser *Orion*, sunk by aircraft on 4 May, and the cargo ships *Baltenland*, torpedoed on 27 December, 1944, and *Gerrit Fritzen*, bombed during an air-raid on 12 March.

Only 10 days after finding the *Frankfurt*, the Baltictech divers came across another bell on an already located Operation Hannibal wreck, the *Goya*, which lies 76m deep.

The *Goya* was a Norwegian motor cargo ship pressed into service as a troop transport for the Kriegsmarine.

Attacked by Soviet submarine *L-3* while packed with refugees on 16 April, 1945, her sinking was one of the biggest maritime losses of life in history, with only 183 survivors from some 6700 passengers and crew.

The *Goya* has been dived since 2002, but the divers came across the bell while carrying out a regular wreck inventory in co-operation with Poland's National Maritime Museum in Gdansk and Maritime Office in Gdynia. Recreational divers are normally forbidden to dive within 500m of the war grave.

The wreck is said to remain in good condition, preserved by the cold Baltic waters. "This time we focused on the stern part and cargo bay," said the team. "On the way back we swam through the mess-hall, where Jacek Kapczuk saw and Marek Cacaj filmed a small bell on the floor."

It wasn't the ship's bell, but a smaller one used to summon crew for meals. "Nevertheless, our hearts beat faster," said the divers. The bell was left where it lay on the wreck.

DIVE-BOAT SINKS IN FLORIDA

INVESTIGATORS WERE trying to determine why a packed dive-boat sank suddenly off Florida's Atlantic coast on the afternoon of 18 July.

Crews from nearby diving and fishing vessels rushed to the scene to pick up the *Safari Diver*'s 13 occupants when it went down.

The 10m charter-boat had been carrying 11 divers, including locals and tourists, along with two crew.

It was about two miles off Pompano Beach in the south-east of the state when it started taking on water at the stern.

Nearby crews saw what was happening and were able to pick up the crew and divers, who had all been forced to jump into the sea.

Coast Guard and Florida Fish & Wildlife Conservation Commission also responded to an emergency call as the vessel sank within a minute to a depth of around 20m.

It was the smallest of three boats run by South Florida Diving Headquarters, a dive-centre at the Sands Harbor Hotel & Marina.

A single-engined Crusader with capacity for 12 divers, the dive-centre described *Safari Diver* as "very stable" and "a favourite among tech divers because the platform is very close to the water".

The owners told press that there had been no apparent problems with the vessel before it departed.

There were unconfirmed reports that it had run over and become tangled with its own anchor-line.

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Divers leave 'dirty wreck' virtually clean

MARK MILLBURN

Last clean: Dive-team with Atlantic Scuba's *Moonshadow*.

VOLUNTEER DIVERS have finally succeeded in clearing ghost-fishing gear from what had long been referred to as the "dirty wreck" of the *Epsilon* in Cornwall's Falmouth Bay.

The large-scale clearance required some 10 dedicated trips over two years in a collaboration between local dive operator Atlantic Scuba and marine-conservation and ghost-gear recovery charities Fathoms Free, Ghost Fishing UK and Neptune's Army of Rubbish Cleaners (NARC).

WW1 casualty the *Epsilon* sank in 1917 after hitting a mine laid by the German U-boat *UC-17*. The steamer had been carrying maize from South America to the Netherlands.

More than 2 tonnes of net, pots and ropes have been recovered from the 24m-deep wreck to be recycled or safely disposed of, according to Mark Milburn of Atlantic Scuba.

A dive on 10 July was said to have removed the last medium-to-large pieces, leaving only remnants that were inextricably embedded.

"As a regular diver of the *Epsilon* with Atlantic Scuba, it's great to see the wreck is finally clear of ghost-gear," said Luke Bullus of Fathoms Free. "Clearing the wreck has been a great collective effort from all involved and it will be interesting to see if more lost and abandoned nets etc appear on the wreck in the future.

"Really looking forward to being able to spend more time taking photos of the abundance of marine life found on the wreck, rather than filling a mesh-bag of ghost-gear on every dive!"

"We are now in the position to have a cleared site to monitor closely and any changes can be documented and investigated for their origin," said Fred Nunn of Ghost Fishing UK.

"Plus, it is one of my favourite local wrecks, so that's a bonus!"

"As one of the most-dived wrecks in Falmouth Bay, the quantities of nets lying around it made it a less pleasant experience," added Milburn.

"Every time we took divers there, they always commented on the large amount of nets. We had been picking away at it for a while but with Fathoms Free and Ghost Fishing UK spending days on site, it certainly made it happen much faster. "Our divers will be keeping an eye out, in case any more ghost-fishing gear turns up."

GHOST FISHING UK

An early *Epsilon* clean by Ghost Fishing UK.

Scottish diver finds Neolithic cup in loch

CHRIS MURRAY

A SCUBA-DIVER has discovered an almost-intact 5500-year-old bowl or drinking cup in the muddy shallows of a loch on the Isle of Lewis off western Scotland.

Chris Murray has discovered other Neolithic bowls in the Outer Hebrides, as reported in DIVER (*News,* September 2019), though they had been decorated and some were scallop-shaped.

For the past 10 years he has specialised in diving and searching stone-built *crannogs* or artificial islands predating Stonehenge or Egypt's Pyramids by more than a millennium.

Murray found the vessel just over a metre down, after seeing a fragment protruding from the muddy lakebed, but it took him around 20 minutes to dig it out.

He also recovered 40 broken pottery shards from the loch.

Murray, a former Royal Navy diver and Coastguard rescue helicopter winchman, has made finds in Lochs Arnish, Langabhat and Borgastail on Lewis but the location of his latest discovery was not disclosed.

His discoveries have resulted in the *crannogs* being backdated by some 3000 years.

The stone islands had previously been thought to date back no further than around 800 BC, during the Iron Age, but the finds appear to date as far back as 3700 BC, and to have remained in use for some 2500 years.

Archaeologists have speculated that they might have been used for social gatherings or as burial sites. The vessels are thought to have been placed in the water deliberately.

RARE FLAPPER SKATE HIGHLIGHTS VALUE OF ENFORCED MPAS

ROV FOOTAGE captured in Loch Melfort on Scotland's west coast has identified an important nursery ground for the rare flapper skate, listed as Critically Endangered.

It's only the second such area confirmed around the Scottish mainland, divers having helped to identify a similar site in the Inner Sound of Skye marine protected area.

Loch Melfort lies in the Loch Sunart to Sound of Jura MPA. Environmental charity Open Seas used its "ClamCam" to video 20 egg-cases, and says that both finds demonstrate the effectiveness of seabed protection.

The cases, also known as mermaid's purses, take 18 months to hatch, so are vulnerable to bottom-trawling and dredging in unprotected areas.

Flapper skate can grow to 3m long. Loch Melfort banned trawling and dredging in 2009 and became an MPA for flapper skate seven years ago.

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Dive-centre fined after poisoning schoolboy divers

GREATER MANCHESTER dive-centre Aqualogistics has been fined but its director has avoided a jail sentence, after a health & safety breach led to the carbon monoxide poisoning of schoolboys during a scuba-diving class at Manchester Grammar School.

The incident occurred on 26 June, 2017 and was reported at the time in **DIVER** *News*.

Both Aqualogistics Dive Training Centre of Stockport and its director Geoffrey Shearn, from Frodsham, pleaded guilty to breaching the Health & Safety at Work Act, at a hearing at Wigan & Leigh Magistrates Court in late July.

The dive-centre was fined £9300 with £11,000 costs, while Shearn was ordered to carry out 100 hours of unpaid work under a 12-month community order, and to pay more than £5000 in costs, according to a report on the proceedings in the *Manchester Evening News*.

A dive-school called VU Diving had been conducting a week-long scuba diving course led by an experienced instructor as part of the Fallowfield school's activities week. The pupils were provided with dive-kit, with Aqualogistics supplying air cylinders.

Twelve pupils were taking part in a class in the school's pool, but boys started feeling ill soon after entering the water, said Mark Monaghan for the prosecution. One was found lying unconscious face-down and had to be pulled out by the instructor.

The school nurse gave the pupil oxygen until an ambulance arrived.

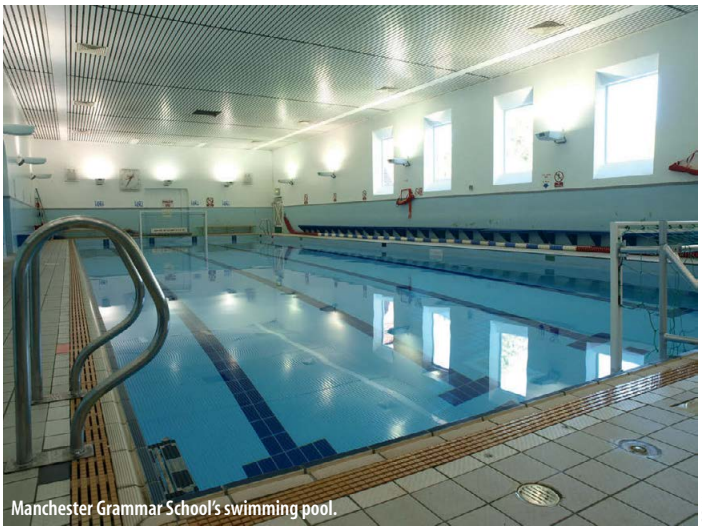
Another boy who became agitated was assisted from the water but then stopped breathing.

These two along with six others were taken to hospital to be treated for carbon monoxide poisoning.

The injuries to one, described as "life-threatening", required him to be placed into an induced coma.

One victim, now aged 19, stated that the last thing he remembered was being unable to breathe or see. He had continued to suffer headaches since the incident took place four years ago.

Eight of the cylinders subsequently tested were found to contain high levels of CO. Health & Safety Executive (HSE) investigators also found high CO levels in the compressor used to fill the tanks when they inspected Aqualogistics' centre.



Manchester Grammar School's swimming pool. MGS

The contamination was said to have followed a fire that had occurred in the filtration system, with a cut-off sensor failing to operate.

Shearn had modified the compressor two years earlier in an attempt to overcome moisture problems, though in mitigation this had caused no problems in that time, said Andrew McGhee for the defence.

He said the cause of the fire was unknown but the event had not been foreseeable and "no risk was run, or recklessly run".

Describing Aqualogistics as a "hugely conscientious" company that had supplied the diving trade for more than two decades without issues, he said there was no evidence of neglect of any "obvious" industry standard. Shearn was an "upstanding professional" who had expressed "genuine and deep remorse".

Judge Mark Hadfield said that although the incident was of the "utmost seriousness" it had been an isolated one, cause unknown.

"Suppliers of breathing air to the diving community and public should ensure that they use correctly installed and maintained equipment accompanied by regular testing of the air supplied," HSE specialist diving inspector Richard Martins told the paper after the sentencing.

"Further tragedy was narrowly averted through the quick response of the school staff, diving instructors and the Manchester emergency services." ■

ANDREA DORIA'S FOGHORN SOUNDS AGAIN – 65 YEARS ON

THE FOGHORN FROM the famed *Andrea Doria* shipwreck has been raised and restored, and was sounded on 25 July in a livestreamed anniversary event at the New Jersey Maritime Museum in Beach Haven.

It was the first time the Italian liner's horn had been heard since it blew on sinking 65 years ago. The 213m ship had collided with Swedish liner the *Stockholm* 100 miles off Nantucket in 1956.

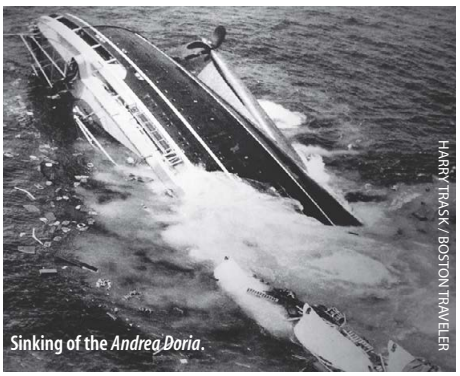
Forty-six of the *Andrea Doria*'s 1706 passengers died, along with five of the *Stockholm*'s crew.

Eight survivors were set to join technical divers, maritime historians and restorers for the 65th anniversary event.

The restored Kockumation horn is 1.2m long and its trumpet 60cm in diameter. Attached to an iron replica of a mast section, it weighs 227kg.

It was discovered in 2016 by a dive team led by Joe Mazraani, captain of the Atlantic Wreck Salvage dive vessel *Tenacious*, which has carried out annual expeditions to the *Andrea Doria* since 2010.

He spotted it beneath the mast and it was brought up the following summer.



Sinking of the *Andrea Doria*. HARRY TRASK / BOSTON TRAVELER

The wreck, which is owned by John Moyer Expeditions, now lies 70-80m deep, having flattened to the seabed as it has deteriorated.

Local salvage laws permitted divers to recover artefacts and the ship's bell, safe, helm and compass are among items that have been brought to the surface, but the wreck has claimed the lives of some 18 divers over the years.

The challenging diving conditions, including strong currents and low visibility, are said to have inspired developments in technical diving.

✷ Another deep and deteriorating north Atlantic liner wreck, the *Titanic*, has been visited by OceanGate Expeditions in the first of a number of planned dives with its five-person *Titan of Titanic* submersible.

The shipwreck was last dived in 2019, when Victor Vescovo's Triton submersible *Limiting Factor* carried out five dives.

OceanGate said it wanted to document rates of decay, examine marine life, map remaining artefacts and develop a 3D image of the entire wreck. It is funding its activities by taking tourists or "mission specialists" paying up to US $150,000 a time on its expeditions.

The 3.8km-deep dives are carried out from support vessel *Horizon Arctic*. OceanGate CEO Stockton Rush piloted the submersible on the first dive while the mission specialist was former French naval commander PH Nargeolet, who had visited the *Titanic* more than 30 times before. ■

Kent diver dies on his 'one last dive' – two others missing

Don Falvey wanted one last dive.

THE FUNERAL HAS been held of a Kent diver who had told friends and family he wanted to do one last dive before giving up the sport because of ill-health – but then died on that dive.

Don Falvey, 60, from Folkestone, "passed away suddenly while doing his lifelong hobby, scuba diving", stated his funeral notice.

The Coastguard had responded to a Mayday call from a dive-boat six nautical miles off Dover shortly before 10am on 1 July, reporting that a male diver was in trouble.

It dispatched vessels from Folkestone and Landon Battery and a search and rescue helicopter from Lydd. The boat was escorted back to Dover Marina where ambulance crews were waiting, but Falvey was declared dead at the scene.

The guesthouse-owner, who was known for his local charity work, had wanted to take "one last dive" following health scares, according to *Kent Online*, but had lost consciousness on ascent. He left a wife and two children.

On the same day in Scotland, a Mayday call was issued from a dive-boat at around 11am after a female diver failed to resurface from a dive.

The call prompted a response from a Coastguard emergency tow vessel and an SAR helicopter from Stornoway. They joined the RNLI's Lochinver lifeboat and nearby vessels to search the area around Kinlochbervie, the most northerly harbour on Scotland's west coast, while police and Coastguard land teams scoured the coastline.

The operation continued for more than nine hours before being stood down as night fell. The search was called off the following day.

And a recovery operation was under way at the end of July for a diver who failed to resurface from a boat-dive off the Isles of Scilly.

Rob Dalby, 55, from West Yorkshire, was reported missing at around 9am on 28 July. A diver with 25 years' experience and some 1500 logged dives, he belonged to the British Sub Aqua Club's West Yorkshire Fire Service Diving Section and the Cave Diving Group. He worked as a green space operational manager for Kirklees Council.

Diving about a mile north-east of Toll's Island on the main island of St Mary's, Dalby is understood to have experienced an equipment malfunction during the dive, and to have become unconscious on the seabed at 38m.

The overall search operation was co-ordinated by Falmouth Coastguard and Devon & Cornwall Police. An underwater search of the area by police divers was impeded by adverse sea conditions.

Police were investigating the incident for a coroner's report.

REEF-WORLD FOUNDATION

'70% of divers touch reef'

IT MIGHT SURPRISE scuba-divers to hear that 70% "contact the reef" while under water, with 36% unaware of doing so, but so says UK charity Reef-World Foundation, which co-ordinates the UN Environment Programme's Green Fins programme.

The foundation has launched its Green Fins Diver e-course, designed to help recreational divers protect coral reefs by learning how to conduct environmentally friendlier dives.

Divers contact the reef an average of 5.79 times per dive, according to Reef-World, which bases its statistics on a survey it carried out in 2018. "Over one million new divers are certified annually and 'on-reef' tourism is valued at US $19 billion per year," it says.

"Even a small breakage from an errant fin-kick can cause damage that takes months to recover from; not to mention other negative actions above the water such as littering or buying souvenirs made of marine life.

"On heavily dived reefs, the cumulative impact of unmanaged tourism can be huge," says Reef-World.

"Research has shown that divers who receive environmental information and understand their potential impact on reefs cause significantly less damage to coral."

The three-module course includes an introduction to coral-reef biology, marine-environmental threats and the Green Fins approach, followed by management techniques above water including trip-planning, best practice on boats and equipment care.

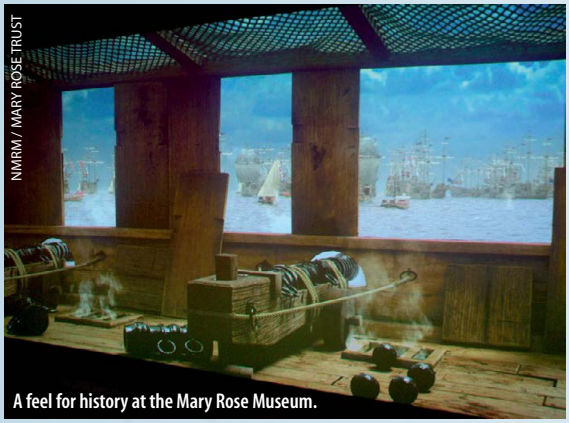
The final module covers best underwater practices for divers including photographers, and there are tests at the end of each module.

The course and digital certificate costs £19, with a scholarship fund available to divers unable to afford the training. It complements an existing Green Fins course for dive professionals.

"The Green Fins Diver e-course is more critical than ever to help ensure the survival of reefs and the diving industry," commented UN Environment Programme marine ecosystems expert Gabriel Grimsditch. "Divers now have a clear road map to champion environmental sustainability as our tourism industries build back better."

Green Fins provides the only internationally recognised environmental standards for the diving and snorkelling industry with a robust assessment system to measure compliance, says Reef-World.

Divers can enrol on the course at greenfins.net/green-fins-diver



NMRM / MARY ROSE TRUST

A feel for history at the Mary Rose Museum.

THAT SINKING FEELING ABOARD THE MARY ROSE

A NEW IMMERSIVE *Mary Rose* experience has opened at Portsmouth Historic Dockyard. "1545 – When Their World Ended" allows visitors to step back in time, says the Mary Rose Trust.

The experience includes virtual appearances by King Henry VIII and the crew of his flagship during its final moments in the Battle of the Solent 476 years ago.

The experience is introduced by Dame Judi Dench: "I remember being one of the millions who watched the *Mary Rose* being raised from the Solent in 1982, and it's a memory that has stayed with me ever since," she says. "Her incredible story both before she sank and now afterwards reveals so much about our history."

Following on from the launch of "HMS *Victory*: The Nation's Flagship" earlier this year, the new *Mary Rose* experience continues the "Flagships Taking Centre Stage" programme put together by the National Museum of the Royal Navy and the Mary Rose Trust.

Both experiences, HMS *Warrior,* the RN Submarine Museum and eight other attractions are included in the simplified Ultimate Explorer annual ticket from £39, nmrn.org.uk

Ancient shipwreck found off Egypt

A RARE ANCIENT galley has been discovered by underwater archaeologist Franck Goddio and his dive-team in the sunken city of Thonis-Heracleion, off Egypt's Mediterranean coast.

The naval vessel is known to have sunk after being struck by large blocks from the temple of the supreme Egyptian god Amun, as it collapsed during a cataclysmic landslide in the 2nd century BC.

The galley had been moored at a jetty on the deep canal that flowed along the south face of the temple, and the falling blocks had pinned it to the canal-bed, preserving the remains as any spaces were filled in with debris.

Now lying beneath 5m of hard clay mingled with "pristine" temple remains, the wreck was detected using a prototype sub-bottom profiler.

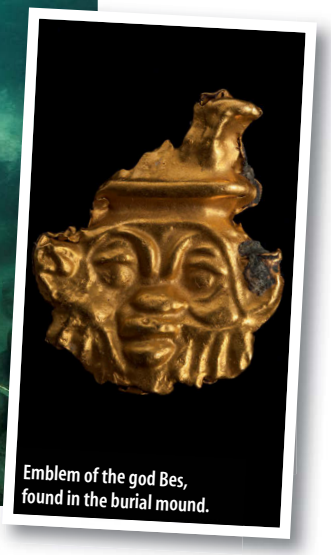
Goddio's European Institute for Underwater Archaeology has been working at the Bay of Aboukir site for more than two decades, in collaboration with Egypt's Ministry of Tourism & Antiquities and backed by the Hilti Foundation.

Thonis-Heracleion lies more than four miles off the Egyptian north coast, but for centuries it was the country's largest Mediterranean port, guarding the entrance to the Nile before the Greek king Alexander the Great founded Alexandria in 331 BC.

The Ptolemaic dynasty, ruled by one of Alexander's generals, replaced the pharaohs soon afterwards and lasted for nearly three centuries.

CHRISTOPH GERIGK / FRANCK GODDIO / HILTI FOUNDATION

Blocks from the Temple of Amun had collapsed onto and sank the galley.



Emblem of the god Bes, found in the burial mound.

However earthquakes, tsunamis and rising sea levels triggered soil liquefaction that caused 42sq miles of the Nile delta to collapse beneath the sea, including Thonis-Heracleion. Goddio's divers rediscovered the city in 2000.

"The finds of fast galleys from this period remain extremely rare, the only other example to date being the Punic marsala ship," said Goddio, referring to a vessel dated to 235 BC.

"Before this discovery, Hellenistic ships of this type were completely unknown to archaeologists.

"Our preliminary study shows that the hull of this galley was built in the Classical tradition and relied on long mortise-and-tenon joints and well-developed internal structure.

"However, it also contains features of ancient Egyptian construction. It was a rowing ship that was also furnished with a large sail, as shown by a mast step of considerable dimensions. This long boat was flat-bottomed and had a flat keel, which was quite advantageous for navigation on the Nile and in the delta.

"Some typical ancient Egyptian shipbuilding features, together with evidence of re-use of wood in the ship, indicate that it was built in Egypt." The ship was more than 25m long, and its beam around 4m.

In another part of Thonis-Heracleion, divers excavating a 60 x 8m *tumulus* or mound have found a Greek funerary area dating back to the start of the 4th century.

Greek merchants and mercenaries lived in the city near the Temple of Amun, and the dive-team were amazed to find preserved wicker baskets filled with the fruit *doum*, which came from a palm tree sacred in ancient Egypt, as well as grape-seeds, as they told the *Guardian*.

Also found were hundreds of Greek ceramics along with Egyptian bronze artefacts including statuettes of the god Osiris, mirrors, a wooden sofa and a gold amulet.

There was evidence of burning, and because none of the artefacts dated from later than the early 4th century it was suggested that a single funeral event had taken place, after which the remains had been sealed into an underground chamber.

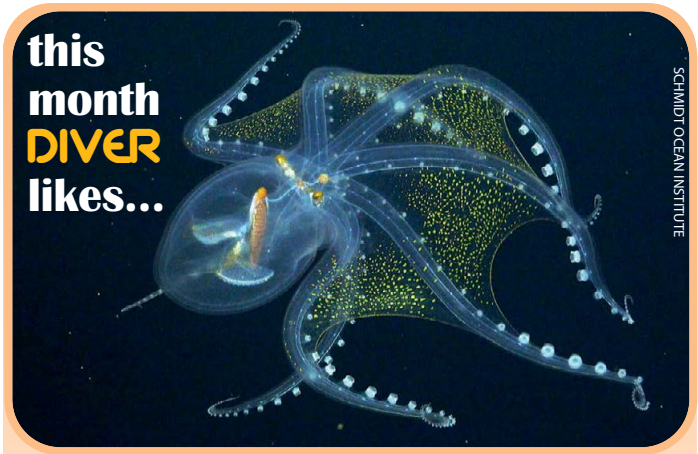
"There's something very strange here," Goddio told the paper. "That site has been used maybe one time, never touched before, never touched after, for a reason that we cannot understand for the time being.

"It's a big mystery."

CHRISTOPH GERIGK / FRANCK GODDIO / HILTI FOUNDATION

Greek ceramics in the *tumulus*.

this month DIVER likes...



SCHMIDT OCEAN INSTITUTE

Glass Octopus Schmidt Ocean Institute's ROV SuBastian captured this hyper-rare image of a glass octopus in the Pacific's Phoenix Is – so transparent, only eyeballs, optic nerve and digestive tract are visible.

Hooked on Life Making a good point are 12 life-size sculptures of sharks, rays and other marine megafauna, made of industrial fishing hooks by Dutch artist Vincent Mock and installed topside and under water along Sardinia's coast for his AMO exhibition, vincentmock.com

Expedition Britannic No time to review this month (it's out in late September) but we've glimpsed Rick Ayrton's new book on diving *Titanic*'s 120m-deep sister and it looks exciting. More next month.

Queen of the Mantas This 5min film looks at diver Andrea Marshall of Marine Megafauna Foundation, discoverer of two manta species. Free to view on Waterbear.com, "the first interactive streaming platform dedicated to the future of our planet" – we like that too.

CASH PROMISE TO DIVERS RECOVERING ARTEFACTS

NEW FUNDING is to be provided to save artefacts at risk of being lost unless urgently recovered by divers from protected shipwrecks in England.

Ever since the Protection of Wrecks Act 1973, volunteer scuba-divers have worked to record and monitor nationally important shipwreck sites, 54 of which are currently protected under the legislation.

Now Historic England (HE), MSDS Marine and the Nautical Archaeology Society (NAS) have embarked on a pilot project using a £13,000 grant from the Aurelius and Headley Trusts, plus additional HE support.

Recovery of material from wreck-sites is allowed only under an HE licence, while the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage dictates that it can be brought to the surface only if conservation funding is in place, and a receiving museum has been secured.

"For many years now budgets have been so tight that sometimes delicate wreck material at risk of loss has had to be left on the seabed," says NAS CEO Mark Beattie-Edwards, adding that the funding means that "groups trying to save our heritage will not need to raise the funds themselves".

The funding will be made available to wreck licensees for the rest of 2021 and next year and will be used to increase capacity at the HE Maritime Conservation Facility in Portsmouth.

Recoveries must be agreed in advance with Historic England.

HE says that maritime archaeology has the potential to reach new audiences around the country. It cites Southend Museum, which in 2018 saw 14,000 people visit an exhibition dedicated to artefacts recovered from the 17th-century *London* protected wreck in the Thames Estuary. HE had funded the excavation by Cotswold Archaeology, incorporating the licensee dive-team. ■

HISTORIC ENGLAND

The *London* dive-team with a recovered gun carriage.

Diving mayor had heart condition

THEN MAYOR OF CAMBRIDGE Nigel Gawthrope, who died on a scuba-diving holiday in South Africa in January 2109, had an undiagnosed heart condition.

The experienced diver and underwater photographer was eight months into his mayoral term when he died at Umkomaas on the KwaZulu-Natal coast, as reported in DIVER *News* at the time.

Gawthrope, 61, was on his second boat-dive of the day at around noon when he indicated to his wife Jenny that he wanted to surface, an inquest in Huntingdon heard on 15 July, as reported by *Cambridgeshire Live*.

Back on the boat he was given oxygen and CPR and on shore paramedics continued attempts to resuscitate him before he was declared dead.

An initial *post mortem* five days later noted air-bubbles in the ventricles of his heart. Pathologist Dr John Grant pointed out in his report to the inquest that it was not known how the body had been stored and that decompression could lead to gases in the body that might not have been present at the time of death.

However, a further *post mortem* once Gawthrope's body was back in the UK had recorded the medical cause of death as acute left ventricular failure, contributed to by ischemic heart disease.

Cambridgeshire coroner Elizabeth Gray said that she accepted the conclusion and said that Gawthrope had been unaware of having a significant heart condition.

She described diving as a "physiologically challenging activity for anybody, but for somebody with undiagnosed coronary artery disease it was just too much." Her verdict was of death by natural causes. ■

FREDA'S DIVER DISHES

These amazing edible flowers bursting from meandering zucchini (courgette) vines can be harvested from gardens in summer. One of the reasons I love these beautiful flowers is because they remind me of the anemones on a scenic wall-dive at St Kilda.

On a courgette you get two types of flower, the male and the female. The male flowers are produced throughout the season and, once the female flowers on the vine have been pollinated (and you can see the fruit starting to grow), feel free to pick the male flowers – they have done their job. You can use either type of flower for your stuffing.

Stuffed Courgette Flowers

Ingredients (makes 12)

1 small courgette finely chopped; 150g tofu; 3 sprigs of rosemary; 2 dried figs finely chopped; 2 tbsp freshly squeezed lemon juice; 2 tsp maple syrup; salt & pepper; 1-2 tbsp toasted pine nuts.

Method

Pull the leaves from the rosemary stalks and finely chop them. Gently crush in a pestle & mortar. Fry courgettes in a little rapeseed oil along with the rosemary, fig, salt & pepper and continue to cook for a few minutes until soft. Crumble the tofu into the mix and cook for a further few minutes. Add maple syrup and lemon juice, mix and set aside.

Prepare the courgette flowers by cutting a little off the base, then gently pulling out the stamen.

Place the mixture into a small food-processor and blend until almost smooth. Scrape the mixture into a piping bag and carefully pipe into each flower, leaving space at the top to be able to fold and twist the tops of the petals around each other to hold the mixture in place.

Place each flower on a lightly greased oven tray and sprinkle with salt and pepper. Bake at 180°C for 10 minutes. Sprinkle with toasted pine nuts and serve as a starter.

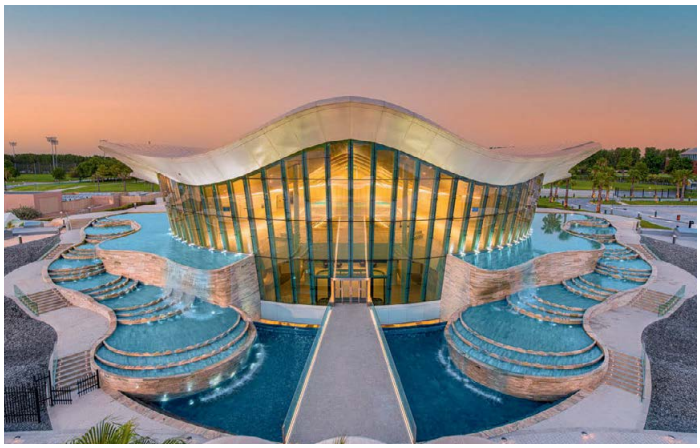
Top Tip

If you have only a few courgette flowers to stuff and have some stuffing left over, cut an onion or two in half and bake for 20 minutes until almost cooked. Pipe the mixture into the onion and bake for 10 more minutes.

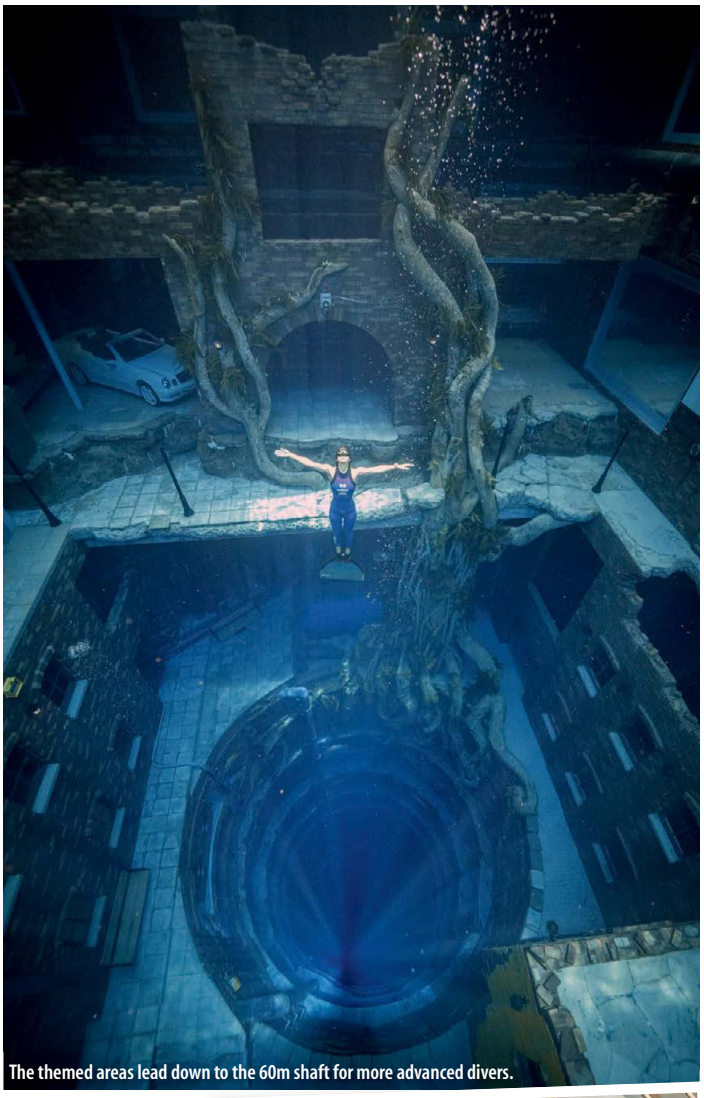
These are absolutely delicious and you can enjoy them throughout the year, rather than only during the short time that courgette flowers are in season.

✷ 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. £1 from every sale goes to Oceans Plastics Greenpeace, salutay.co.uk

60m-deep pool for divers in Dubai



ALL PHOTOS: DUBAI DEEP DIVE



The themed areas lead down to the 60m shaft for more advanced divers.

THE WORLD'S DEEPEST swimming pool for diving opened to the public at the end of July in a part of the world that doesn't do things by halves – the United Arab Emirates.

Only technical divers can reach the bottom of Deep Dive Dubai because its pool is 60m deep.

Big enough to hold 14 million litres of water – the vertical equivalent of six Olympic-sized swimming pools – the facility has already been verified by Guinness World Records as the world's deepest diving pool.

Its director is Jarrod Jablonski, best-known as an extreme cave-diver and founder of Global Underwater Explorers. Also on the staff as technical director is another notable GUE diver, Richard Lundgren.

The pool is themed as a submerged metropolis, with streetscapes, garages, apartments and arcade games.

There are two underwater habitats with dry chambers at 6m and 21m and 56 underwater cameras covering all angles of the pool, along with sound and mood-lighting systems.

The fresh water is maintained at 30°C and circulated every six hours through siliceous volcanic rock and other filtration systems.

The pool is built into a 1500sq m oyster-shaped facility that includes a dive-shop, gift-shop, an 80-seat restaurant that is set to open this winter and function rooms and conference spaces. Viewing areas on the lower floors allow diners in the restaurant and people in other rooms to see into the pool.

Deep Dive Dubai embraces what it describes as the region's largest underwater film studio, with media editing room, video wall and the cameras, sound and lighting systems set up in the pool itself.

In the last quarter of 2021, a 10-person hyperbaric chamber will also be made available at the site.

Scuba and freediving experiences and training courses at all levels are offered in what has been certified as a PADI 5* IDC facility. The activities are available to anyone of 10 and over in three categories – Discover, Dive and Develop, the latter covering training from beginner through to technical and instructor levels.

Prices for experiences and courses start from 800 dirhams (£158).

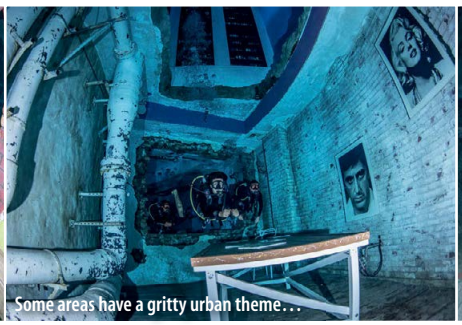
"For those seeking a unique experience, Deep Dive Dubai provides an exceptional, safe and controlled environment to learn all about diving," said Jablonski. "For experienced members of the freedive and scuba-dive communities, it's a facility and experience like no other."

Existing international diving pools have become progressively deeper over the years, from Nemo 33 in Belgium through Y-40 in Italy and the 45m Deepspot in Poland.

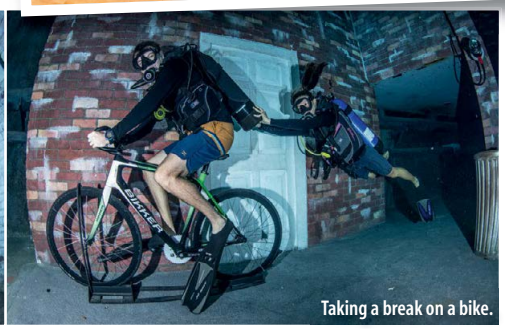
Located in Nad Al Sheba, Dubai's new facility is a 20-minute drive from the international airport.

Diving bookings can be made at deepdivedubai.com

Arcade games and table football…



Some areas have a gritty urban theme…



Taking a break on a bike.

Divers help to ID leopard shark hotspots…

ANNA FLAM / MMF

Leopard shark and diver at Mozambique's hotspot site.

THE EXISTENCE OF a key global hotspot and potential breeding area for leopard sharks has been revealed in Mozambique by the Marine Megafauna Foundation (MMF).

Its new study was produced in collaboration with Swansea University and volunteer body All Out Africa.

Based on their findings, the scientists are recommending species-level protection and expansion of marine protected areas to safeguard the animals, which are also known as zebra sharks.

The team used underwater surveys and identification photos submitted by "citizen scientist" recreational scuba-divers to track individual leopard sharks, which have unique spot patterns.

Over the course of the study the researchers helped to create the Wildbook for Leopard Sharks (leopardshark.wildbook.org) global online database, through which any diver can submit photos.

Images taken between 2010 and 2018 succeeded in identifying 90 individual sharks of both sexes, with 38% of them seen over multiple years, indicating an affinity for the area. More than 62% of the sharks were mature.

High frequency of both male and female adult sharks in a small area indicates a breeding area – a prime habitat for protection.

The scientists also interviewed 100 local fishermen to identify potential habitats, because they were likely to come across the sharks as bycatch in gillnets. The combined information was used to create distribution maps, with habitat modelling identifying further potential locations to survey.

"When used in combination, fishers' observations and dive surveys can complement each other," said lead author Saoirse Pottie.

"Fisher surveys can collect sightings information at a wider spatial scale than underwater surveys, yet dive surveys are capable of providing more in-depth information on the movement and behaviour of individuals."

Leopard sharks are IUCN-listed as Endangered but are not formally protected in Mozambique, where most of the suitable habitats identified in the study remain unprotected.

"This is one of the world's largest identified populations of zebra sharks and we should protect them, otherwise we could see them disappear, as has happened in parts of south-east Asia," said MMF scientist and co-author Anna Flam.

The study is published in *Ocean and Coastal Management*.

Mozambique-based MMF was founded in 2009 to research, protect and conserve threatened sharks, rays and turtles globally, marinemegafauna.org ■

…AND SHINE A LIGHT ON ENIGMATIC 'WEDGE' RAYS

MEANWHILE TWO SPECIES of the shark-like rays known as wedgefish have been tagged by MMF scientists for a first-of-its-kind study in Mozambique.

The white-spotted guitarfish or bottlenose wedgefish (*Rhynchobatus australiae*) and the bowmouth guitarfish or shark ray (*Rhina ancylostoma*) are both IUCN-listed as Critically Endangered.

They are particularly vulnerable because of their slow growth, late maturity and low reproduction rates.

Wedgefish are caught for their fins, but so little is known of their biology or ecology that few management plans exist, says the MMF.

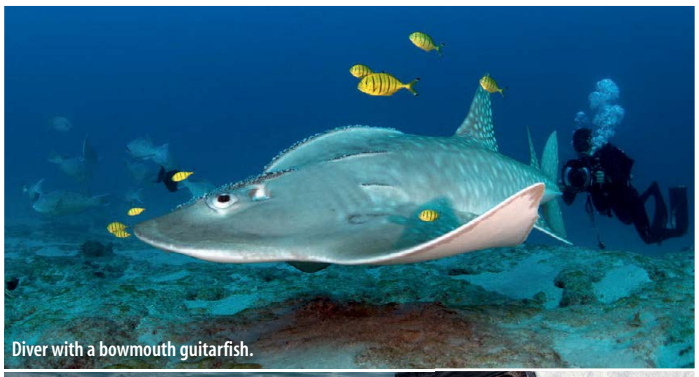
The study is taking place in the protected Indian Ocean waters of the Bazaruto Archipelago National Park and Vilanculos Coastal Wildlife Sanctuary, with MMF working with park staff to identify primary aggregation sites.

The tags are a combination of acoustic transmitters, which send signals that can be picked up by listening stations for up to five years, and six-month pop-up archival satellite tags that record depth, temperature and light levels. The two types provide complementary data.

"We can learn where the animals spend most of their time, whether visits to specific sites are year-round or seasonal, how far they move, how deep they dive, and which temperatures they prefer," said MMF co-founder and project co-lead Dr Andrea Marshall. "This will help to identify areas of critical habitat that must be prioritised for protection.

"We are very excited to see what the tags can tell us about these curious animals. With such little information available, we truly aren't sure what to expect."

More tags will be deployed in the coming months. The study is supported by the Blue Action Fund, Mohamed bin Zayed Species Conservation Fund, Ocean Wildlife Project and private donors. ■



Diver with a bowmouth guitarfish.

Andrea Marshall gently returns a tagged bottlenose wedgefish to the water.

MMF

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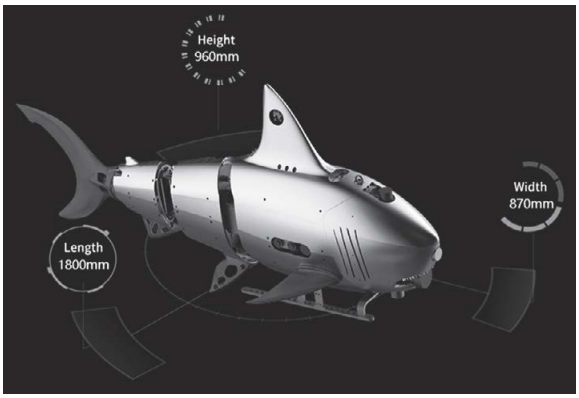
Spy v spy

As if poor old mantas weren't put upon enough by the human race, it seems that our own Royal Marines are now trialling underwater drones disguised as the rays to snoop on the warships of unfriendly powers. Made by Oxford-based Animal Dynamics, the Raydrive is described as virtually undetectable.

If only real mantas were undetectable. The Bootnecks had better be careful where they deploy their pet rays – set them free in certain tropical seas and they'll have had the rakers off them in seconds.

Talking of China, one of its enterprising companies, Boya Gongdao, has been showing off its own new improved 2m Robo-Shark. The propulsive tail-fin can



BOYA GONGDAO

speed it along silently at 6.5mph, complete with camera and three types of sonar.

This will also be military hardware, of course, so we could soon have robo-rays spying on robo-sharks and vice versa. How long before they're armed, too?

But no need to worry about the ocean fast being emptied of real animals – we divers will still have "big stuff" to capture on camera under water. And it will be capturing us on camera right back.

Shipwreck sweep

While we're on bots, it's fun to be able to read every now and then about another iconic shipwreck that's been found at great depths by questing research vessels, and being told the story of that vessel and seeing how it looks now.

But Robert Ballard, famed for finding the *Titanic* and the *Bismarck* back in the day, is taking all the fun out of it by telling us that a new class of cheap-to-run, fast-diving military-style AUVs is going to be deployed to sweep every corner of the ocean for days on end, and no doubt to find and record those wrecks all at once.

Those exploration surface vessels will be redundant – Ballard only goes out on his *Nautilus* now to get out of the house (he's just been on his 158th expedition).

The UNESCO estimate for how many wrecks remain to be found is around

3 million, but what if they do find them all at once – how will DIVER *News* ever cope?

Stressed Ephorate

I mentioned recently that if you get to dive the very ancient Peristera shipwreck, 28m down near Alonissos in the Greek Islands, you should be prepared to be under close surveillance from the battery of cameras down there.

The authorities – that is, the Ephorate of Underwater Antiquities – are determined to maintain their iron grip on all sub-aqua proceedings, and even this year's opening up to Joe Diver has been presented as something of a trial period for all involved.

Because of the Ephorate's name, the picture in my head is always that of one of those councils of elders that appear in sci-fi movies as holograms to lay down the law. Sorry, I can't help it!

According to newspaper *Kathimerini*, even the Ephorate's "partners" might not manage to reach the Peristera shipwreck this summer.

An 800,000-euro proposal for a research project by august educational bodies to develop a 3D video-game simulation of this and three other underwater sites – Pavlopetri off Laconia, the sunken city of ancient Epidavros and 1983 collier the *Christophoros* near Skopelos – looks to have been rejected at the very last fence, says the paper, as the Ephorate deleted the holograms and left the room.

Questioned by the paper, it said that it was working on seven other such projects at the same time and, with all its regular work, was just too short-staffed to cope.

Dive logs

Two divers have been charged with violating the Underwater Antiquities Act in South Carolina, in a story that gives previously unsuspected meaning to logging dives.

Police had been watching the men, engaged in what they described as "logging operations", on several occasions. Nathan Tarpein and Nicholas Fox were seen dragging hunks of wood out of the Savannah river and onto a barge before transferring them to trailers on the bank.

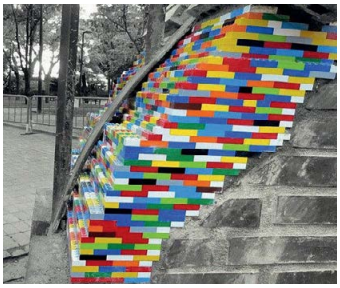
The pair had been diving to attach lines to allow the logs to be winched to the surface. They said they thought the cops could "only enforce hunting and fishing laws", not arrest them for woodworking activities, but it seems that their grasp of state law was shaky.

This was not just any old lumber, you understand, but "historic submerged logs", which are apparently a thing.

Did Billy the Kid once hide in these trees? Did Lincoln carve "Abe Woz Here" into the bark? No, it seems to be historic, a log just needs to have saw-marks in it.

According to the woodentops, the men didn't have the required permits – or a diver-down flag for that matter. Nicked.

Eat a brick



ALEX CELADA / PIXABAY

In case you missed this tasty and thought-provoking nugget, WWF posed the rhetorical question of which mammal consumes the most plastic – and it turned out that the answer was humans, with a cool 21g a month.

And if that doesn't sound much, it's the equivalent of a Lego brick. You could build quite a Lego wall in a lifetime of dining.

Shark denial

You might well have heard about the shark that grabbed a local parasailor as he was coming in to land over the Gulf of Aqaba, and did a fair amount of damage to his foot in the process.

Local experts were quick to declare that sharks did not frequent Jordanian waters – "very rare" – but if this was meant to reassure potential tourists, it almost certainly had the opposite effect on divers, who would of course regard sharks as a previously unsuspected attraction.

We know that freak attacks happen, but most divers like the company of sharks and realise that it's sudden flashes of light colour at the surface that are most likely to provoke an instinctive reaction.

Isn't that why we wear black?

Release claws

When Larry the Lobster arrived at the Hare on the Hill pub in Rochdale as part of its regular seafood delivery from Scotland, head chef Austin Hopley (*pictured, on the right*) was shocked.

Not because the crustacean had its own name (I think he gave it that later) but because it was bright blue.

He wasn't prepared to land such a rare beast in boiling water, so he saved its life and found it a new home, the Manchester Evening News reported. Online research had shown him that such colour mutations were one in 200 million.

Sea Life Manchester was pleased to come to Larry's rescue – and Hopley must have become very attached to him during his brief acquaintance, because he has decided not to feature lobster on the pub's menu any more.

To paraphrase Samuel L Jackson in *Pulp Fiction*, Larry must have been one charmin' lobster.

HARE ON THE HILL

It's not so unusual for divers to come across weapons, ancient or modern, but to identify a major battlefield is something else. Report by NIKITA PETROV, photography by STANISLAV TROFIMOV

SPEARHEADING THE BATTLE OF SUDBISCHE

IT WAS DESCRIBED as one of the bloodiest battles from the days of Ivan the Terrible. The engagement is recounted in old manuscripts, and historians say that European history could have taken a very different turn had the outcome been different.

Yet the location of the battle had never been traced, and because of this some people denied that it ever took place.

But now Russian archaeologists reckon they have found the battlefield – with the help of our group of amateur scuba-divers, following up on the accidental underwater discovery of a spearhead.

Ivan IV (1530-1584), known as "the Terrible", was tsar of Moscow before becoming the first Russia tsar.

Above: Alexander Arkhipov with the 16th-century spear he has just found that would reveal a long-lost battlefield.

Below: The spear as it was found in the Gogol river.

His challenges came from many directions. To the west this meant a struggle for access to the Baltic Sea; in the south-east and east, threats from the Kazan and Astrakhan khanates and the need to develop Siberia; and, in the south, constant incursions from the Crimean khanate.

Ivan would succeed in capturing Kazan and Astrakhan, with Chuvashia, most of Bashkiria and the nomadic Nogai Horde voluntarily becoming a part of Russia. He also won a war against Sweden.

Which left the Crimean Tatars who, under Khan Devlet-Giray, repeatedly forayed across the frontier into southern Muscovy. The economic prosperity of the Crimean (and Kazan) states was based on raiding neighbouring territories and trading in captured slaves.

According to some estimates, at least three million Russians were enslaved by Tatars over the course of the 16th century.

The problem came to a head in 1555 at the Battle of Sudbische, a village in the

Orel region 220 miles south of Moscow.

Sudbische lies some 85 miles from Oryol, where our Divo club is based.

This spring it happened that the club had planned an expedition as part of an ongoing project to investigate waterway trade routes in the Orel region.

The group had decided to follow the ancient Muravskaya road, a trade route that passed through the centre of Russia and was at one time the main road between Crimea and Moscow.

Traders, ambassadors and warriors rode along this road between the Oka and Don rivers, and the Crimean Tatars had carried out numerous raids along it.

The waterways that ran beside the road were also in active use in those days, and the divers were exploring them in the hope that they might give up some of their secrets. They were looking for ancient piers and marinas, fords, bridges or any other old structures.

AFTER SETTING UP camp and preparing our diving equipment, the divers began their exploratory work on the bed of the Gogol river.

And that's when Alexander Arkhipov came across the head of a spear, and he and the other club-members went on to find several dozen arrowheads.

According to preliminary estimates, these artefacts were at least 400 years old. The Battle of Sudbische was supposed to have taken place somewhere in this area – could the weapon and the ammunition have any connection?

Historians and archaeologists had long tried to pinpoint the battleground, but archival documents had proved unhelpful.

We knew only that in June 1555, not far from Sudbische, a battle was recorded as taking place between 13,000 fighters under the command of the *boyar* or nobleman Ivan Vasilyevich Sheremetev and Devlet-Giray's 60,000-strong horde.

Above from left: Statue of Ivan the Terrible; the Orel countryside through which the Muravskaya road ran.

Below, clockwise from top: The spearhead and arrowheads; using the hydro-ejector equipment to sift through mud from the Gogol river.

The clash began with a surprise attack by the Russian forces on the Tatars, who had been travelling in convoy.

The battle raged for two days, and at one point it seemed that the Russian troops had been overwhelmed, but somehow they managed to rally.

Eventually the Tatars retreated, leaving 15,000 of their dead and about 60,000 horses and 180 camels captured by the greatly depleted force of Russians.

FIVE THOUSAND Russian warriors had died in the unequal battle, but afterwards it was claimed that their action had not only saved Moscow from what would have been a major attack but had prevented a subsequent devastating invasion of western Europe.

Another significant feature of the Battle of Sudbische was that it was the first between Russia and the Crimean khanate in which both sides had used not only spears and bows but also, for those who could afford them, firearms.

Based on the finds, Divo quickly sought guidance from the Institute of Archaeology of the Russian Academy of Sciences, with which we had collaborated before. ☛

Under its direction the divers embarked on further work in the Gogol. The archaeologists recommended that we should search the muddy sediment using a hydro-ejector, concentrating on the area in which the ancient objects had been found the previous day.

Despite the cold April water and poor visibility they went ahead and found a significant number of arrowheads as well as many fragments of horses' harnesses.

"There could have been a battle here," said archaeologist Oleg Radyush at this stage. "I suppose that during the erosion of the shore this part was washed away and accumulated near the dam.

"Considering that the village of Sudbische was nearby and we know there was a battle somewhere here, it can be assumed that this discovery represents an episode of the Battle of Sudbische."

It seems that residents of villages in the area had come across artefacts at such sites over the years, but these had always been isolated specimens, not enough in themselves to suggest the site of a battle.

The mass of items found by Divo's divers did seem to belong to the Ivan the Terrible era, but only full-scale field research would bring confirmation.

The search for material traces of military history outside settlements or fortifications is always problematic, but to discover objects in a riverbed that correspond to a legendary battle is rare good fortune, offering the chance of being able to reconstruct the course of events.

Above from left: The riverbed excavations widened out into a search of the surrounding terrain, initially with metal detectors; finds included more arrowheads but also lead ball ammunition for guns of the time; Oryol governor Andrey Klychkov in the foreground examines some of the finds.

Below: Heads and tails – finds included this coin from the reign of Ivan the Terrible.

Bottom: Members of the Divo dive-club at the Battle of Sudbische memorial – which as it turns out was erected some six miles from where the engagement took place.

FOLLOWING THE DIVES, the club-members decided to carry on under the auspices of the archaeologists and help to search the vicinity above water.

Metal detectors were used to mark points of interest before a geodetic survey was carried out, with discovered objects pinpointed using tacheometry and GPS.

The initial findings were impressive. There were more than 150 arrowheads of various size, lead bullets and buckshot, a blade fragment, a quiver hook, belt pads and girth buckles, fragments of shoes and horseshoes with their nails.

Including those artefacts found under water, more than 900 were collected over the next three weeks, with no fewer than 400 arrowheads, more than 50 bullets, many other metal objects, a lead cannonball – and the matchlock of a gun.

It was apparent that the assembled artefacts dated no later than the mid-16th century. There are now plans to organise large-scale excavations that will represents a new stage in studying the defences of the Moscow state's southern borders in the 16th and 17th centuries.

There is a monument to the Battle of Sudbische and we paid it a visit, though it now seems it was located in the wrong place. The battle was six miles away.

For all this time, the archaeologists had been searching in the wrong place.

"When my archaeological team arrived, at the invitation of the head of the Divo diving club Sergey Kulikov, and for the first time held in our hands artefacts extracted from the bottom of the river, there was no certainty that they had anything to do with the Battle of Sudbische," said Radyush.

"It was possible to establish only the historical period – the late Middle Ages."

"But every day more and more discoveries were made. We were able to localise the scene as a 900 by 400m plot of land that was literally strewn with various metal objects of that era, indicating that this had been a major battlefield.

"Then we found lead bullets and a coin minted in the first half of the reign of Ivan the Terrible, which made it possible to significantly narrow the timeframe to the mid-16th century."

Many archaeologists have come to see the finds, and the Oryol region's governor Andrey Klychkov also paid a visit: "The event that took place in our region isn't only of local or Russian interest but rather European and world-scale," he said.

Discovering the exact location of a historic battlefield is a rare event, but a spearhead accidentally found by a diver on a riverbed near the village of Sudbische had initiated a cascade of events that has now filled a blank spot on the maps.

Clockwise from above: Arrowheads; cross, lead balls; fragments of armour; belt-hooks and gun mechanisms; horses' harness buckles.

INSTITUTE OF ARCHEOLOGY OF THE RUSSIAN ACADEMY OF SCIENCES.

OUR EUROPEAN TOUR Pt 4

We left Swedish film-makers and diving road-trippers LINN VENNBERG and MATTIAS GRANBERG back in Spain, hunkered down in their van as the pandemic raged, but they never gave up. Now we catch up with them again – the European tour must go on!

HELLO AGAIN! We left you in Spain, waiting for France to get out of lockdown. A couple of days before Christmas we were able to continue our journey to the south of France, where we found a nice spot to spend the holiday and enjoy some Swedish treats we had obtained at IKEA.

As we continued along the French coast the weather started getting colder and, in the mornings, the temperature in our vehicle would fall to a couple of degrees.

Setting out pre-pandemic, we had originally planned to spend the winter months further south in Sicily, Malta and Greece, so we hadn't installed a heater.

One night when we stopped to sleep the thermometer showed -3°C outside, and that was when our side-door decided to stop closing fully.

Next day we went to a garage to fix it temporarily pending the arrival of spare parts, and when they arrived and the door was fixed, we decided it was time to get ourselves somewhere warmer.

We weren't likely to be able to go to Greece after Malta as planned, and Italy remained very closed down, so we headed straight for Malta, leaving Italy for our return journey.

A Covid test, two ferries, tapeworm treatment for the dogs and some miles on the road later, we were on the island with nice sunny weather and almost 20° more warmth.

It was finally time to start diving again.

We turned up at the Go Dive Malta centre, which had offered to help during our visit. We were briefed on the dive-sites around the island, because we would be doing most of our dives from shore by ourselves.

The dive-centre has a sailing boat from which it dives during the season, so its guests can combine their dive trip with sailing round the coast, but unfortunately it was on land during our stay.

It might be warmer, but we had to wait for the wind and swell to subside. It took a week before the sea finally calmed down and we could do our first dive in Malta.

Cirkewwa is one of the most popular sites and there is a big parking lot by the entry points, easy entry using ladders, and showers and toilets for divers.

Below the surface there is a lot to see. Two wrecks, replicas of a Roman anchor and vases, another big anchor, a sandy bottom where we could spot rays and a reef with overhangs, an arch and other marine life including octopuses.

FOR THE FIRST DIVE our target was the wreck of the patrol-boat *P29* , scuttled in 2007 as an artificial reef, like many of the wrecks around Malta.

The 52m ex-minesweeper sits upright at 34m, its machine gun still at the bow.

The wreck was prepared for diving before being scuttled, so the interior has been cleared out, making it safe and easy to enter, as is the case with most wrecks around Malta.

The following week we explored different parts of the Cirkewwa dive-site and visited its other wreck, the tugboat *Rozi*, as well as sampling *P29* again.

Then we took the ferry to the smaller neighbouring island of Gozo, well-known for its many dive-sites with spectacular walls and rock formations.

For the first dive we headed to Mgarr Ix-Xini, a sheltered shallow bay with a sloping sandy bottom for a night dive.

This is a good place to spot interesting marine life after dark and because it's so sheltered it's almost always possible to dive there.

It is also the spot where we had done our first night-dive, seven years before.

Entering the water and sinking into the darkness was a lot less nerve-wrecking this time, but it brought back memories of those nervous first moments completely surrounded by the dark water before reaching the bottom.

We started making our way over the shallow rocky section to reach the sandy slope and didn't have to search for long before finding something interesting, as two flying gurnards came sweeping across the bottom in a perfectly synchronised dance.

Above: Safety stop by the reef at Cirkewwa.

Left: The Maltese patrol boat *P29*.

Further out we found trumpetfish, and in the little cave were accompanied by two big barracuda.

As we swam back through the rocky shallows, we spotted an all but invisible cuttlefish mimicking its surroundings.

The shifting colour and patterns on their bodies and the flowing fin around the mantle makes them mesmerising to watch, and we spent a very extended safety stop with this little fella.

We stayed on Gozo for three weeks and dived some of the most spectacular sites around the island, including the Blue Hole, the Inland Sea, the *Karwela* wreck, Reqqa Point and Billinghurst Cave.

The first two of those attractions, at Dwejra where the Azure Window stood before its collapse, and *Karwela* are among the most popular in Malta, if not Europe, for good reason.

The underwater seascape around Dwejra is especially amazing.

Gozo is also a beautiful place above water and we explored many of the trails that cover the island.

At the Blue Hole you enter the water through a hole in the rocks about 10m in diameter.

A few metres down the chimney opens up towards the sea through another hole in the wall, and outside you can dive either along the wall to the left or go right to what used to be the Azure Window.

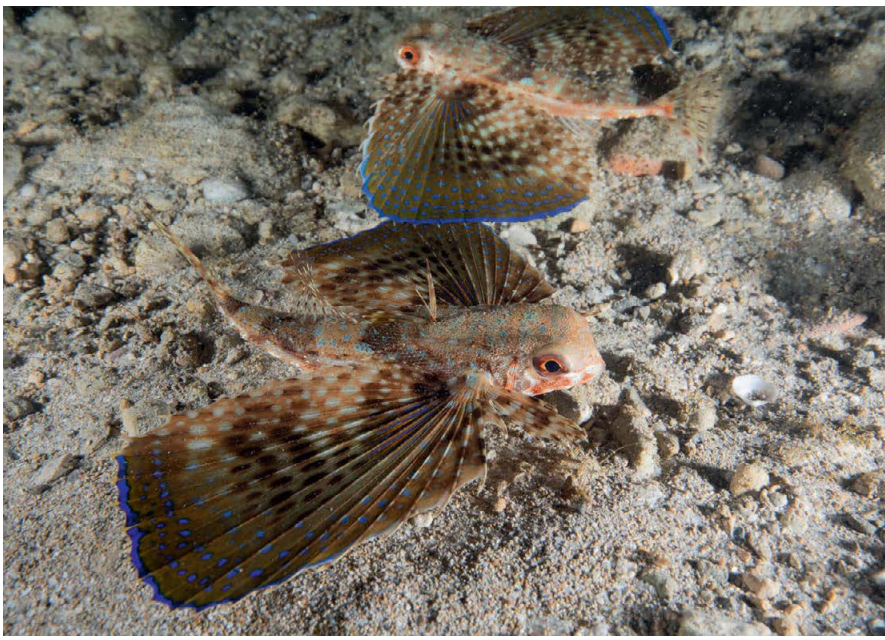
Just 200m from the Blue Hole you find the Inland Sea, a small lagoon connected to the ocean through a narrow tunnel, the main attraction of this dive.

It goes from just a few metres deep at the start to 20m at the other end, making for a special diving experience. Beyond it big boulders and steep walls take over.

On the other side of the island in Xatt l-Ahmar bay lie three wrecks.

All were scuttled as artificial reefs – *Xlendi* in 1999 and *Cominoland* and *Karwela*. together in 2006.

The latter two sit upright in the sand at about 40m while *Xlendi* lies upside-down a couple of metres deeper.



Above: Flying gurnards seen during a night-dive in Mgarr Ix-Xini.

Below: Happy diver after exploring some of the many things to see at the Cirkewwa dive-site.

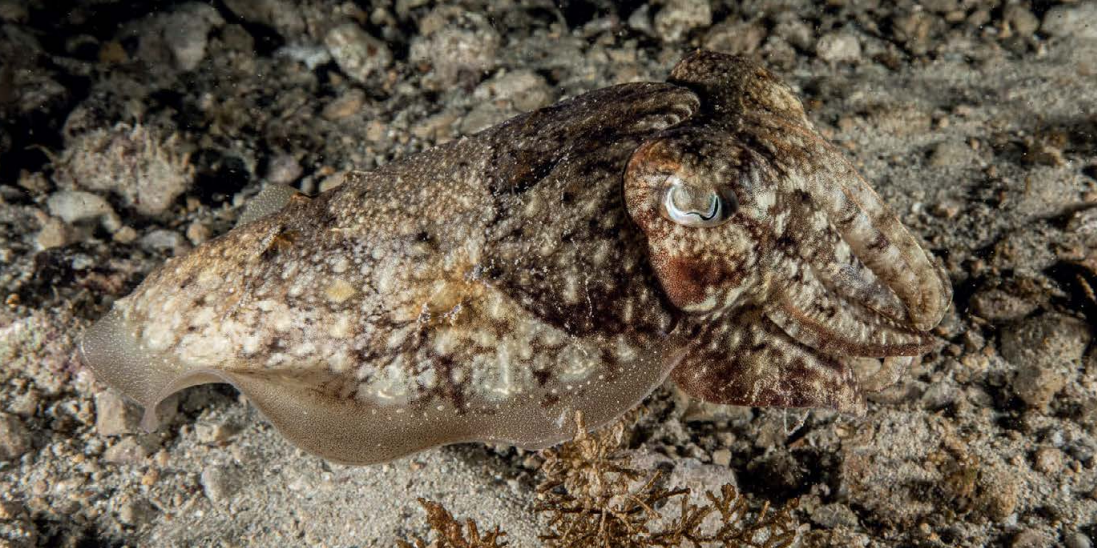
WE CHOSE TO DO several dives on the *Karwela*. with its famous staircase. You enter the site over the cliffs and, with the right compass bearing, it takes only a couple of minutes to reach the wreck by swimming across the shallow bay and over the steep drop-off into the blue.

When diving without a guide it's always important to research a site well beforehand by reading online, in guidebook or talking to locals. You need to know what to expect with current, depth and topography to plan the dive.

Normally we also research what we want to see and film or photograph.

This is more important on deeper dives with limited time, and on wrecks it's a lot easier because you know where everything will be.

We checked where on the wreck to



find the staircase and, because it was the deepest part of the wreck, started there before ascending to the deck, exploring the exterior and heading back to the reef.

Another interesting part of the *Karwela* is the easily accessed engine-room, and we explored it on the next dive. The shallow bay is a nice place to end a dive and ideal for safety or decompression stops.

Most dive-sites around the islands are quite exposed and sensitive to bad weather, but the entry at Reqqa Point was the most difficult of the places we dived so we had to plan the dives for when the water was really calm.

In summer there is usually a ladder to exit the water by but these can break during winter storms and when we dived there it had either broken or been taken up during winter, so we had to make our way in and out over the sharp cliffs.

Above: A cuttlefish, well camouflaged among the rocks.

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Below: The Karwela resting at about 40m; and its famous staircase.

Below the surface Reqqa Reef stretches out about 50m like an arrow over the sandy bottom and offers large boulders and steep drop-offs. It's a good spot for marine life and we saw a lot of moray eels, octopuses, small grouper and schools of fish around the drop off.

Having explored the reef on the first dive we followed the wall to the left to reach Billinghurst Cave on the next one.

It is possible to enter the water directly above the cave but we couldn't get there in our vehicle and the ladder was broken.

The cave is almost 100m deep, has an airlock at the end and the walls are covered in colourful sponges, corals and other growth. You don't need to be a cave-diver to enjoy it, and even if you're just exploring the area around the large opening as we did, there is lots to see on this beautiful dive.

BACK ON MALTA, we revisited Go Dive Malta, which lent us DPVs and showed us around one of the most famous wrecks, the *Um El Faroud*.

The former Libyan oil-tanker was scuttled in 1998 after suffering damage while in dry dock following an explosion that cost nine lives. The 100m-plus wreck lies 36m down by the stern and is broken into two parts just a couple of metres apart, having split during a storm.

Because of the wreck's size the DPVs came in handy as we explored it from stern to bow and back again.

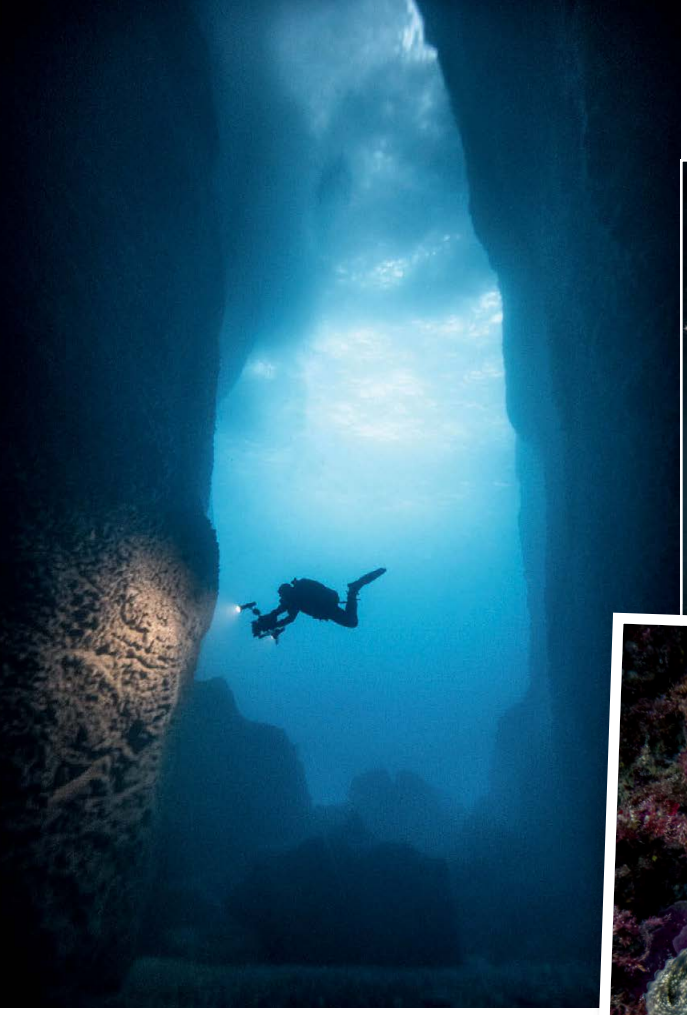
It's an impressive sight as the stern first appears in the blue. It is also prepared for penetration and you can explore the engine-room as well as the bridge and cabins, though visibility was not at its best the day we were there.

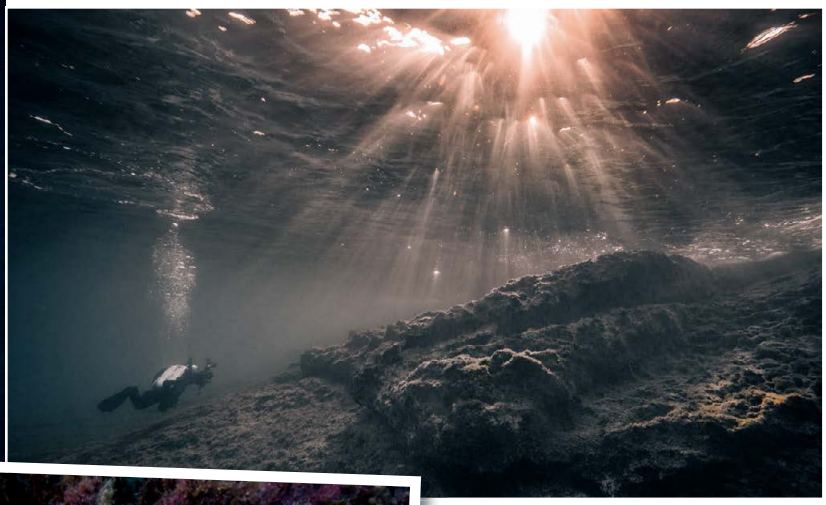
We also dived at Cirkewwa again and this time the visibility was amazing. Already from the wall we could see the entire wreck of the *Rozi*.

We had already planned the photos to take and the required positions of the divers, and started by the big rudder, a great place for photos, passed the engine-room where the engines have been removed, and made our way to the bow.

After getting the planned shots we went to look at the big anchor that lies between *Rozi* and *P29*, where we also had some shots planned, before going on to look at the replicas of amphoras and anchors and to explore the wall with its tunnels, crevices and overhangs.

This was our last day's diving in Malta. We could have stayed far longer on this picturesque and welcoming island but it was time to head to Italy.





We had some trouble finding open dive-centres because many regions were still under strict restrictions but on Sicily they were already up and running when we arrived at the beginning of March so we did a day of diving in the Plemmirio marine protected area.

The topography consisted of boulders, a big arch with a hole in the roof letting sunrays in, a cavern and various interesting rock formations. On the edge of the walls were schools of reef fish.

The rest of our time on Sicily we spent in the north-west to do some shore-diving outside San Vito Lo Capo. A shallow rock reef by the shore dropped to a sandy bottom at 20m-plus, and further out huge boulders were covered in gorgonians with lobsters hiding beneath them.

Clockwise from above: Exploring the majestic tunnel at the dive site Inland Sea; Xatt l-Ahmar Bay looks spectacular at sunset; an octopus glides across Reqqa reef.

On our way there we visited the Valley of the Temples. This UNESCO World Heritage Site includes no fewer than eight temples dating from 510 to 430 BC.

We recommend going there at the end of the day, because the impressive old temples with the vibrant sunset in the background are spectacular.

If all had gone to plan, we would have explored Italy on the way to Malta and after Sicily the next stop would have been Greece. From there we would then have driven up to northern Italy and the Dolomites through Bulgaria, Rumania, Hungary and Croatia.

Given the situation and the restrictions in some of those countries, however, we decided to skip this part of the journey. Guess we'll have to do a separate dive-tour around eastern Europe soon!

Below: Divers by the rudder of tugboat *Rozi*.

DRIVING UP THROUGH ITALY, the dive-centres remained closed in most regions, and at Easter the country went into lockdown again.

We found a closed campsite with a private beach where the owners were kind enough to let us stay, and had the place to ourselves for a few days.

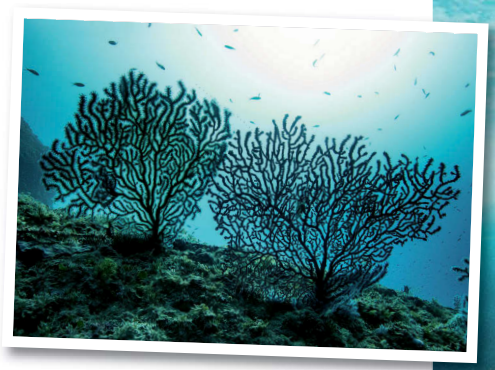
By the time we reached Liguria, the northern coastal region bordering France, the restrictions had eased and we could finally go diving again. We stayed in Santa Margherita Ligure just outside Portofino, as the dive-centre was there and there is no parking in Portofino.

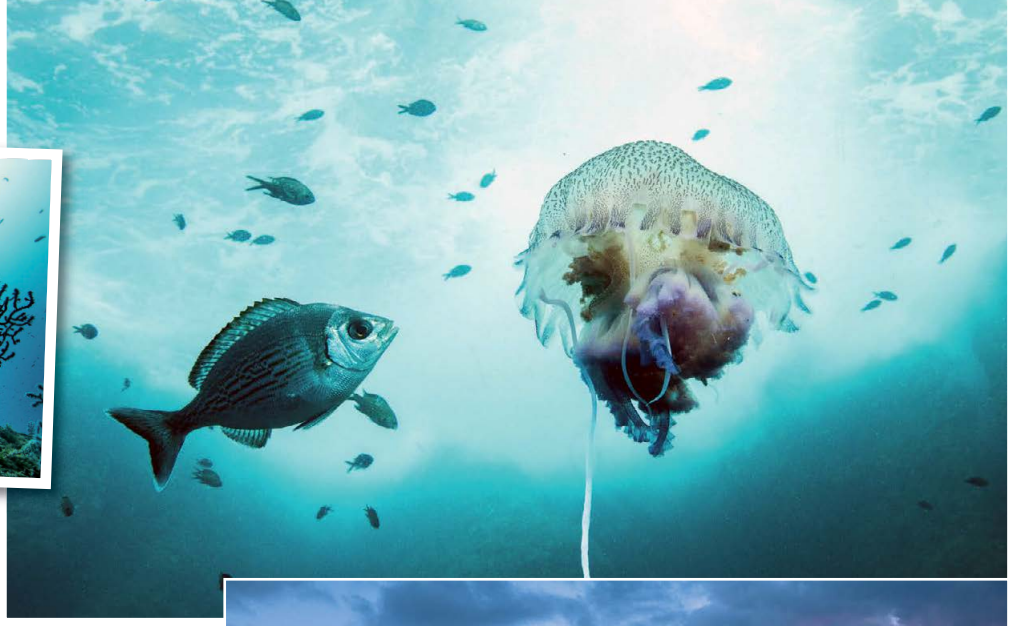
The boat-ride out to the Portofino marine protected area was nice, taking us past the luxurious oceanfront villas and a very scenic coastline. The dive-site was by the cape beneath the Portofino lighthouse, where the wall goes down in levels and further down boulders are scattered around as it levels out.

The rock was covered in gorgonians of different colours and other corals and we saw grouper patrolling the wall and hiding in crevices.

The shallower parts had a lot of reef fish such as damsels and different sea breams, as well as bigger predatory fish.

Having got our dive-equipment wet again we were ready to spend some time in the mountains and set course for the Dolomites. For a week we drove around this impressive mountain range and





explored its beautiful peaks and valleys.

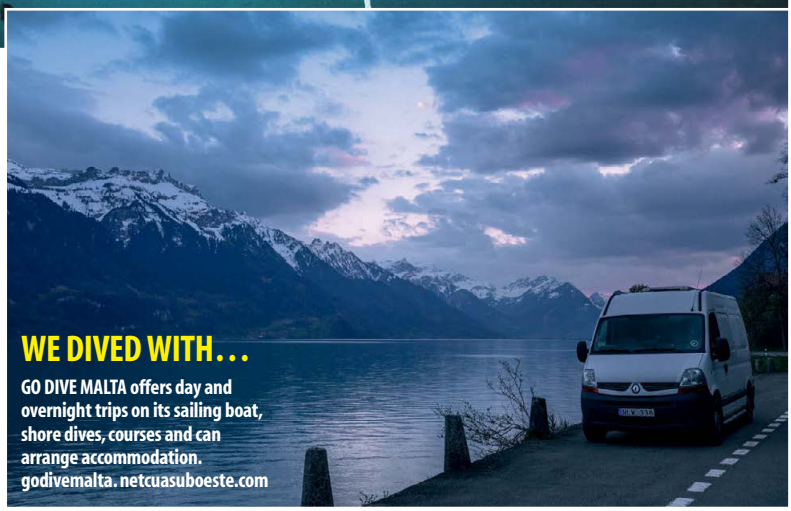
It was still early in the season, so some places remained inaccessible because of snow on the roads, but the mountain-tops looked all the more beautiful.

We then continued through Austria to Switzerland for more impressive views and hiking before reaching Lake Thunersee, one of the country's most popular dive-sites. Here we met up with friends to dive and hang out.

This was welcome – most of the time it's great living on the road and spending the days working and exploring together but it can also be strenuous to live in 6sq m and spend so much time together.

After saying goodbye to our friends it was time to head north to dive the south of Sweden before driving home through Norway. See you there next time!

Clockwise from above left: The rocks in the Portofino MPA are covered in gorgonians; a sea bream checks out a jellyfish in Portofino; a perfect place to stop for the night in the Dolomites, with mountain view and a lake to swim in.



WE DIVED WITH...

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WORTH EVERY MIDGE

There had to be a drawback to the perfect dive road trip and in north-western Scotland it had to be the 'wee eveners' – but it would take a lot more than bitey flies to spoil the diving for ROSS MCLAREN

MOSTLY DIVE OFF THE COAST around the Clyde and in the West Coast sea lochs around Loch Lomond, so when my friend Andy "the Northern Diver" Clark invited me to take part in his expedition WET to try something new a bit further north, I jumped at the chance.

The invitation also gave me the chance to get our pride and joy Tom the Transit out for his first adventure of the summer… and first overnight diving trip.

However, as he is a family camper I had very strict instructions that he must be kept clean and dry-ish at all times.

I don't really know what they were worried about, because my car is the epitome of looked-after.

I cleaned it twice last year in place of the normal annual event.

The dives were planned for Loch Carron, about two hours north of Fort William in the north-west and about 20 minutes from the ever-popular Eilean Donan Castle. This meant a bit of a drive after work on a Friday night but I find there's something special about going the extra mile (in this case 100 miles) to dive, enjoying all the way the anticipation of what we might find.

One of my favourite roads runs across Rannoch Moor and through Glencoe, but on this occasion the drive was even more special.

An already magical place was made all the more spectacular as the evening sunlight cast an unbelievable golden hue over the landscape and mountainsides.

We moan about the weather in Scotland and, more specifically, the rain, but there is an upside to it all – the resulting lush green landscape.

The views were breath-taking as I passed through Fort William and headed on through Glen Shiel.

Eventually Glen Shiel opens out onto beautiful Loch Duich. As the sun began to set behind the mountains Eilean Donan Castle on the loch was bathed in an incredible light to which my photos only barely do justice.

It's easy to see why this remote location has been used in so many movies and TV programmes over the years.

Above: Blenny.

Left: Three Sisters in spectacular Glencoe.

Eventually I made it to the very aptly named Wee Campsite at the back of Lochcarron – that's not a typo but the one-word name of the village.

I have a theory about Scotland. Whoever created our glorious country did an unbelievable job, but I think they did it too well. The other countries in the world must have been jealous, so to quell unrest across the globe they had to add in a wee "evener" – the midge!

There are not enough expletives in the world to describe this scourge of Scotland. I reckon had William Wallace or Robert the Bruce worked out how to weaponise the wee bugger we'd have taken over the whole of the British Isles and all be speaking Gaelic by now.

Heading north in summer? Get yourself a midge net and some Smidge!

I HAD MISSED waking up in the van. Getting up first thing in the morning, opening the curtains to the sun slowly climbing over the hills and getting a wee brew going on the stove is something special. It sets you up for the adventures ahead.

Dive one saw us head through the village and drive about 20 minutes up the road to Conservation Bay.

Parking just at the side of the road (there's plenty of space – we had four vans and three cars between us) you head down to the pebbly beach.

The only real downside to the site is the trudge down. It's not "difficult" and the path is well made but it's just a bit of a slog, especially at the end of the dive.

The bay is beautiful and I wished I'd brought the paddleboard for a wee shot too – next time.

The dive does have to be done around the start of slack water and then timed so that the outgoing current brings you back to the beach at the end, but it's well worth it.

Dropping in, the first thing that hit me was the incredible visibility, and I was reliably informed that on that day it wasn't even "that good". I'm used to 5m being "good", so with 15m-plus in some places, for me it was out of this world.

I've never dived a wall that was quite so alive. In parts it was almost impossible to see the rock face itself because of the extensive coverings of yellow and orange dead men's fingers and sponges.

In among the soft corals was the odd anemone. Their bright pink and white standing out against the backdrop of the wall was a magnificent sight.

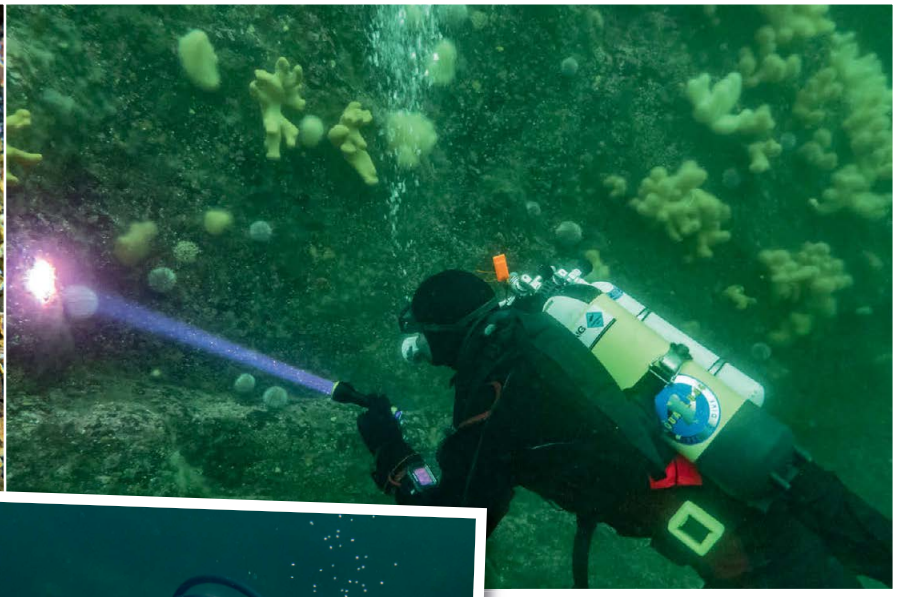
Closer inspection of parts of the rock face and the sponges revealed the occasional nudibranch too.

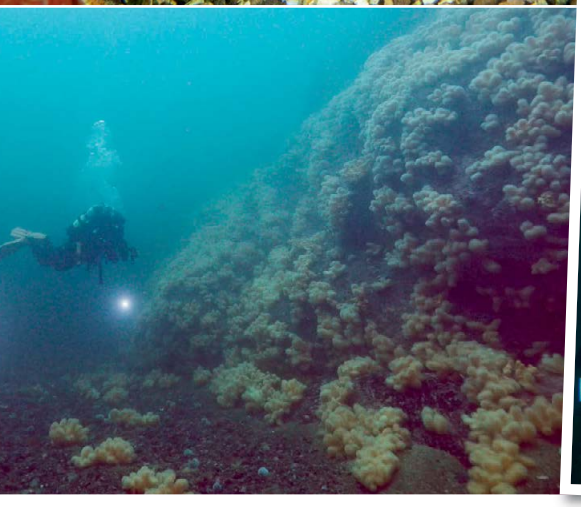
The spiky sea-slugs were, as always, a treat and proof that it pays not to restrict yourself to the wider view.

At only 20m deep this wall would seem to suit divers of all levels, and once on the seabed an array of starfish, crabs and

Above, clockwise from top left: Eilean Donan castle; pink anemone; Alex Differs on the wall in Conservation Bay; thirst won't wait – an antique gin bottle; Ross on the wall at Castle Bay; nudibranch.

Below right: Conservation Bay.





flatfish make their presence felt.

We headed back towards the village to Strome Castle and the bay/slipway around it. I'm not sure I have ever dived such a dramatic-looking site.

As you look out on the bay, the ruins of the castle loom over it and you can imagine what it would have looked like hundreds of years ago.

This spectacular view epitomised why I love diving in Scotland.

You get the amazing sites under water, but the sights above the surface can be just as impressive, and there's a palpable sense of adventure about them.

OUR SECOND adventure of the day was a drift-dive that saw us enter the water from the bay and be taken around the small headland on our left and into the slipway on the other side with the incoming tide.

Below: Andy Clark at Castle Bay.

It was another wall and one that gave the wall at Conservation Bay a run for its money. We did have a wee bit of a surface-swim out to where we dropped down, but it was well worth it.

From the surface the drop was about 10/11m to the seabed, and once again the visibility was incredible.

Once beneath the waves we kept the wall on our left shoulder and followed it round. The first section took us through a "canyon" of sorts before hitting the main wall which, much like Conservation Bay, was awash with life.

The current here was a bit fast, so stopping for photos and to really explore the wall wasn't the easiest, but the colours and the ambient light streaming down from above made it one of my most memorable dives.

Normally on a dive day I'm very much of the opinion that I'm there to dive, so it's in, out, one hour's surface interval (longer if the previous dive was a bit deeper) and back in as quickly and safely as possible.

But with the views and the company that weekend the surface interval of two-plus hours seemed to go by without me realising it. In fact the diving almost became a second thought.

Having the campervan there for its first proper dive-trip made for a very civilised surface interval.

One of the other divers even had his own teacup and saucer – don't ask.

THE FINAL DIVE of the day was straight off the slip at Castle Bay and out into the wee bay and over the maerl beds – something new to me, but what an experience!

My buddy Chris Rickard, who is a conservationist and UK marine-life expert, explained exactly what this weird-looking stuff was – it's a red coralline algae that grows at half a

Clockwise from above: Castle Bay; butterfish; flame shell; maerl bed; scorpionfish.

Bottom: Ross at the Castle Bay site.

millimetre a year, so if any damage occurred to the bed it would take years if not decades to recover.

The vital role maerl beds play in the spawning and nursing of a variety of marine life has only recently been fully appreciated, and Loch Carron is now a designated Marine Protected Area to help keep them safe.

By far the coolest and weirdest creatures of the weekend were the flame shells found there. These bivalve molluscs are related to scallops and, like them, are able to swim to evade predators, Chris told me. Brilliant orange tentacles protrude from their shells, and they use these to catch food. They do resemble fire as they wave in the current.

IT WAS A PRIVILEGE to see the flame shells, because they tend to spend most of their time buried under the seabed.

They're hugely important to our marine ecosystem, because adding a few hundred of their nests to a sea floor changes it from a mobile sandy bed to a static one.

This then provides an anchor-point for other marine animals and somewhere for them to spawn and nurse their young.

We spent a good 65 minutes exploring the seabed along with another wall, and could have easily spent another 65.

The vis remained out of this world and it was so bright that lights were redundant.

On top of all the life an assortment of old bottles were scattered around, and after carefully checking that it wasn't home to any little critters I might have pocketed one for my collection… shame there was no gin in it!

This was my first real overnight dive-trip in the campervan, and it won't be the last. Having the option to pull up at the side of the road next to a loch and just set up shop for the night (responsibly) is a great opportunity and I'm lucky to be able to take advantage.

It won't be my last visit to Loch Carron either – between the incredible diving, the beautiful scenery and some nice places for paddle-boarding it will remain on my to-do list – but perhaps to do outside of the midge season!

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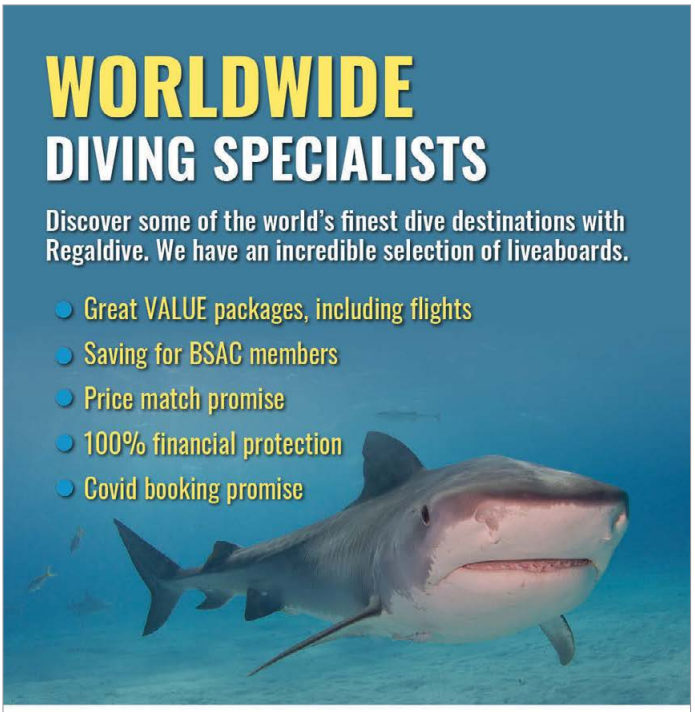

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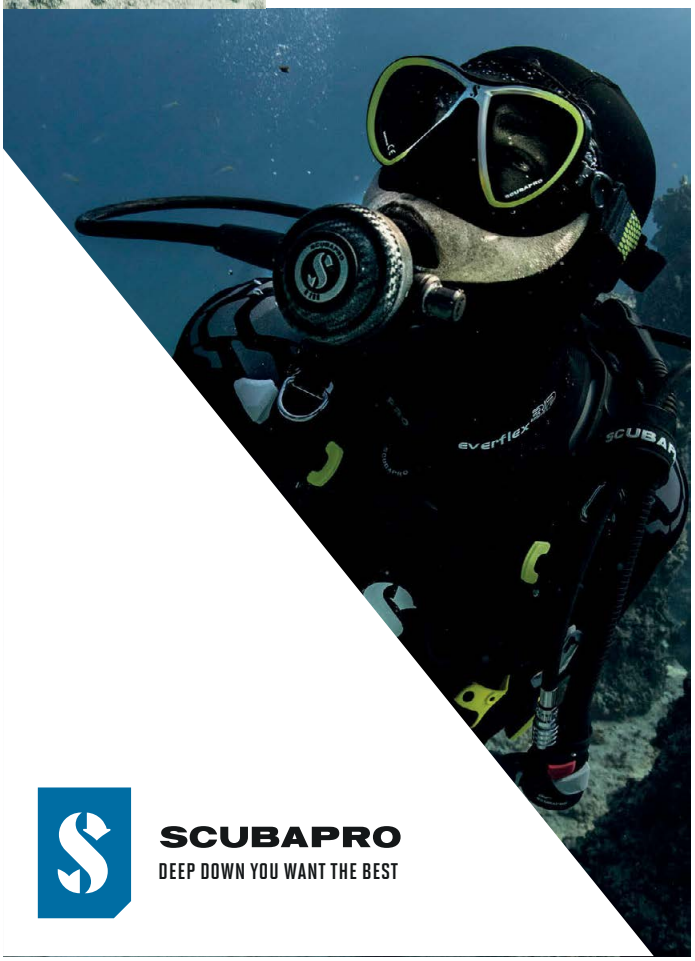
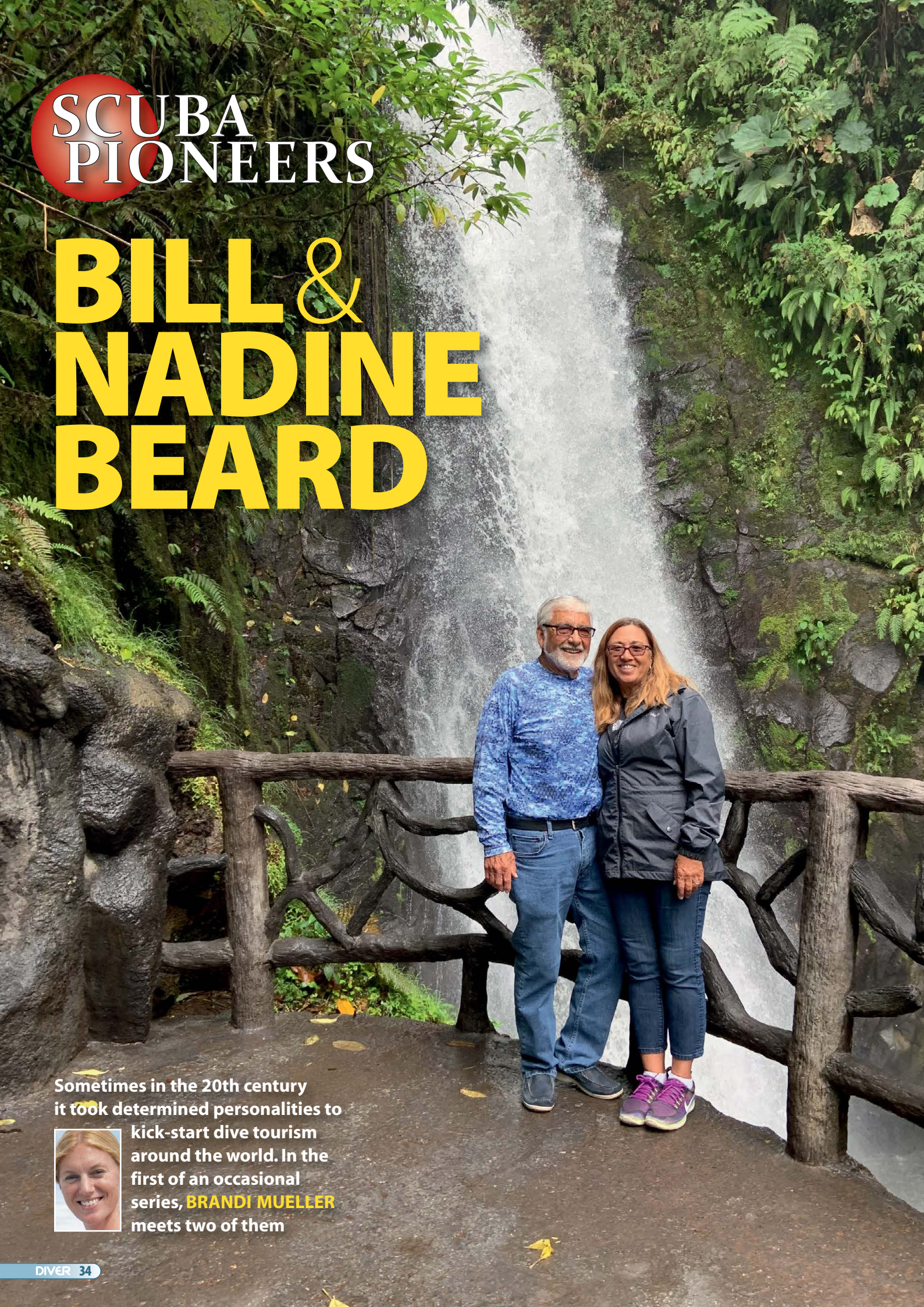


SCUBAPRO
DEEP DOWN YOU WANT THE BEST

SCUBA PIONEERS

BILL & NADINE BEARD



Sometimes in the 20th century it took determined personalities to kick-start dive tourism around the world. In the first of an occasional series, BRANDI MUELLER meets two of them

ON A RECENT TRIP to Costa Rica arranged by Bill Beard's Costa Rica Scuba Diving & Adventure I heard bits and pieces about the famed Bill, the man who brought diving to the country. On a trip more than 50 years ago he had seen the potential – but could find no one to take him out or provide tanks.

What followed was an adventure worthy of a novel. Bill & Nadine Beard video-chatted with me recently about their challenges and successes in Costa Rica, from filling tanks he had brought in his hand-baggage at the country's only compressor through early-days diving from canoes to teaching local people both how to dive and about the importance of conservation.

As a child, Bill loved water. "We would play a game where we would bring back a handful of sand to the surface to show we had made it to the bottom," he said.

"We would go deeper and deeper and see who won." I believe Bill won a lot. By the time he reached adulthood he was already competing in and winning US spearfishing contests.

I asked him how he got into scuba.

"My first time was when a friend had a tank on the boat. We were spearfishing and he said: 'Try this'. It was before BCs, and I just held onto the tank.

"He strapped some weight on me and I jumped off the side of the boat straight down into the silt. I probably had too much weight on, but I thought 'this is pretty cool'." They used the tanks mainly when they wanted to spear species of fish that were difficult to reach.

Times changed. Certification cards started to be required to fill tanks, and Bill needed to become properly certified. He quickly became an instructor, and started certifying his friends.

After exploring a few other diving locations, a cousin mentioned that he should check out Costa Rica.

KNOWING NOTHING about the country, he visited the library to learn more and was soon on his way.

He liked CR but after failing to find a scuba tank he left – and returned with his own. "The only place I could find to fill them was Miller Gas in San Jose," he told me. It was 1970. Initially he would go diving using a dug-out canoe.

Bill opened CR's first dive-shop, and later the first resort dive-centre. When setting up the business he would buy flight tickets for friends in exchange for them bringing items he needed to stock, from tanks to masks, fins and snorkels.

I laughed, and asked if he had ever considered that he was probably the only person muling things "into" Central America at a time when so many others were muling things out.

Bill started out teaching at the university in San Jose, and to stay afloat had to do other things, including working in a barbecue restaurant.

After becoming known as a diver and instructor he started getting a lot of calls from local law-enforcement officers to carry out not-so-fun search and recovery missions. "So then we certified the local police, so that they could recover bodies on their own," he said.

I HAD BEEN tipped off by Vanessa Willing, director of the company, to ask Bill about diving the Poas volcano. It's 2708m high and active, the most recent eruption having occurred in 2017.

I had taken the winding road up to the national park to see it on my first day in CR, but unfortunately all I had seen was a white mist of clouds.

Bill told me that some of his dive-buddies had been out drinking and ran into a researcher from the UK studying the volcano and crater lakes.

They had suggested that they could help by diving the lake to take samples, and Bill was recruited to help.

"At 5am the next day we were carrying an aluminum boat up the volcano with our tanks and dive-gear," he said.

The water had been cold and the air even colder (it's chilly at altitude) but the water was crystal-clear. "While we were taking samples we came across an old Coke can with zero rust because the water was so pure. There was a mooring from 1908, put in when the lake used to have a tour-boat, and I was able to unscrew the iron bolt from the mooring because in water that pure there was no rust."

On surfacing, the divers found themselves in the same white-out cloud mist I had seen on my visit to the volcano. They couldn't find the boat (nor could the boat-crew find them).

So they waited, in the freezing cold, for the cloud to pass.

Bill had noted bubbles coming up from the floor of the lake, caused by volcanic activity. They got the samples the researcher wanted and headed back down into the warmth.

"I wasn't drinking then but they had hot sugarcane juice and rum we were drinking to try to warm up," said Bill.

Halfway through his foggy, frigid story, he stopped and asked if I was asking about diving the Poas volcano or the time he had dived the Arenal volcano's lake.

I said I'd love to hear about both… but we were already too far sidetracked.

INSTEAD, BILL told me of another dive on 11 July, 1991 that prompted me to make an addition to my own bucket-list.

"We found out that there was going to be a total solar eclipse, and I wanted to dive it. I asked all my dive-buddies and everyone laughed and said no, but I finally got one buddy to dive with."

Plans were made, and as the eclipse got closer word spread and interest increased.

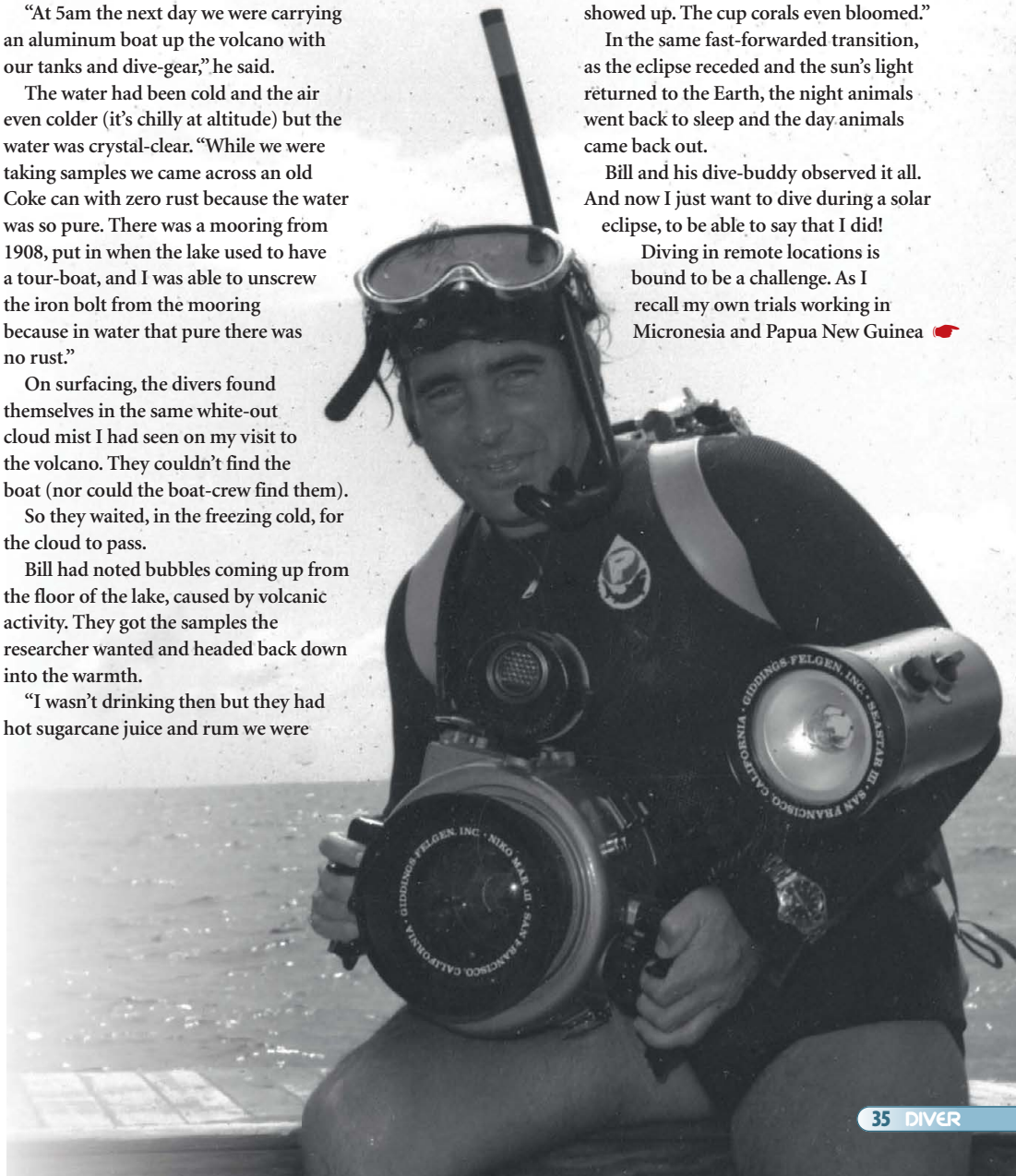
"That day everyone came out in different boats. Even the president was on a boat to watch the event. We got in before the eclipse to see what would happen."

Bill described a normal underwater scene to start with: "It was like before a night-dive but it went really quick to all-black, with everything behaving like it was night. Fish that you don't see at night disappeared; those that come out at night showed up. The cup corals even bloomed."

In the same fast-forwarded transition, as the eclipse receded and the sun's light returned to the Earth, the night animals went back to sleep and the day animals came back out.

Bill and his dive-buddy observed it all. And now I just want to dive during a solar eclipse, to be able to say that I did!

Diving in remote locations is bound to be a challenge. As I recall my own trials working in Micronesia and Papua New Guinea



Below: Bill Beard in the early days in Costa Rica.

today, I can hardly imagine what it was like introducing dive operations in a Central American country 50 years ago.

Nadine chimed in about the accounting difficulties involved in paying their staff.

"The bank was an hour away in each direction and we didn't have Internet or credit cards. People still paid their bills with traveller's cheques that took 60 days to clear."

What a customer paid on 1 June would not become available to the business until at least the start of August, and any small business-owner can imagine the stress this could cause. "Sometimes it was difficult just to meet payroll, because we couldn't access the funds for so long."

Without the big grocery stores we take for granted, food supplies were limited too. The couple found that one of the best ways to guarantee a stocked fridge was to befriend local fishermen and get first crack at their fresh catches.

"Once I bought some shrimp off a fisherman and ended up with tons of it," said Nadine. "We were trying to sell it and giving it to all our friends."

I WANTED TO KNOW how it felt to find a new site, thinking of the famous Bat Island, which commonly has several large bull sharks roaming around. What was it like diving a random island in the middle of nowhere for the first time?

"I took friends spearfishing there," Bill told me. "We got a 70lb amberjack and then we learned about the bull sharks in the area. That was pretty scary – maybe it wasn't too smart."

Bill is proud of his ocean conservation work in CR. In the 1970s a Costa Rican could make a quick buck catching fish to sell to the aquarium trade. To stop this, he said that he certified and hired as many of those fishermen as he could.

"We took anyone who wanted a job other than fish-collecting," he said. All these men became certified, which stopped the practice while also providing more sustainable jobs for the fishermen.

The fish were worth far more alive than in someone's fish-tank. Later Bill also set out to stop dragnet fishing, whereby nets are dragged along the seabed, destroying far more than they catch. In the end the practice was outlawed in CR.

NADINE HAD BEEN working as a clerk at a post office in Canoga Park, California, when she met Bill in late 1987, "and diving was probably the farthest thing from my mind," she explained.

"He would wait in the line every other day to buy a couple of stamps, which I'm sure he didn't need, just to get a chance to say hello." Some mutual friends kept putting in a good word about him but, concerned about the 22-year age gap, she kept saying no to his requests for a date.

"One day he asked if I couldn't just have a cup of coffee with him. I thought a harmless cup of coffee couldn't hurt, right? My world has never been the same.

"Once I had a chance to sit down and talk, I found him to be one of the most interesting people I had ever met – and he had Costa Rica on his side too.

"We dated for several months and I told him: 'I've never dated anyone as old as you,' to which he replied: 'I've never dated anyone as old as you.' *Touché*."

Bill returned to Costa Rica and asked Nadine to visit him there. "He had just put in the tin-roof dive-shack at Ocotal, and promised to teach me to dive. I had never been snorkelling, let alone diving. Lying on the beach was more my style.

"I didn't even have a passport, but you didn't need one to visit Costa Rica at that time – only a $3 tourist card. So I boarded a flight to San Jose.

"Bill was busy running the dive-shop, so I rented a car and followed his directions: turn left onto the Pan-American Highway, pass through two mountain ranges and three and a half hours down the road when you see the first stop-light, turn left.

"After the double bridge, take your first right, and at the beach I'll be sitting on a bench waiting for you.

"The sun was setting when I arrived, so it was only the next morning when I saw the blue water from the hotel perched on the hillside. I was blown away, and knew it was going to be really hard to leave.

"Bill gave me the resort course and I fell head-over-heels in love with diving. I dived every day that week, and soon after that I quit my job at the post office."

Nadine took her PADI instructor course at Dixie Divers in Florida. "I was terrified. It was 1992, and I was already working at the dive resort. If I failed, it would be mortifying but I felt totally unready for the physics, physiology and equipment portions of the course.

"Bill was super-confident, and luckily I passed. I loved being an instructor and introducing the beauty of the underwater world to new divers.

"I have never regretted for one moment taking the plunge."

AS THE ONLY INSTRUCTOR for his first 15 years or so in the country, Bill has connections to most of the CR dive community. "When we go back we have young guys come up and tell me that I certified their fathers and sometimes their grandfathers," he says. Many dive-industry workers in Costa Rica can trace their start back to Bill and Nadine.

The couple talked about how the needs of divers have changed over the years. Previously people had wanted to come to dive, dive, dive, but in more recent years it seemed that more also wanted to experience CR on land.

The couple's extensive time in the country had left them with a wealth of information. They decided to transform their business into an all-activity booking agency. They now set up personalised trips to meet the needs of any traveller, which can include diving both coasts, seeing wildlife, hiking, hot springs, zip-lining, whitewater rafting and more.

Both Bill and Nadine are SSI Platinum Pro 5000 members, multi-agency instructor-trainers and have been elected into the International Legends of Diving in the USA.

Incidentally, Bill retired from spearfishing when he was 46 (after winning the trophy for biggest fish in the Dominican Republic's "Festival del Mar" tournament).

He doesn't sell spearfishing trips, but says that he does support the practice when locals are freediving and fishing selectively for food.

billbeardcostarica.com

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Things fall apart

LOUISE TREWAVAS

I CAN'T QUITE UNDERSTAND IT. How did that happen? Every item of my scuba kit was fine when I put it away.

Perhaps it's lockdown. Perhaps this always happens after a period of "dive hibernation".

I'm finding it difficult to accept that items of my kit can expire in storage. The longer I've owned a piece of kit, the greater is my confidence that it's pretty much indestructible.

I've had the same mask for more than 15 years; why isn't it just the same as it ever was? This is not my beautiful mask. It's looking battered and discoloured, with a split in the seal.

When I took my faithful old computer to the dive-shop to ask for a battery-change, the guy behind the counter shook his head.

He said they don't make those batteries any more, which made me feel really sad, as if a part of my life had been declared obsolete.

So I dug out my much newer Suunto D5 dive-computer and found that the strap had completely sheared off – on both sides. It would now look more at home pinned to a nurse's uniform.

For me, an important part of a dive-computer's function is help prevent a leak through my wrist-seal. This is no good at all.

I excavated a diving pouch that I had left in the bottom of my crate and discovered that the batteries inside my back-up torch are covered in rusty sludge. So no big surprise that it wouldn't turn on.

There is also a massive hole appearing between the finger and thumb of one of my dive-gloves. And they don't seem to fit me any more – have my hands mysteriously grown?

I'm beginning to take this personally. I feel like a pet-owner, guilty of neglect. I'm wicked and I'm lazy. Perhaps it's me that's in a state of deterioration.

OF COURSE BACK IN THE DAY, when newly qualified, I would worry about my scuba-kit failing me on a dive. Today's dive-kit is actually incredibly robust and reliable. In reality, I'm more likely to fail my dive-kit than the other way around: fail to check it, clean it, or fail to put it together properly.

Or change the batteries. Possibly in my case, all four.

Being a bit slack about looking after your gear is actually a bit of a luxury. If you dive with a rebreather you'll enter a whole new relationship with your kit, because now every piece of it is part of a system: your life-support system.

This system has numerous fascinating points of failure, some of which seem to occur secretively.

With scuba you only really have to worry that you have something to breathe. So just don't empty your cylinder and lose your buddy; everything else is manageable.

With a rebreather you have to constantly monitor that what you're breathing isn't about to kill you.

This is an entirely different level of intimacy. You might as well set a place at the dinner-table for that rebreather now, because that's how constant your attention is going to have to be.

This is now your wild, wild life.

It's easy to get distracted, but nothing is staying still. Sometimes I just have to remind myself, things fall apart. It's scientific.

HIDDEN GEMS ON

ESCAPE ISLAND

During the Covid pandemic circumstances led CATHERINE HOLMES to spend time diving in Barbados. Wide-angle lens or not, it proved an eye-opener

BARBADOS HAD NEVER been high on my list of diving destinations. It's best known as a celebrity hang-out and home of fine Caribbean dining.

I found myself on the island in late October last year, escorting my mother to family living there. It was just before the second UK lockdown and we stayed on for a month while the surgery where I work was closed, and my husband worked remotely from there.

We were among many nationalities finding themselves in the same position, several staying for months on end.

Barbados pre-Christmas had suffered almost no Covid-19, having imposed strict entry requirements and isolation on arrival. Covid-related deaths were in single figures. This changed at Christmas when tourists, many from the UK, broke isolation rules, leading to a spread that reached the prison, then the community.

However, the authorities quickly reintroduced strict lockdown, enforced by the military guard. By May it was getting back towards pre-Christmas levels, with a vaccination programme in place.

Diving stopped altogether for a couple of months, and restaurants were closed. In the new normal diving began again, at first tentatively and from shore only.

Barbados remains a good place to travel to, if and when we can, with direct BA and Virgin flights daily.

Until the last total lockdown it had been on the list of countries not requiring quarantine on return.

Set in the lesser Antilles, just east of the Windward Islands, it is a beautiful green island with sandy beaches, year-round sunshine and beautiful clear water.

The east coast, the Atlantic side, is rugged, with large waves crashing on miles of deserted beaches. Wild and beautiful, it's good for a day trip.

The west coast has calm, clear ocean that laps onto white, palm-canopied beaches. Most of the development is on this coast, with large hotels, beachside restaurants and fishing villages with picturesque boats and colourful wooden chattel houses.

Bajans are relaxed, friendly people, and the sound of the Caribbean music served with the local rum is never far away.

Wander a few miles inland and you find photo opportunities galore, lush tropical gardens, wild green monkeys and hummingbirds.

The capital, Bridgetown is the hub of activity, with a large cruise-liner port, fishing boats, hotels, markets and a famous cricket ground.

From here people go game fishing, on catamaran day trips for snorkelling and to see the local green turtle population, and even on a submarine to view the reef. A hyperbaric chamber was installed in 2004.

Most of the dive operators, visiting some 40 sites, are found in Bridgetown. Many shut down during the pandemic but several had kept going and were glad of our custom.

I HAD DIVED BEFORE with Roger's Dive Shack, a family-run PADI dive-centre. Roger Hurley started up in 1998 and the place is usually busy and well-organised, but with few visitors only the two-tank morning dive-trip was available.

Arriving at 9, diving is usually finished around 2pm, but we had to slip into Bajan time and be relaxed about start and end times. The boat can take up to 15 divers to the fringing reefs every morning for the first dive, with a second dive usually in Carlisle Bay near the dive-centre.

You kit up on shore, walk out to the beach and swim to the boat.

There are two distinct barrier reefs and fringing reefs on the west and south coastlines.

The barrier reefs, separated from the shore by deep lagoons, are 15-25m across and start at a depth of 15-21m, sloping on the deep side to more than 60m.

On these long inverted U-shaped reefs divers drift with the current, often to be picked up further along.

Inner sites are shallower, with more soft and branching coral growth.

As a photographer, I found the outer reef near Bridgetown and towards the southern sites pretty repetitive, except for the small but beautiful wreck at Friars Craig on Asta reef.

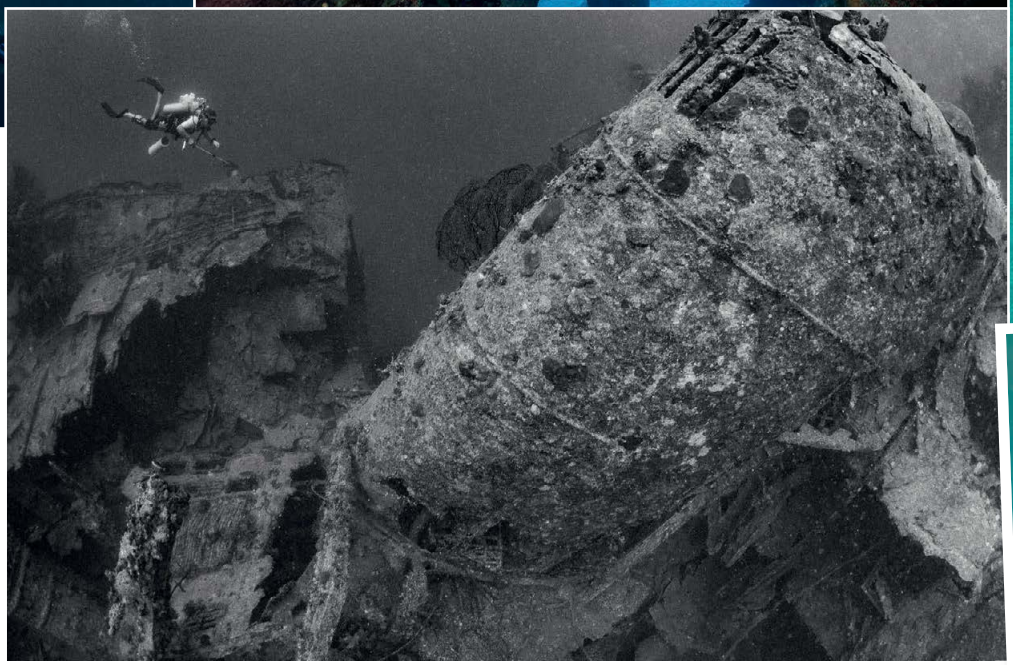
Above: Caesar grunt and pink sponges in Carlisle Bay.

Left: Green monkey.

The sea as you head south tends to get choppy, and the visibility slightly poorer.

There are some passing rays and turtles, but for me there is evidence of overfishing and the seascape is bland. Many locals and dive pros visit these sites particularly to spear lionfish.

Lionfish have become a serious threat ☛



to fish life in Barbados since 2011.

The invasive species reproduces rapidly, spawning more than 2 million eggs a year, and is a ferocious predator on juvenile fish. It has depleted the population by more than 80%.

Divers and fishermen are encouraged to hunt them in a conservation effort to save the reef ecosystem.

Carlisle Bay is a joy for a photographer. My brother would often head home after the first dive, but I revelled in super-long dives in the shallow bay.

There are six wrecks in the bay within a very small area, at a depth of 6-18m.

It's possible to dive all six in one dive, but for photographers there are numerous distractions along the way, making moving very far unnecessary.

Four of the wrecks were sunk deliberately. *Bajan Queen* is the newest, from 2002, and the largest wreck, at 36m long. Its intact engine-room is encrusted with corals, and the two huge propellers are surrounded by blackbar soldierfish.

The wrecks all attract their own distinct marine life, and the whole area is a protected marine reserve, with a resident green turtle community.

Carlisle Bay can be accessed as a beach dive, if not from the returning day-boat. The wrecks are home to huge shoals of sergeant-majors, squirrelfish, lizardfish and grunt.

Moray eels can be found sheltering under the wrecks, alongside lobsters.

Hard corals encrust most of the wrecks, and blennies abound. The shallow clear water makes this an ideal place to try out new techniques or spend longer on subjects. On my first dive there I was surrounded by a school of squid, and often encountered the local sting ray and turtles.

Above, clockwise from top left: Dive-guide hunting lionfish on the *Stavronikita* wreck; blackbar soldierfish on the *Bajan Queen*; the *Stav*.

Below: Spotted moray eel off the north-west coast.

Below right: Secretary blenny.

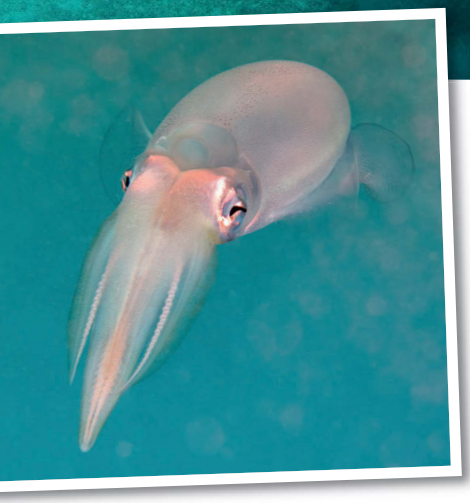
A PARTICULAR TREAT are the many seahorses. Dark brown and with a rough surface texture, they can be difficult to separate from the background, though the conditions and long dive-times help.

As the only photographer on most dives, I found such subjects readily available. Other interesting species included a pair of slender filefish, bottlenose batfish, flying gurnards and frogfish.

As a solo diver I found the daily schedule slightly limiting and time-consuming. I would happily have dived two or three times a day just in Carlisle Bay, but couldn't arrange a means to facilitate this easily at the time.

A real joy after a long morning of diving from Bridgetown is a visit to the nearby Cuz's Fish Shack on Pebble Beach, renowned as the best fish shack in Barbados, father and son over 67 years.

Its fish cutter with Bajan chilli sauce is



washed down with a refreshing beer or liquor from the rum shack next door. Ask any local for directions.

Another west-coast diving highlight is the 111m *Stavronikita* wreck.

It lies upright embedded in sand at a depth from 9m at the top of the mast to 40m at the keel, covered in a huge number and diversity of corals and surrounded by shoals of fish.

The vessel was sunk in 1978 as a substrate for an artificial reef for divers. Like other large wrecks, it provides an ideal site for many and varied dives, and both wide-angle and macro photography.

Bottom time is often limited to 30-40 minutes, particularly diving on air, which was all that was available at the time from Bridgetown.

Several hurricanes have caused the bridge superstructure to collapse, and many areas inside are unstable, but part of the engine-room can still be entered.

Beautiful gorgonians, seafans, black corals, colourful sponges and hydroids adorn the mast, beams, ladders and lower stern. There is an abundance of life from nudibranchs, shrimps and blennies to moray eels, turtles and schools of jack.

Luckily we experienced no current, which can be problematic in this area. Organising the trip was not straightforward, and only one dive was available at the time.

A FELLOW underwater photographer suggested Cement Plant Pier in the north as the best place for photographers to dive after Carlisle Bay.

I eventually managed to find a small operation at Little Good Harbour, next to the wonderful Fish Pot restaurant in a very beautiful setting.

BarbadoScuba is run by Scott, a fellow Australian. He was super-efficient and very safe taking small groups of divers, ideally only four at a time, to various north-west coast sites.

He was flexible, happy to start very early to maximise the number of dives, and to run morning and afternoon trips.

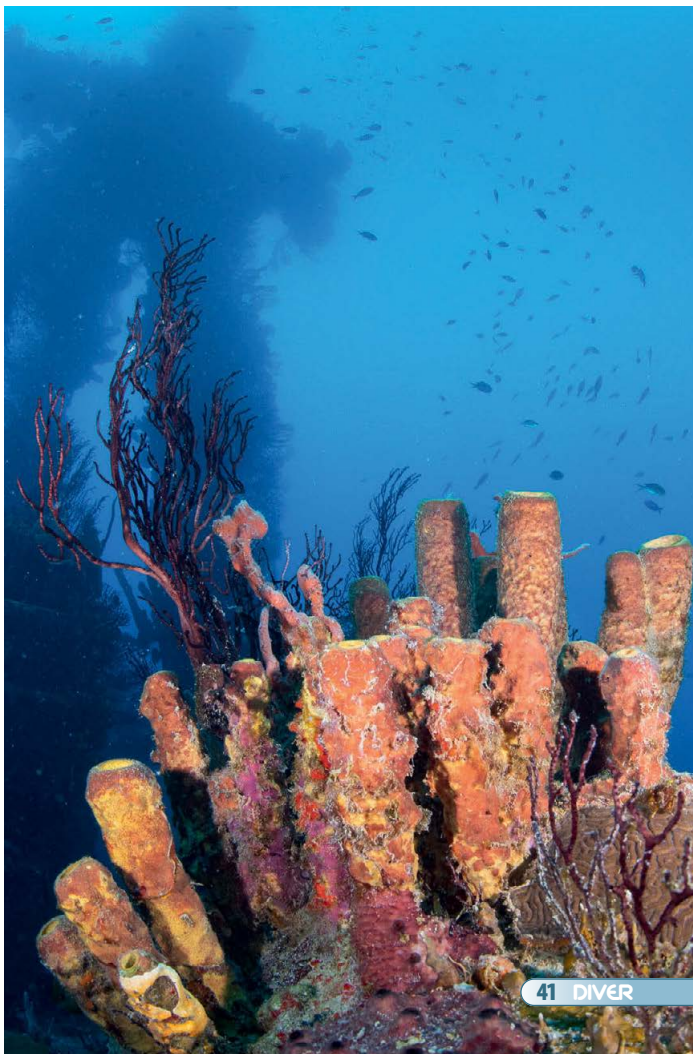
Little Good Harbour is just under an hour's drive from Bridgetown but the efficiency once there makes it worth the trip. Scott can supply nitrox and the tanks are loaded on the boat ready to go

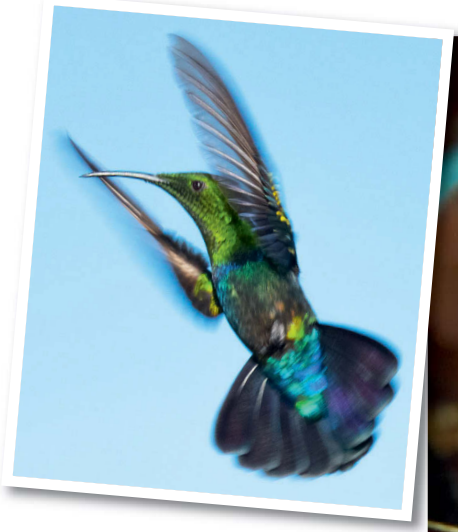
Above, from left: Green turtles; slender filefish pair.

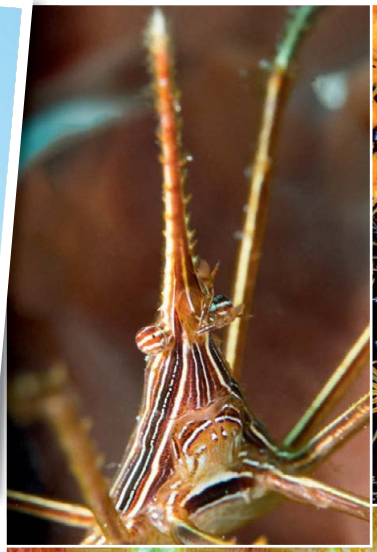
Left: Squid in Carlisle Bay.

Below left: The Fish Pot in Little Good Harbour

Below: Spotted tube sponges on the *Stav* wreck.







Top left: Hummingbird.

Above, clockwise from top left: Arrow crab; yellow cup corals on black sponge; cleaner shrimp; neon goby on hard-coral block.

when you arrive.

There are many beautiful sites in the north-west, where the water is far less choppy and the reefs verdant and teeming with fish. There are regular sightings of eagle rays and turtles as well as schools of mackerel, bar jack and barracuda.

Cement Pier itself is a working area, so access to dive there is sporadic, determined by the arrival and departure of ships and announced only the day before or on the day.

It is described as a very easy dive in shallow water but sadly it remained closed while I was there. A week later it opened for a day and my brother dived it.

He described it as beautiful on that day, as sunbeams permeated the pylons.

Smaller critters, seahorses, frogfish, octopuses, filefish, shrimps, sailfish and pike blennies can be found there, along with the rare bottlenose batfish and jawfish incubating eggs in their mouths.

The pylons are covered in huge sponges, and schooling fish congregate there. Occasional pelagic species pass through hoping for a meal.

I REALLY WANT to dive this site, but I did manage several other dives on the north-west coast, including the wreck *Pamir,* a 51m cargo ship that sank in 1985 and rests upright at 12-15m. You can enter the ship through large holes and it teems with life, inside and out.

With such a small dive operation and not limited by long drift dives I was able to revisit sites and had time in the calm clear water to linger and experiment with different lenses and techniques.

There are also some dive-sites in the far north and on the east coast, but both areas are challenging to get to and dive.

The east coast has pounding waves and rough seas, but in the summer it can be calmer. The seascape is said to be much starker with giant boulders and less coral, but big schools of fish.

In the far north Sharks Hole is an advanced dive to a depth of 18-28m. The seas are choppy, with a big swell, so it is rarely visited, though it sounds exciting.

Barbados remains a safe and appealing place to visit, with strict and well organised quarantine measures. If you go, the *Barbados Dive Guide* by Lucy Agace provides a useful reference source.

My apologies for the lack of wide-angle images with this article, but a flooded strobe on day one left me with a single strobe and backscatter torch for the month. The dive-shop didn't really cater for photographers and items sent by post can be delayed for months by customs, so do your best to take spares with you.

FACTFILE

GETTING THERE ▸▸ BA and Virgin Atlantic fly direct from London Heathrow to Bridgetown (BB).

DIVING & ACCOMMODATION ▸▸ Catherine dived with Roger's Dive Shack, a PADI 5* centre, rogersscuba.com, and PADI & SSI centre BarbadoScuba, which can also arrange accommodation on request, barbadosscubadivers.com

WHEN TO GO ▸▸ Year-round diving. Water temperature is 26-29°C. Wettest months June to November (hurricane season).

MONEY ▸▸ Barbados dollar ($1.98 = US $1)

HEALTH ▸▸ The Barbados Defence Force runs a hyperbaric chamber near Bridgetown.

PRICES ▸▸ Return flights from London from £500 (November). Five-dive package with Roger's Dive Shack US $275.

VISITOR INFORMATION ▸▸ visitbarbados.org

A hidden retreat in the middle of a busy international port near the city of Antwerp, Domein Muisbroek hosts a rich population of fish and is a resting place for waterfowl and migratory birds. Belgian divers refer to it as "the Well of Ekeren". KURT STORMS reports

NATURAL ATTRACTION

IT'S STILL EARLY in the morning, and I am photographing in the shallow water near the platform. The sun's rays cut through the foliage and give the steps a fairytale atmosphere. Fortunately I have installed my fisheye lens, because the water is crystal-clear today.

Many Belgian divers have taken their first fin-strokes at Domein Muisbroek. The usually good visibility at the inland site makes it an ideal training ground.

When you first arrive by car at the location, nothing suggests that it once belonged to the North Sea.

Millions of years ago, during the Pliocene and Miocene eras, the sea level was about 50m higher than it is now. The Miocene was the time of *Megaselachus megalodon*, at some 18m the largest shark that ever existed.

Much later, during the 1920s, soil was excavated to raise the bottom of a railway marshalling yard in Antwerp North.

This created two lakes, the largest of which was originally 7-9m deep. According to rumour, this served as a source of water for the steam locomotives of the time.

It's said that the supply was later capped because the water was too hard.

Later, during the construction of Belgium's A12 motorway, the lake was excavated to greater depths. And in 1997 AVOS, the Antwerp Association for Conservation & Sport, concluded a user agreement with the city for scuba-divers to be allowed to use the location.

Above: If you can't get fish to pose, this dweller in the Well of Ekeren is always available.

Via the purpose-built platform you can either jump straight in or take the steps.

Along the water's edge, you can dive to a depth of 6m, while in the middle of the lake you can find those depths down to 21m and a bottom consisting of mud and silt.

IT'S ALWAYS WORTH taking a good look at the impressive perpendicular drop-offs that surround this pit. You're likely to see many fossilised seashells and, if you're lucky, even shark teeth.

Taking the fossils home with you is, however, not an option. Once out of the water, they collapse.

The thermocline is evident when descending, the temperature dropping with every metre, so adequate thermal protection is recommended, even in summer.

From May onwards, the vegetation along the edges of the lake increases and schools of young perch are visible everywhere.

The water plants purify the water and visibility soon improves dramatically, making this my favourite time of year.

In several places fallen trees and branches overgrown with algae lie on the shore, and when the sun shines, you can capture its rays filtered through these in your photo.

For this sort of shot I use my wide-angle lens with a short shutter-speed – 1/125th or faster.

About 15m from the jetty is a fallen tree with a trunk that remains partly above the water, often with ducks resting on it.

BY THE TIME summer arrives the waterweed is at its densest. This provides good concealment for all kinds of underwater inhabitants, including eels, pike, perch, carp and crayfish.

There are also said to be turtles in here, though I have yet to see them.

At the surface nature is also in full bloom around this time, and mating damselflies and nectar-eating bees are just a few topside examples of why you shouldn't forget to bring your macro lens.

Walking around the lake, you'll find

Above: Trying out sidemounts in the lake.

Below, from left: Diver with one of the installed artworks; the steps.

plenty of subjects.

I prefer to use wide angle under water so that I can set up a subject completely, preferably with a diver, and a number of objects have been placed on the bottom to make this easier, as the images show.

Night diving is also an attraction at the Well of Ekeren, because you usually get to see greater numbers of fish after dark.

When they're hunting, pike don't hesitate to use the light of your torch to help them catch fish. Nocturnal diving does have to be requested at least a week in advance, however.

Should you be in a position to pay a visit, the Well of Ekeren is open every day between sunrise and sunset.

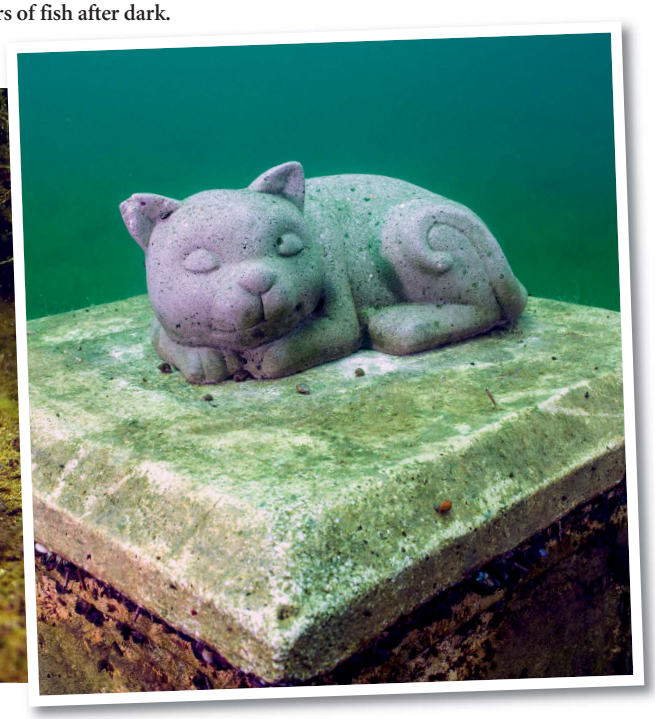
During the week it's quiet but at the weekends it can be very busy, especially on Sunday.

There is ample parking space but no other facilities at the site at present. Diving requires a permit and day passes are available by writing to AVOS at vergunningen@avos.be, or completing an online form at avos.be

The Well of Ekeren really seems to have something to offer everyone – and that is quite special for such a small piece of nature.

Top right: The torso

Below, from left: Crayfish; dozing cat.



NEUTRAL BUOYANCY

Freedivers – and scuba-divers who also freedive/snorkel, for example during big-animal encounters – can still practise underwater photography at a high level once they reach a reasonable level of skill. MARK HARRIS wrote the classic book on the subject, *Glass and Water* – and here, in the first of two extracts, he looks at how to achieve the level of control needed to leave the diver time to focus on getting the picture

'You go down to the bottom of the sea, where the water isn't even blue anymore, where the sky is only a memory, and you float there, in the silence' *Jacques Mayol*

SUE HOOD, TARTAN DRAGON LTD

Right: Wildlife videographer Doug Allan (shown filming humpback whales) is notable for being proficient with freediving buoyancy skills. He has it down to a tee, and his other freediving techniques are very good too. He is a good example to follow.

THE STATE OF neutral buoyancy is the nirvana scuba divers aim for. Freediving photographers at least make a nod toward achieving this neutrality; not all achieve the right balance.

If you watch modern natural history documentaries, the last 10 minutes often show a feature on how some scenes were shot. For underwater films taken by freediving videographers, this can be invaluable viewing.

What I sometimes see is a videographer using up valuable energy correcting his or her underweighting. To the untrained eye it can be easy to miss, but if you look at the body angles relative to the surface, it becomes apparent.

Do freedivers really need to worry about this? Does it matter if we look ungainly on our dives? The answer to both is an emphatic "yes". Every fin-kick we make should be for the purpose of motion towards a location or target. If it is a corrective kick to offset over or under-weighting, then it is wasted energy that translates into a reduced breath-hold.

Our spatial awareness will also improve considerably when not having to fight the forces trying to take us up or down. Not only does it look right, it feels right.

Analysing Mass

Before we start to put the right practices into place, let's analyse the factors that affect our buoyancy. Firstly, it would be a good idea to compare what we are and what we carry, to the density of water.

The constituent parts we contain or carry that are lighter than water (ie, that float) are air, neoprene and fat (or more flatteringly, "bioprene").

Put a wetsuit into a bath of water and it will float. Air is contained within our lungs, sinuses and mouth cavity. Some also finds its way into our intestines, alongside other gases such as methane.

All of these gases are less dense than water and therefore provide an upward force or lift. The distribution of this lift will vary in proportion to the location of the different substances.

We normally have a fair volume of air in our lungs and head, so more lift is applied here and hence we naturally float toward the surface in a heads-up position.

Our bones and muscle tissue are heavier than water. This creates an opposing force to lift that we can refer to as sink. Everything else quite literally hangs in the balance.

Left: A floating freediver with heavier body parts (his limbs), sinking downward. Without a wetsuit, the downward angles would be more pronounced.

A large-form system with heavy accessories will sink, whereas a small-form system in a compact housing may well float.

Most mask/snorkel/fin combinations will sink, although some lighter-construction items may not.

Taking everything into account, what would we expect to happen if a medium-build freediver in a wetsuit (and no weightbelt), were to jump into the sea?

I'm sure most of us would expect to see him or her float. I certainly would.

However, if we were to observe a lean and muscular freediver wearing no wetsuit, carrying a large-form camera, jump into a freshwater lake, we might see something quite different.

Especially if he had only taken, say, half a lungful of air.

He might not sink like the proverbial stone, but would need some effort to stay at the surface. I'd expect this diver to be negatively buoyant.

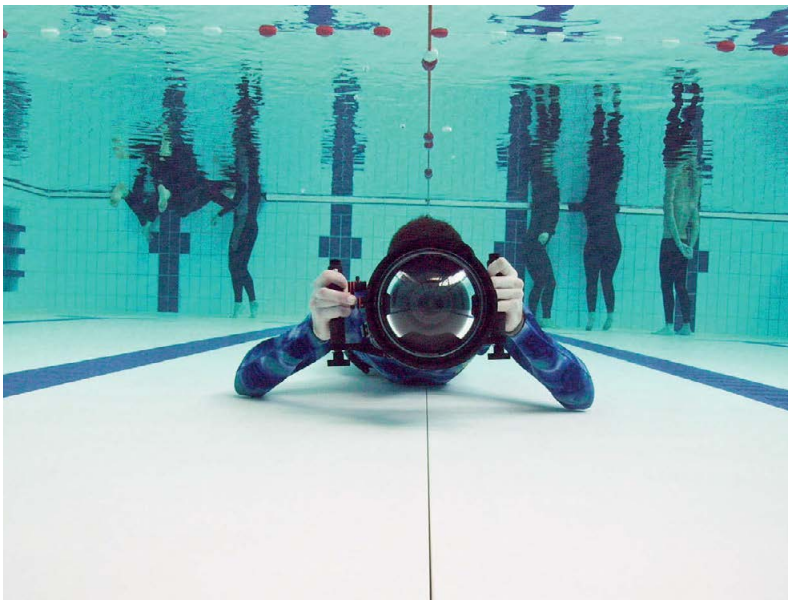
The Physics of Pressure

Increasing depth will increase pressure, reduce the volume of our gas spaces, and therefore eventually make us sink. We know that certain parts of our bodies and equipment make us float, and that some cause us to sink.

We also know that, as we dive deeper, rising water pressure increases the sink force. For the sake of efficiency, we would like to achieve near-neutral buoyancy at a certain depth, but certainly not at the surface. Here we would like to have positive buoyancy for the sake of safety and comfort.

In the majority of cases we are going to find that the forces of lift by far outweigh those of sink, and therefore make: a) our neutral-buoyancy point too deep; and b) descending somewhat of a struggle.

So we use a very dense material – lead – and typically attach this to a belt around our hips.



Left: A freediving photographer with lean body mass and thin wetsuit has easily sunk to the bottom of this swimming pool.

If our lake-diving muscle man wanted to balance forces, clearly adding lead would contribute more to his problem.

An easy solution here would be for him to wear a wetsuit, which in a cold lake he might well be grateful for anyway!

It is probably also worth mentioning at this point that fresh water is less dense than salt water, and therefore less ballast is needed to make us sink in fresh water.

Finding Your Depth

The next couple of questions you might be asking are: "At what depth should I be neutrally buoyant?" and "How do I work that out?"

To answer the first question, you need to decide at which point in the dive you are likely to be finning in a horizontal position.

Wherever this is, then you will want to maximise the efficiency of your kick, and you now know that being almost neutrally buoyant is the key to this.

For the sake of safety, the precise neutral point should be targeted at least 2m deeper than the depth you wish to swim at.

If you were to lose consciousness at your swimming depth, then at least you would start to float rather than sink.

The loss of efficiency will be minimal, and worth the safety margin.

I'd expect the majority of freediving photographers to not want to be neutrally buoyant any deeper than 20m, and I'd recommend that 5m be the shallowest depth.

Being neutral shallower than 5m will make breathing at the surface a bit of an effort – the extra weight required will lower the body position at the surface, especially on full exhale.

With the lungs lower down, water pressure mounts around them. Deeper than 20m your time will be too short to get a decent composition, unless you have competitor-level breath-holding abilities.

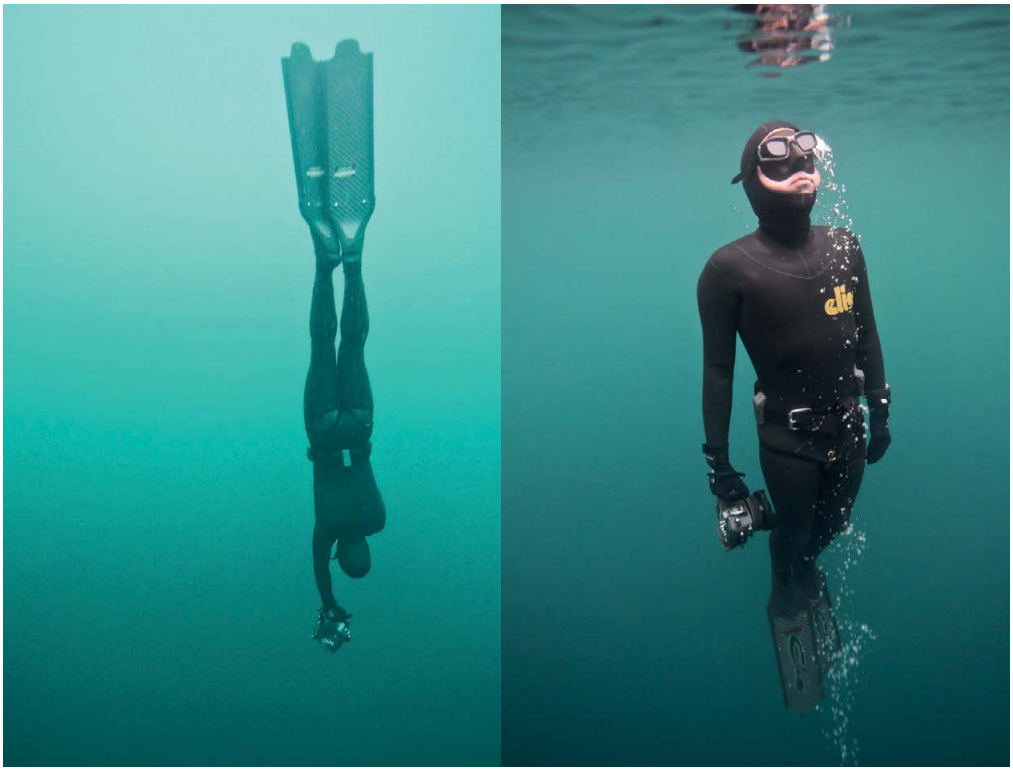
Establishing the neutral point is quite straightforward. A depth-gauge or dive-computer in Freediving mode is needed, as is a weighted rope or line tied off at the surface (an anchor line will make do).

A full deep breath should be taken at the surface and then you simply pull or swim down to the depth you want to be neutrally buoyant at, as shown on your depth-gauge.

When you reach this depth, grab the rope to stop yourself. You should then release your grip and monitor your depth-gauge.

If the depth increases, then you are negatively buoyant and will need to remove lead from your belt.

If it decreases you are positively buoyant and will need to add lead.



Adding and removing lead is carried out at the surface, and shouldn't be in more than 1kg increments. Failing to release the rope often gives a false sense of depth if there are waves moving the line up and down. Better to trust your gauge.

If you find yourself without a depth-gauge or dive-computer, then there is an alternative method you can use to determine if you are moving up or down.

Above, from left: Freediver who has stopped finning at depth and is now sinking; the same diver on the same dive, but at a significantly shallower depth, now floating up to the surface without the need to fin.

Below: Establishing neutrality

Focus on the sensation in your ears. If you can feel pressure mounting, then you are certainly sinking. On the other hand, if you can feel a fullness and/or air escaping through your Eustachian tubes, then air is expanding. This means that you are floating upward.

If you need to fine-tune things, then you can sacrifice a small amount of lung volume to decrease lift.

As long as you have taken a few deep breaths of fresh air, then breathing out, up to no more than an estimated third of this won't have a huge impact on your breath-hold time.

What little you lose from this will be more than made up by the efficiency of your finning. Consider that average human lungs typically hold 4-5 litres of air and that translates into 4 or 5kg on the weight-belt.

So most of us should be able to emulate adding up to an extra kilogram of lead by breathing out a little as I previously described. Needless to say, that can be quite useful.

One caveat I would add with sacrificing lung air is to avoid doing this on deeper dives.

Using Equipment to get the Balance Right

Can we assume that piling on lead weight to offset buoyancy of neoprene is sufficient to maximise efficiency of fin-kicks when we are neutral?

Unfortunately not. The lead weight has mass that takes energy to propel. What we can do however is use an open-cell freediving suit, which has much better thermal properties than scuba wetsuits.

Personally, I find that a 3mm tailor-made two-piece open-cell suit is perfectly comfortable in water temperatures as low as 20°C. In a 3mm scuba wetsuit, most divers will start to get chilly below 26°, myself included.

The end result is that you can use a thinner wetsuit when using an open-cell type, and therefore less lead weight to offset the buoyancy.

Earlier on, I described how camera variations will either sink or float. Housings that float are frequently supplied with a small lead weight to neutralise flotation.

I would generally advise that you fit this weight onto the housing, even though this increases the obvious risk of the rig sinking should you inadvertently let go of it.

I would also advise against excessive use of the increasingly popular ball-joint float arms with a large form system.

Basically, I'd prefer to have a camera-rig that is slightly negative, and for good reason.

If the top half of our body is more buoyant than the lower, then strapping weight around our waist doesn't bring us into a nice hydrodynamically efficient horizontal position.

We could take a leaf out of the books of competitive freediving and use a neck-weight, but these can be a little impractical for other reasons (such as using up valuable baggage allowance when flying).

A negatively buoyant camera rig (as long as it is only 1-2kg negatively buoyant) is the perfect solution.

When carried in the shoulder region or in front of the head, the mass will help pivot our bodies into a horizontal position.

Just be mindful to not let go of the housing, or you can connect it to a Velcro wrist-strap via a lanyard.

The suggestion to not use floating ball-joint arms might not sit well with some readers, especially those who have either invested in them or who have been advised to the contrary.

Heavily weighted camera systems put strain on the wrists, and cause destabilisation that can in-turn increase camera shake.

The benefit of a slightly overweighted system only really exists on the occasions where you are likely to need to swim horizontally under water.

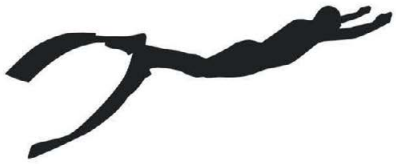
Also, you might have a particularly heavy configuration that exceeds the 1-2kg sink force I suggested.

Floating strobe arms might therefore be necessary in certain cases.

Other good techniques or equipment

Trim

A diver without a camera, and not moving forward. His body angles upward as the flotation acts from the lung area of his body.



The same diver fins in the direction of the arrow, but now angles in the opposite direction. This is because he is positively buoyant and must counteract the flotation force in order to maintain a constant depth. This is an inefficient profile.

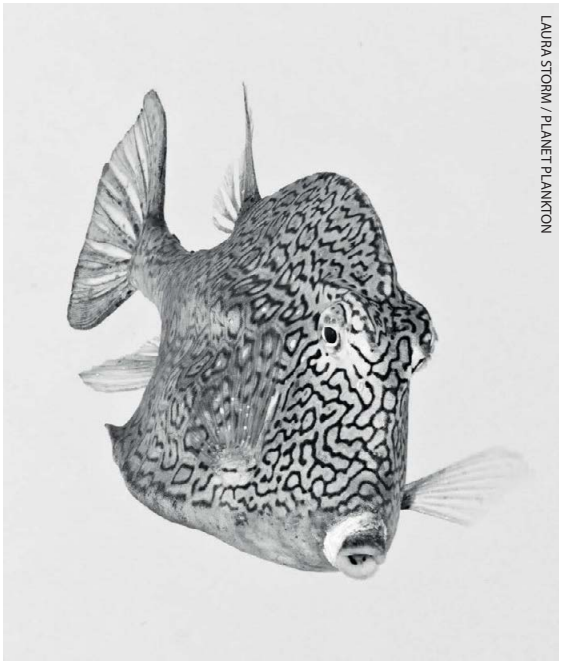
The diver stops finning again and is handed a negatively buoyant camera. This pivots the diver into a neutrally buoyant and horizontal position.

Now when the diver swims forward, his neutral buoyancy means that his profile is parallel to the direction he is swimming in, and efficiency is maximised.

modifications still help to offset the compromises.

Through experimenting with your buoyancy – something that I thoroughly recommend you do – you might find that for reaching your desired neutrality at optimum depth, you are less buoyant at the surface than you'd like to be. Certainly less so than the average snorkeller.

This is where a float can be put to good use, and/or a snorkel.



LAURA STORM / PLANET PLANKTON

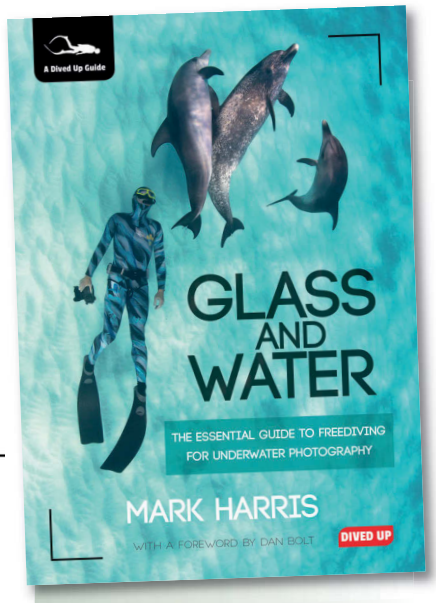
Left: Honeycomb cowfish – neutral spatiality. Taken while freediving by Laura Storm, using a Canon EOS 550D with 60mm lens, Sea & Sea housing, f13 @ 1/80s, ISO 100.

NEXT MONTH:
A Virtual Dive

Summary

As soon as you start swimming under water in a more neutrally buoyant state, you'll realise the benefits. Your confidence will increase and you will be able to concentrate more on your photography.

- **Swimming when neutrally buoyant is more efficient and improves spatial awareness.**
- **Typically there are more factors that make us float rather than sink.**
- **The deeper we go, the more we sink.**
- **The saltier the water, the more we float.**
- **Don't make a neutral point any shallower than 5m.**
- **A small amount of lung air can be sacrificed to produce a little extra negative buoyancy, if needed.**
- **Custom-made freediving wetsuits enable thinner composition, and in turn less ballast.**
- **Some camera weight can mean better distribution for correct profile.**
- **Snorkel and/or float use should be considered mandatory when optimising buoyancy.**
- **For the sake of safety, swim with some positive buoyancy.**

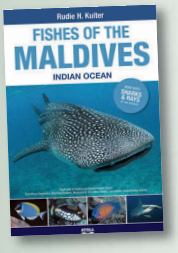


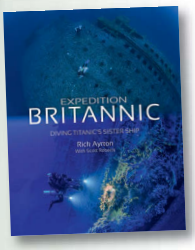
The Book

***Glass and Water*, by former UK champion Mark Harris, is the first book on underwater photography for freedivers.**

With contributions from experts the book teaches the skills, knowledge and equipment necessary to successfully pursue underwater photography without scuba gear. It's available as a paperback (£17.95) or ebook (£9.99) from Dived Up

Dived Up is a publisher and distributor of books that it says help divers, snorkellers and freedivers get more out of their time under water. Its titles range from dive guides to underwater photography, maritime history, biography and more.





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DIVED UP BOOKS FOR UNDERWATER EXPLORERS

XLENDI WRECK: WORKING AT 110M

A 2700-year-old Phoenician ship is the oldest wreck ever found anywhere near the Maltese islands – and it goes on producing surprises for the CCR divers working on it. Report by TIMMY GAMBIN and LUCY WOODS

IT WAS BACK IN 2007 that evidence of a deepwater shipwreck was detected during an offshore remote-sensing survey conducted on the fringes of Xlendi Bay in Gozo, Malta.

This anomaly turned out to be the remains of a Phoenician cargo vessel dating back to the 7th century BC – a rare and hugely significant find.

The identification of this anomaly was based on its dissimilarity with the surrounding seabed, its size and shape and shadows cast by potential objects.

The presence of an ancient shipwreck was confirmed through high-resolution imagery obtained by use of an ROV. Because of its location, the team named it the Xlendi Wreck.

At 110m below sea level, the wreck is an extremely challenging dive, and it wasn't until 2018 that the first underwater excavation by scuba-divers was able to take place.

However, an initial survey of the wreck in 2014 had already confirmed that the upper layer of cargo lay exposed on the seabed, including dozens of amphoras or storage jars, and the grinding stones used to make flour.

That same year, a 3D photogrammetric survey was completed. This involves digitally overlapping multiple 2D images and turning them into a detailed 3D model of the site.

These surveys provide an informed sense of what can be expected on further investigation and possible excavation.

A manned submersible was used to initiate object recovery. Four objects were raised, chosen as representative samples of the mixed cargo.

It would be another two years before the site was explored again.

THE MAJORITY OF ancient shipwrecks that have been studied and excavated lie at depths around 50m or less. Discovery of the Xlendi Wreck brought with it a serious challenge – how to safely plan and execute an excavation when divers could spend only a handful of minutes on the site, and without compromising scientific standards.

The deep waters covering this wreck have thrown up many challenges at the surface that have rendered progress in the systematic collection of the archaeological data slow.

However, at the same time it has presented an opportunity to test various tools and technologies for deep-sea underwater archaeology – contributing to the practice of maritime archaeology as a whole.

Almost a decade of research culminated in 2016 and 2017 in exploration of the wreck by an expert team of divers who were able to recover 12 objects.

Some of these items were previously unknown in the archaeological record. Of particular interest were a small number of urns that appeared to have been locally produced, but represented a hybrid of local and imported styles.

The successful recovery of the objects rested on the maximisation of bottom-time. With a direct route to the wreck, the divers were able to descend in eight minutes and spend 12 minutes on the site. This resulted in a further two and a half hours of ascent time.

To create that direct route down, a 1 tonne mooring block had to be sourced and rigged to anchor the dive-vessel. It was secured using a mooring-line, chain and shackles.

The dangerous nature of the deep site meant that only a few highly disciplined divers could access it on that dive.

Stringent safety measures were in place, with hyperbaric doctors present on the dive-boat and additional safety provided by a fast RIB kept on standby to ensure an immediate response in case of emergency.

THE DECISION TO go ahead and conduct a full excavation was taken during the 2018-2019 seasons.

Because this would be the first-ever excavation by divers at such a depth, no manual was available.

Similar projects had been conducted before, but no deeper than 65m. Before the Xlendi Wreck, the deepest excavation our University of Malta team had done was on a WW2 aircraft wreck site at 55m.

Our main problems when working at this sort of depth were of course the threat of carbon dioxide build-up and the consequential limited time available to get things done on the site.

A non-flexible rigid grid was set up, dividing the excavation area into a 4 x 2m grid, further divided into 2 x 2m units and 1 x 1m sub-units.

The area chosen for excavation was where the amphoras met the saddle querns, the stone tools for grinding corn.

A submersible hydraulic hose was used for excavation, and all the material removed was deposited in bags for later sieving – a process that inevitably resulted in a lack of visibility.

Lessons learnt in 2018 were applied in 2019, ensuring a safer and more efficient excavation, with an ROV facilitating both that and the daily planning process.

The logistical organisation (which includes liaising with Gozo Hyperbaric Chamber, Armed Forces of Malta and other bodies) has always had to be spot-on, to keep the risks to a minimum.

Further ceramic objects were raised in 2019, including a partial Phoenician fineware ceramic bowl and a small urn with four lugs.

Another noteworthy find consisted of small, loose fragments of wood, located in the upper and lower levels of sediment.

THE DISCOVERIES and recoveries made in those previous years promised that the 2020 season would be one of immense interest – but the arrival of the global pandemic threatened to stall our work.

However, with Covid safety measures in place and a thoroughly planned season of work, the international dive-team arrived in Gozo in late August last year.

We had two main aims: to recover further objects from the seabed and to record the ship's ballast *in situ*. This not only provides stability but is often used to store cargo, as it was on the Xlendi Wreck.

Over five weeks a substantial quantity of cargo was recovered, including complete amphoras, ceramic

JOHN WOOD / UNIVERSITY OF MALTA

DAVE GRATION / UNIVERSITY OF MALTA

'IT WAS THEN THAT WE MADE A RARE AND EXCITING DISCOVERY: EVIDENCE OF A MORTISE-AND-TENON JOINT'

fragments and smaller whole jugs and urns.

Our team of 18 divers now use mainly JJ, XCCR and rEvo rebreathers, as well as two Liberty units.

Our cameras include a Sony A7iii with Easydive housing and a micro four-thirds Boxfish 360, used with Keldan lights. We take Paralenz cameras along too.

Our 3D photogrammetric surveys of the site were carried out on a daily basis, ensuring that the progress of excavation was scientifically documented.

When we work artefacts are recorded *in situ,* then excavated and placed on the side of the site.

Once we have enough we organise a lifting day, using a purpose-built basket which is sent to the surface using guidelines and lifting bags.

Using the submersible hydraulic hose, we were able to excavate the next layer of the wreck while systematically recording our progress.

Above: The divers load the lifting basket when enough artefacts have been excavated.

Pictured: Three lights illuminate the site.

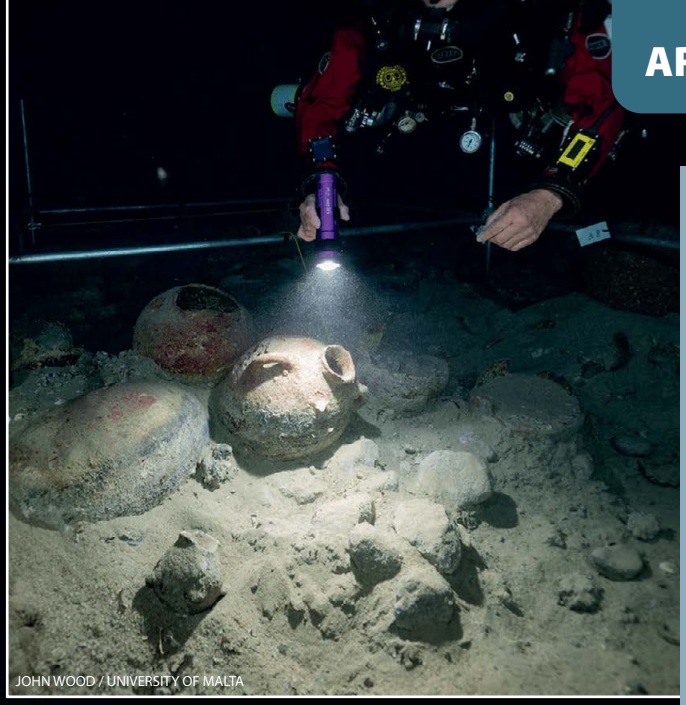
THE TEAM MANAGED to lift some of the wooden fragments found at the lower levels, and it was then that we made a rare and exciting discovery: evidence of a mortise-and-tenon joint.

This find provides some of the earliest evidence of this type of joinery being used for hull construction in the Mediterranean.

Until this point the hull of the Mazarron 1 wreck, discovered in 1988 off the coast of Spain, had been one of our most important sources for understanding ancient shipbuilding and how it developed during the Iron Age.

This 7th century BC wreck also used pegged mortise-and-tenon joints in the assembly of its hull timbers. Such joinery had been introduced by Phoenician traders who had established a colony on the Iberian peninsula.

The Mazarron 1 boat, which probably had a square sail rigged on a mast as



JOHN WOOD / UNIVERSITY OF MALTA

Above: Amphoras on the Xlendi Wreck site.

Below right: Cameras ready for action on the site.

Photographing a deep wreck

IN 2014, PRIOR TO the first dives on the Xlendi Wreck, the team used a manned submersible to descend to the depths to photograph the site, so that the images could be used to create the 3D model.

Since 2016, this task has been carried out by specialised rebreather divers. It is a very demanding operation. To capture a sufficient quantity and quality of images to build the detailed 3D model, multiple dives are required.

Divers would take around eight minutes to descend and have a maximum of 15 minutes to photograph the site, before requiring around three hours of decompression before surfacing.

During their time on the wreck, the divers use high-resolution mirrorless cameras.

Strong lights are used so that the wreck can be seen in its full glory, and so that the colours are not lost through the filtering effect of the water.

Once the team has captured enough images, they produce the 3D model through photogrammetry, taking measurements of the wreck's visible features through analysis of overlapping photographs.

Because of the size, complexity and visibility of the Xlendi Wreck, thousands of images are captured manually on a daily basis.

These are loaded as a single batch into software that is also capable of automatic camera calibration. This method is relatively low-cost, because it doesn't require significant training or overly expensive equipment.

However, it is a laborious task and very time-consuming, particularly for larger and more complex underwater sites like this one.

KRISTOF GOOVAERTS / UNIVERSITY OF MALTA

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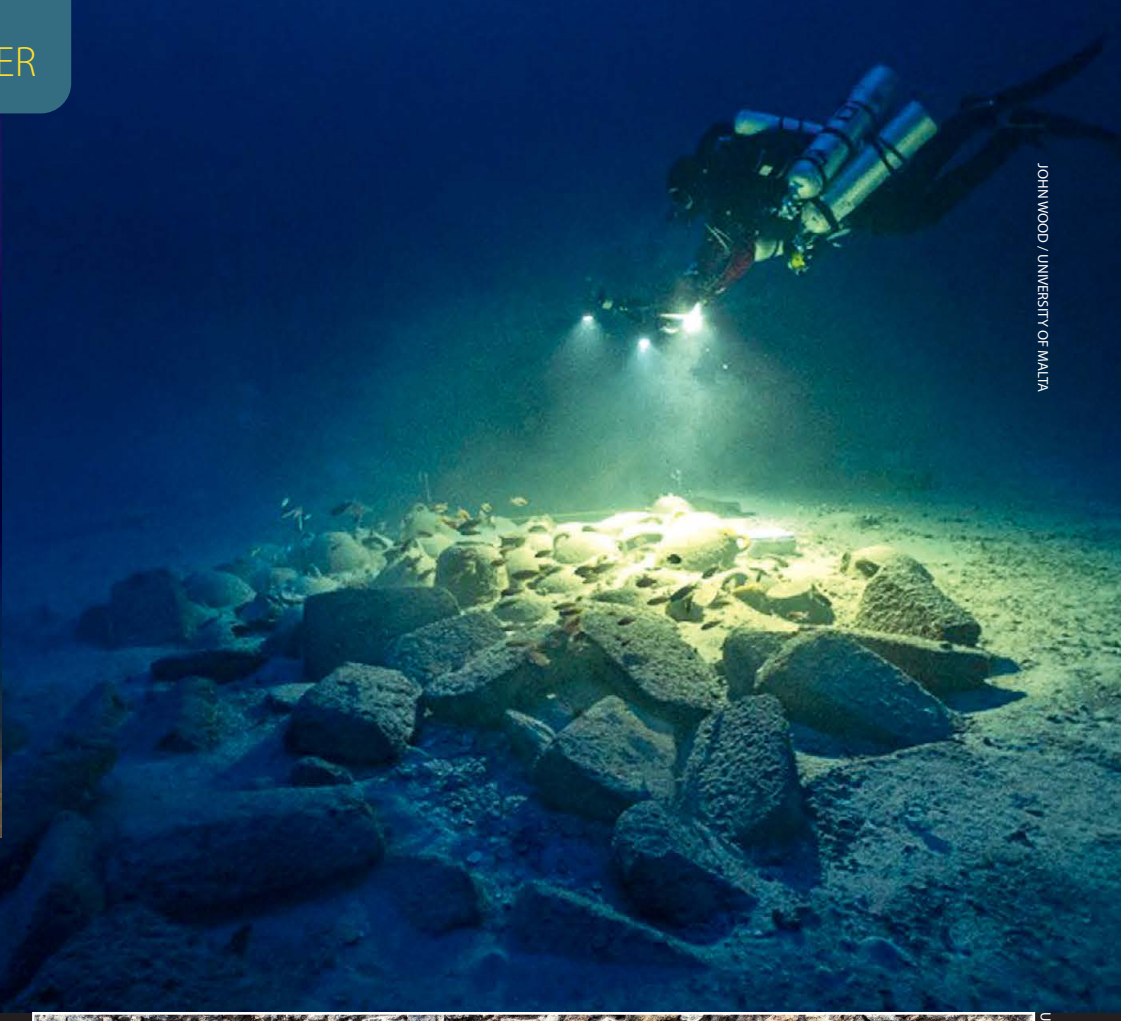

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well as oars, would have been light, fast, manoeuvrable and able to negotiate shallow environments with cargo weighing as much as 4 tonnes.

But spacings in the joinery and other techniques suggested that a local shipwright could have built it as a hybrid between Phoenician and local styles.

So had it been an oddity of its time, or an intermediate stage in Iron Age shipbuilding? Now that we have also found mortise-and-tenon joints on the Xlendi Wreck, we hope to be able to shed new light on that question.

The scarcity of remains such as those we have been finding at this location off Gozo cannot be over-stressed – the Xlendi Wreck is a unique site.

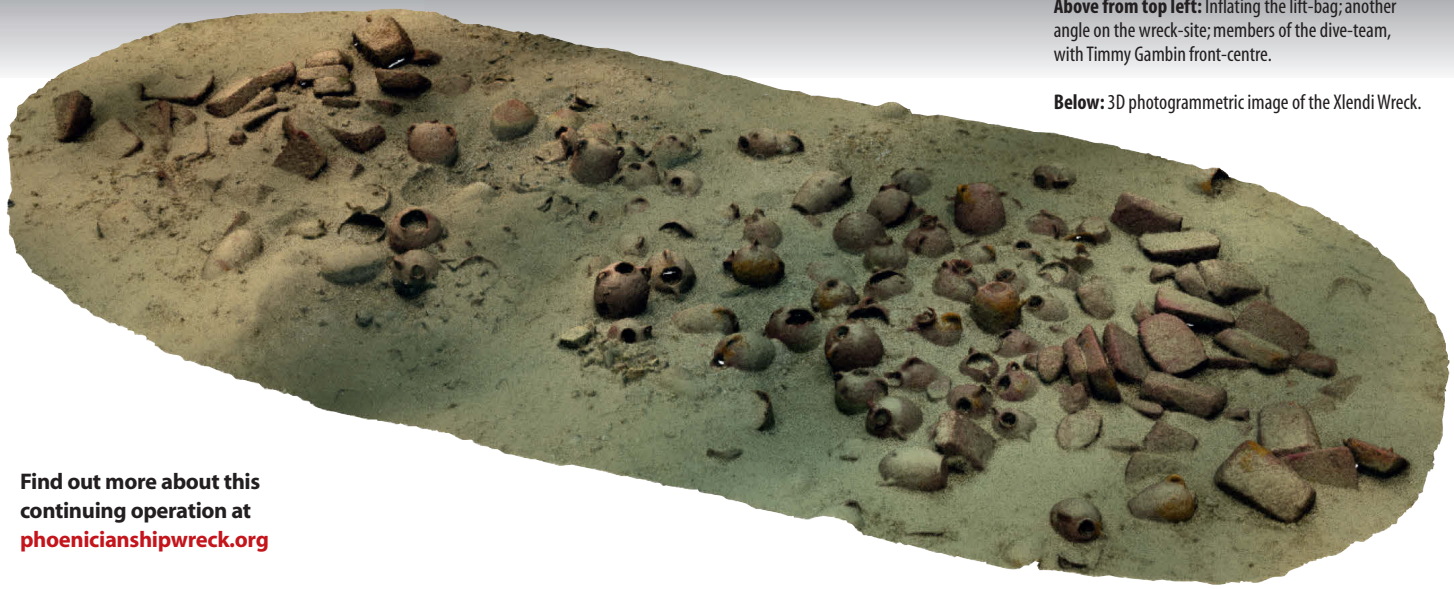
And while hands-on excavations at this depth are also unusual, the advantage of having the human eye looking over things is unbeatable – even if the human is able to remain on-site for only 14 minutes.

Robots will never replace humans!

UNIVERSITY OF MALTA

Above from top left: Inflating the lift-bag; another angle on the wreck-site; members of the dive-team, with Timmy Gambin front-centre.

Below: 3D photogrammetric image of the Xlendi Wreck.



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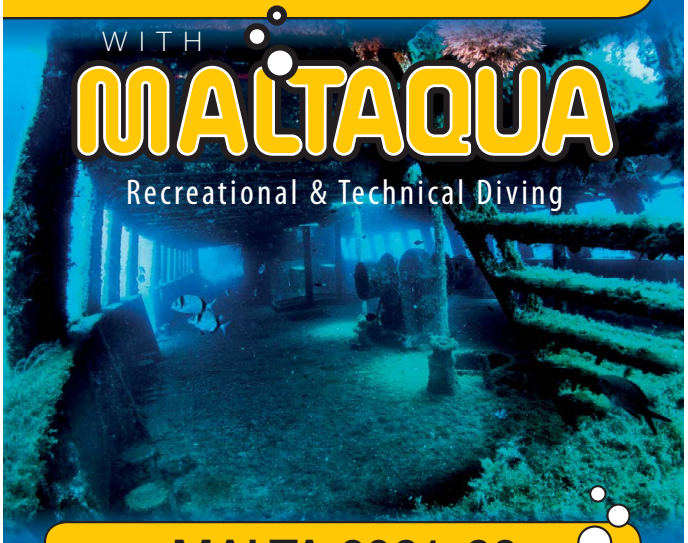

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SEALED WITH A KISS

Lundy in the Bristol Channel has a lot going for it, not least playful grey seals and much underwater colour. JO CAIRD paid the island a visit in July with STEVE PRETTY, who took the pictures and managed to keep his housing intact

THE SEALS MUST have got the memo that there would be divers here today. We've been in the water fewer than five minutes when the first one approaches, circling before coming in for a closer look at Steve's camera.

I'm fully expecting our new friend to dart away any moment now. Except, that's not what happens.

The seal sticks around, practically lying across Steve's lap as it explores his camera housing with its open jaws.

It seems to be interested in its own reflection in the glass dome and I'm momentarily concerned that it'll be aggressive towards what it thinks is another seal – those are pretty big teeth and they're pretty close to Steve's face.

Fortunately, my fears are unfounded. After a few minutes ' gentle investigation, the seal takes its leave, spinning away through the water as Steve and I shake our heads in disbelief at this extraordinary encounter.

My only remaining worry is for the dome, which can't have benefitted from the proximity of those gnashers. (It's a relief to find, once we're back on the boat, that somehow the housing has escaped this experience without a scratch.)

Most of us will be familiar with Lundy Island from hearing it mentioned as part of the BBC's *Shipping Forecast* over the years. But there's more to this patch of sea off the North Devon coast than squally showers and fog patches.

The island after which the area is named, a granite outcrop 3.5 miles long by half a mile wide, is owned by the National Trust and maintained by the Landmark Trust.

Its remoteness (Ilfracombe is a 90-minute boat ride away), eccentric collection of historic buildings and rich birdlife attract around 20,000 tourists each year.

THE BIG DRAW for divers, however – and the reason for our visit – is Lundy's population of some 180 Atlantic grey seals. We catch sight of several sunning themselves on the rocks of Gannet Bay as Mark Hutchings of Ilfracombe-based Wild Frontier Charters manoeuvres the boat into position a safe distance from the shore.

He must keep 100m from hauled-out seals, according to the rules of the Marine Nature Reserve around Lundy.

They plop into the water and make their way over to the boat as we get kitted up, curious to see who has come to play on this blazing-hot July morning.

Mark reckons the seals on the rocks are youngsters, judging from their size and the lighter colour of their fur. Grey seals are the larger of the UK's two seal species – adult males can measure up to 2.5m and weigh 350kg, with females growing up to 2m long, and 250kg.

Pups are born between September and November, so these could be last year's babies or they might be 18-month-olds – it's hard to tell precisely from a distance.

The seal that's so keen on Steve's camera is towards the smaller end of the scale too – the size of a very large dog, perhaps – and accordingly puppy-like in its demeanour. Getting up close to that animal is breath-taking enough, but it isn't long before we encounter several seals on an entirely different scale.

Left: Kiss from a seal.

Below: A bottling seal falls to rest in a kelp bed.

We're making our way slowly around Gannet Bay at a depth of around 4m when I spot a massive seal hanging upright in the water at the surface, its head in the sunshine.

It isn't moving a muscle and continues to stay absolutely still as we cautiously approach a little closer.

This behaviour, I learn later, is known as "bottling", for the shape the seal takes in the water. When they lie horizontally at the surface it's called "logging" – you can probably guess why.

After a few minutes, with no warning and no other movement that I can discern, the seal sinks down through the water, landing softly in a patch of kelp.

It lies there, utterly still, before eventually rising to the surface and repeating the exercise.

This is how seals sleep when they're in the water, explains Dan Jarvis, welfare development and field support officer at the charity British Divers Marine Life Rescue (BDMLR). As with other seal encounters, he says, it's vitally important not to disturb them.

Doing so – any change in behaviour caused by people qualifies as disturbance – can interrupt their rest, cause them stress, waste their energy and result in injury or death.

Dan points to a code of conduct put out recently by the Seal Alliance, a collective of organisations focused on conservation work with seals and includes BDMLR.

A lot of its advice is aimed at seal encounters on land but its central messages are relevant for divers too: never approach seals – if they want to play, they'll come to you – and never feed them.

I SEE SEALS BOTTLING many times on our Lundy dives, and interrupting them couldn't be further from my mind.

On the contrary, watching these snooze sessions – the gentle cycle of rise, hang, fall, settle – is one of the most calming experiences I've ever had under water.

A couple of seals – including one so large it must be a bull, its bulk absolutely dwarfing our two buddy pairs – up the nap ante by tucking themselves into small caves beneath kelp-covered boulders.

They're surprisingly well-hidden, given their size, the only clue to their presence a brief stream of bubbles or the protruding tips of neatly folded rear fins.

My favourite seal encounter comes later in the week, on the first of two dives with Easy Divers, which runs Lundy dive and snorkelling trips in addition to operating a dive-school and guesthouse in Ilfracombe.

Turning to check that Steve is behind me, I'm startled by a seal darting past him and away into the blue.

He is looking the other way so doesn't spot the animal, which spins its way through the water back towards me.

It circles a couple of times before descending right in front of me, pausing oh so briefly to touch my forehead with its nose.

It's hard to remember to breathe, I'm so excited, but I manage to keep my cool.

The seal takes its leave and I spend the rest of the dive on a high.

Left: Fins are a source of endless fascination.

Right: Will the dome-port survive this investigation?

WHEN THE SEALS are proving elusive, as they do for a fair portion of each dive, there's plenty else to admire at Gannet Bay, which we visit with both Wild Frontier and Easy Divers.

The plant life is the first thing you notice. Thick fronds of chocolate-coloured kelp dominate at depth but the shallower you get, the more diverse the scene, with myriad other species of algae giving the place the feel of a lush underwater garden.

The sun beaming down from a bright blue sky to light up this wonderland, it's easy to forget I'm in British waters.

Beneath where the boat is moored, spider-crabs carpet the seafloor, and the occasional juvenile ballan wrasse flits in and out of the kelp. Simon Barker of Easy Divers says he has spotted nudibranchs here in recent days but, try as I might, I don't manage to find any myself.

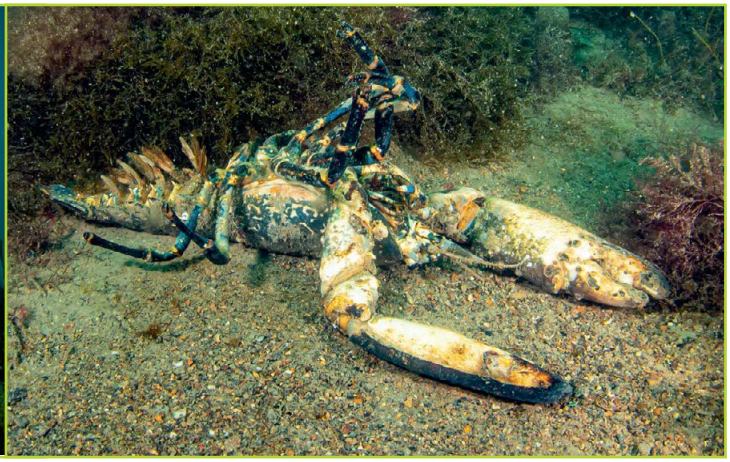
The search effort isn't wasted, however – I'm thrilled to spot my first ever blue-rayed limpet, its tiny iridescent form, no bigger than a peppercorn, clinging to the very end of a kelp frond.

CONDITIONS ARE PERFECT for diving Lundy's exposed western side but Simon has beginners on the boat today, so he and skipper Andrew Benji opt to take us to another east coast dive-site, Brazen Ward, for our second dive.

Named for an old French fort, the ruins of which stand on the cliff overlooking one side of the bay, and with a famous Lundy geological landmark, the Mouse Hole and Trap, overlooking the other, it's as picturesque a dive-site as you'll find.

As the beginners head to the shallows for more seal fun, Simon recommends starting our dive with a hunt for sunset-

Below, from left: Rich colours characterise Lundy Island; it isn't all seals – a Lundy lobster.



cup coral to the south of the site. We find them, clustered at the base of a small overhang, incongruously bright and cheery in these chilly, greenish waters.

Next up is the badly broken up wreck of the *Salado*, a cargo steamship that went down in fog in 1897.

It's nice to see the algae-covered ribs of the hull but they're not really worth the long swim, in poor visibility (the seabed here is sandy mud), when we could have been playing with the seals instead.

Shallowing up, we're rewarded with another gorgeous algae garden, a dozen shades of green shimmering beneath us in the afternoon sunshine.

It's with regret that I step onto the lift after this final dive on Lundy – diving with seals is an addictive experience, and there are plenty more dive-sites to explore.

It doesn't help that a dozen seals suddenly appear in the bay in the wake of a couple of kayakers making their way around the rocks. I long to jump back in the water with them, but a cup of tea has just been placed in my hand and there is packing down to do.

It's unlikely that we'll be blessed with weather this good again – the sea is like glass on both our dive days, not a breath of wind in the air – but I'll be coming back to Lundy as soon as I'm able, whatever the forecast holds. I wonder if the seals will remember me.

FACTFILE

GETTING THERE ▸▸ Trips to Lundy Island depart from Ilfracombe Harbour. Those staying on Lundy itself can arrange to be picked up at the island's jetty.

DIVING ▸▸ Wild Fronter Charters (wildfrontiercharters.co.uk) cater to experienced divers with their own kit, Easy Divers (easydiversnorthdevon.co.uk) run trips for all experience levels, as well as hiring gear.

ACCOMMODATION ▸▸ Double rooms at Epchris Guesthouse (which is run by Easy Divers) start at £80 per night.

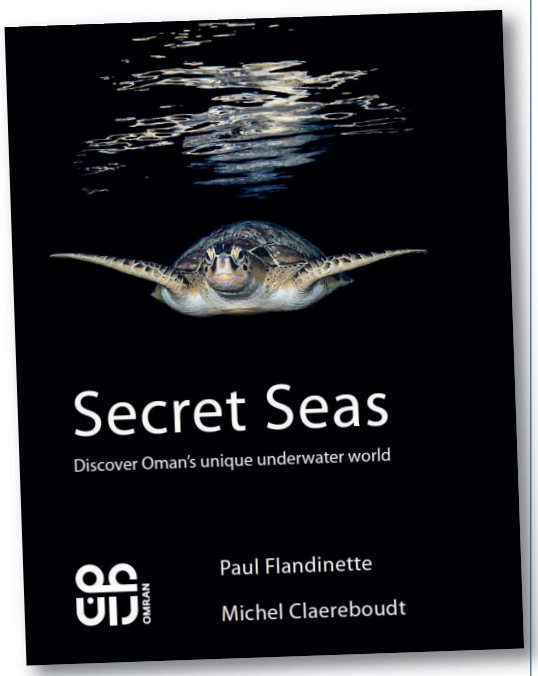
WHEN TO GO ▸▸ May to September.

PRICES ▸▸ Day trips with Wild Frontier Charters cost £95 per person; two dives with Easy Divers, £177 per person, including full gear hire.

VISITOR INFORMATION ▸▸ landmarktrust.org.uk/lundyisland

SULTANATE PUTS ITS CASE IN PICTURES

***Secret Seas: Discover Oman's Underwater World* by Paul Flandinette & Michel Claereboudt**



THE DIVER OFFICES are being pleasantly inundated with new marine-life books at the moment – last month we reviewed half a dozen and still they're arriving.

Secret Seas is a bit different from the others in that it is unashamedly dedicated to selling a diving destination through its wildlife attractions.

The book is sponsored by OMRAN, a group that owns many of Oman's leading hotels and is charged with developing tourism. It is claimed to be the first large-format photographic book about the country's underwater world.

Paul Flandinette is a professional underwater photographer, author and film-maker, who has been based in Oman since 2013. Michel Claereboudt is a marine ecologist, also a photographer and has lived in Oman for 24 years.

I'm not sure exactly who did what in the book but it all hinges around 300 high-quality underwater photographs taken over the past seven years and presented with informative captions, grouped into chapters covering coral reefs, blue water, eyes, critters, nudibranchs, turtles and so on.

Because of the book's objective there is a fair amount of background info on Oman to digest before we get stuck into the pictures.

This felt as if it might have been recycled from decades of tourism publicity material, and at times had a touch of state-speak about it – "*life expectancy today is around 75 years, literacy is 95% and its citizens enjoy access to high standards of healthcare*" – but I did find it clear and helpful in setting the scene.

Honest too: "*It is true that, depending on the season, underwater visibility can be variable from day to day or even from dive to dive.*"

I have dived only in Musandam, the northern outpost of Oman, although further dives in the part of the UAE that separates Musandam from the main part of the country gave me a taste of the distinctive underwater world of the Gulf of Oman and Arabian Sea.

According to the authors, 1600 species of fish, 130 hard and 60 corals can be found in the sultanate's hotspots, and *Secret Seas* gives some 150 typical species their chance to shine, certainly enough to make a convincing case for paying a visit.

Seeing those distinctive cauliflower coral beds, groups of green turtles, pairs of cuttlefish or, especially, the beautiful dragon moray, does it for me every time, and the range from shrimp to whale sharks impresses.

There are nice turns of phrase in the captions too: "*The digestive tube of this urchin looks like a nuclear reactor glowing red hot, possibly making it the most beautiful anus in the animal kingdom*" was one example that tickled me.

We don't always get physical copies of review books, sometimes because they have yet to be printed, in which case we must depend on a Kindle version or digital proofs.

I had the latter on this occasion, and it's hard to assess a coffee-table book without feeling its heft and seeing the reproduction of the images.

This one I know is printed on 170gsm matt art paper and I have no reason to think that it isn't well-produced – but there is one aspect that unfortunately kept nagging at me as I read through the pages.

That is the rather crude typography, which makes the book much less of a pleasure to read than it should be.

This book is hardly cheap for what is essentially a promotional tool, and a shortcoming like this could so easily have been rectified by the page designers adjusting a few settings.

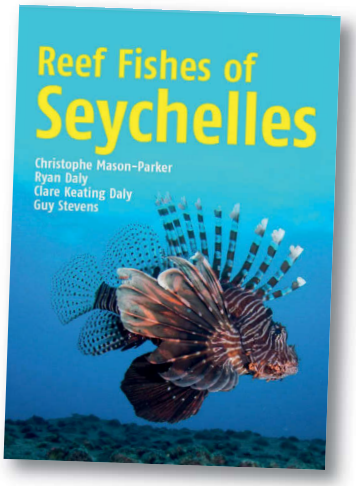
It's irritating because it undermines all the hard work that the authors have clearly put into every other aspect of their book.

Mazoon Publishing
ISBN: 9780618260300
Hardback, 240pp, 24x30cm, £36.85

FISH ID IN THE INDIAN OCEAN

***Reef Fishes of Seychelles* by Christophe Mason-Parker, Ryan Daly, Clare Keating & Guy Stevens**

IF I WANTED to find out anything about diving in Seychelles, I would probably contact conservationist and underwater photographer Christophe Mason-Parker. He has covered the subject for **DIVER** in the past and has written two previous books on the islands for publisher John Beaufoy – the *Underwater Eden* coffee-table book and, with Rowana Walton,



Underwater Guide to Seychelles. He lives on the spot and is very much a Seychelles sub-aqua ambassador.

With this new reference book he joins forces with three other experts on the location, and no doubt you'll find plenty of crossover in here with other Indian Ocean destinations such as the Maldives or Mauritius.

Ryan Daly and Clare Keating are divers who work with the Save Our Seas Foundation at D'Arros Research Centre in Seychelles, while Guy Stevens co-founded the Manta Trust charity, so the quartet have impeccable credentials.

This photo ID field-guide covers 550 of the nearly-900 fish species recorded in Seychelles, those found within recreational diving limits.

With almost 700 images, it claims to be the most comprehensive such book on this part of the world.

The fish pictures are a decent size, six to a spread. They are credited mainly to Mason-Parker and Daly, and if some tend towards the dark side at least the photographers can't be accused of artificially dialling up the brightness. Let's just call them natural.

The accompanying tight captions provide a description, biology, distribution and also IUCN listing. Apart from the sharks and rays most are "Least Concern" or "Not Evaluated" so perhaps this needed mentioning only where there is a threat.

A practical decision was to arrange the fish families that look and behave similarly together rather than according to strict taxonomy rules, which is helpful for divers just seeking a quick identification. Variations in appearance between males, females and juveniles are accounted for.

With helpful introductory chapters this is attractively produced and another welcome addition to divers' marine-life ID shelves.

John Beaufoy
ISBN: 9781912081479
Softback, 256pp, 15x21cm, £19.99

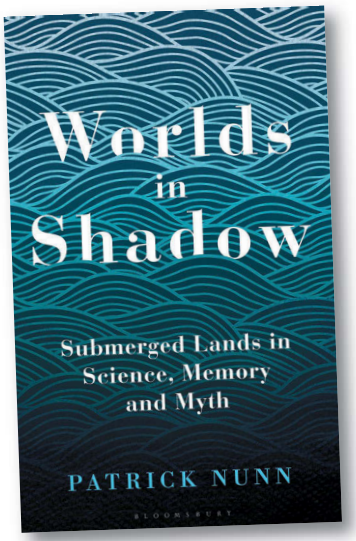
TOP 10 BEST-SELLING SCUBA-DIVING BOOKS

as listed by amazon.co.uk (18 July, 2021)

1. **100 Dives of a Lifetime: World's Ultimate Underwater Destinations,** by Carrie Miller & Brian Skerry
2. **Underwater Foraging – Freediving for Food,** by Ian Donald
3. **Dorset Dives: A Guide to Scuba Diving Along the Jurassic Coast,** by Will Appleyard
4. **Silent Warriors: Submarine Wrecks of the United Kingdom,** by Pamela Armstrong
5. **Fishes of the Maldives, Indian Ocean,** by Rudie H Kuiter & Tim Godfrey
6. **Pirate Hunters (audiobook),** by Robert Kurson
7. **Animal Explorers: Toby the Deep-Sea Diver,** by Sharon Rentta
8. **North Sea Divers: A Requiem,** by Jim Limbrick
9. **Neutral Buoyancy: Adventures in a Liquid World,** by Tim Ecott
10. **Scuba Fundamental: Start Diving the Right Way,** by Simon Pridmore

OCEAN MYTH MEETS SCIENCE

Worlds in Shadow: Submerged Lands in Science, Memory and Myth
by Patrick Nunn



Ever hovered over the seabed in a volcanic area watching the bubbles welling, feeling the unusual warmth of the water and wondering what exactly is going on under there?

This book is all about the shifting shape over time of the ocean, its floor, islands, seamounts and coasts, and it might well fascinate you as a diver as much as it did me.

Patrick Nunn is a British oceanic geoscience professor based in Australia. He has won many awards, not least a shared Nobel Peace Prize for his work on climate change.

A primary interest in this new book is the way tales of ancient post-Ice Age floods, volcanic eruptions, earthquakes and other phenomena are passed down as folklore over millennia, sometimes distorted but often surprisingly accurately – far more so than, say, Noah's Ark.

We live in an era of rising sea-level, which is why so many "drowned lands" require explanation. *World In Shadow* offers scientific explanations that even I can follow for elemental occurrences that must have seemed like divine intervention in past times – when the ocean was an unknowable place that might also have represented the boundary between life and the spirit world.

Nunn enjoys debunking New Age theories, and you can almost hear his contempt for the "pseudoscientists" who propagate myths about the existence of Atlantis, which he insists came from the imagination of Greek philosopher Plato, who used the story purely to make political points.

He also dismisses ideas that the submerged Yonaguni Monument in western Japan was built by a lost race – it remains one of my favourite dives, man-made or not, but while I'd love the theory to be true, based on this book I'd trust Nunn's judgment.

Prehistoric climate change and what goes on beneath the Earth's crust under the sea as lava flows and tectonic plates shift – memorably likened to rodents crawling under a carpet – causes islands to vanish or appear suddenly, and terrifying tsunamis to overwhelm settlements.

Nunn looks at submerged lands such as Heraklion in Egypt, which archaeological divers have explored for years, and I was reminded of how relatively recently the British Isles were connected to the Continent by Doggerland (to around 6000 BC).

He points out that living in coastal areas has only fairly recently been regarded as desirable, and says that it's probably time to reconsider that practice as he looks at what lies ahead for the world.

Reading this book, which ranges so freely through time, our planet really starts to feel very impermanent.

It's well worth checking out. Get a taste by searching YouTube for the title; the author gives a short talk for the Edinburgh Science Festival.

Bloomsbury Sigma
ISBN: 9781472983473
Hardback, 352pp, 13x21cm, £16.99

Reviews by Steve Weinman

TOP 10 MOST GIFTED SCUBA-DIVING BOOKS

as listed by amazon.co.uk (18 July, 2021)

1. **100 Dives of a Lifetime: World's Ultimate Underwater Destinations,** by Carrie Miller & Brian Skerry
2. **Wrecks & Reefs of Southeast Scotland,** by Mike Clark
3. **Reef Life: An Underwater Memoir,** by Callum Roberts
4. **Wild and Temperate Seas: 50 Favourite UK Dives,** by Will Appleyard
5. **Scuba Diving Hand Signals: Pocket Companion for Recreational Scuba Divers,** by Lars Behnke
6. **Fifty Places to Dive Before You Die,** by Chris Santella
7. **Scuba Diving,** by Dennis Graver
8. **Diving the Thistlegorm** (softback) by Simon Brown, Jon Henderson, Alex Mustard & Mike Postons
9. **Silent Warriors: Submarine Wrecks of the United Kingdom,** by Pamela Armstrong
10. **Deco for Divers: A Diver's Guide to Decompression Theory and Physiology,** by Mark Powell

MASKS
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BOOKING NOW

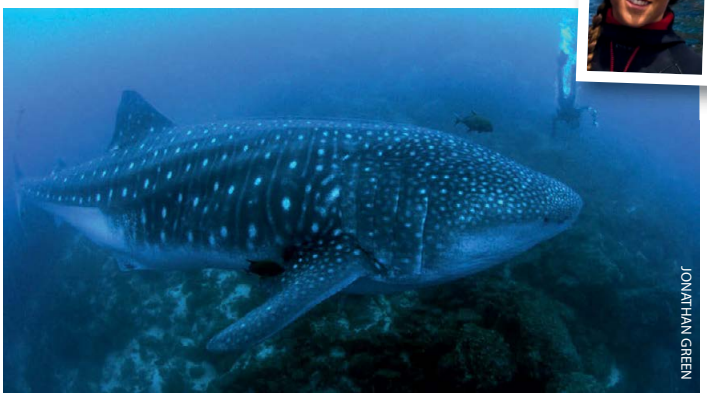
Galapagos: a year soon passes

An expert-led trip in prime whale shark season is in prospect with Sofia Green Iturralde (*right*) of the Galapagos Whale Shark Project on board *Aqua Galapagos*. There is time for current uncertainties to settle down because it departs in September 2022.

Ecuadorian marine biologist and conservationist Iturralde is an expert on whale shark behaviour. Her evening presentations and Q&As will complement the in-water experiences.

Likely locations along the way include Isabela, Fernandina, Wolf and Darwin Islands and Cousins Rock, with manta rays and hammerhead sharks likely to be encountered along with the whale sharks.

Choose a 10-day package from Dive Worldwide that includes flights from the UK for £5895pp, or eight days in Galapagos (one night in Guyaquil, seven nights on board) from £4995. You get up to 19 dives, group size is 15 and the boat leaves on 26 September.



JONATHAN GREEN

US $145 covers national park fees, tourist card and hyperbaric chamber contribution. And having travelled all the way to Galapagos, you might wish to combine the dive itinerary with an extension to explore topside.

▸▸ diveworldwide.com

GREEN-LIT for dive travel

WL Watch-listed (sudden change in classification possible)
NE No entry for most UK travellers
QE Quarantine on entry, even if fully vaccinated

Antigua (WL)
Australia (NE)
Barbados (WL)
Bermuda (WL)
Cayman Islands (WL, NE)
Croatia
Dominica (WL, QE 14)
Gibraltar
Grenada (WL)
Iceland
Israel (WL, NE)
Madeira (WL)
Malta
Montserrat (WL, NE)
New Zealand (NE)
Norway (QE 10)
St Helena (QE 10)
Taiwan (NE)
Turks & Caicos Islands (WL)

AMBER-LIT Aruba, Bahamas, Bahrain, Belize, Bonaire, St Eustatius & Saba, British Virgin Is, Canada, Curaçao, Cyprus, Denmark, Fiji, Finland, France, French Polynesia, Greece, Greenland, Honduras, Italy, Japan, Jordan, Madagascar, Malaysia, Marshall Is, Mauritius, Micronesia, New Caledonia, Palau, Papua New Guinea, Portugal incl Azores, Solomon Is, Spain incl Balearic & Canary Is, St Kitts & Nevis, St Lucia, St Vincent & Grenadines, Sweden, Thailand, Timor-Leste, UAE, USA, Vanuatu

RED-LIT Cape Verde, Costa Rica, Cuba, Dominican Republic, Ecuador, Egypt, Indonesia, Kenya, Maldives, Mexico, Mozambique, Oman, Philippines, Réunion, Seychelles, South Africa, Sri Lanka, Sudan, Tobago, Tunisia, Turkey

Oasis accolade

Bunaken Oasis Dive & Spa Resort, which opened in North Sulawesi only four years ago, was recognised as Indonesia's Best Boutique Resort 2021 by Global Tourism Awards.

"We have also been voted Indonesia's Leading Dive Resort by the World Travel Awards for the past three years," said happy owners Elaine & Simon Wallace, describing the latest accolade as "really exciting, as it demonstrates the all-round excellence which awards divers and non-divers alike.

"We're especially pleased for our team, who've worked tirelessly throughout the pandemic to ensure that Oasis is a safe and luxurious retreat which is fully ready to welcome guests as soon as they are able to travel"

Bunaken Oasis is situated on Liang beach on the edge of Bunaken's National Marine Park. It has 12 ocean-view cottages.

A full-board 10-night, 26-dive package in a luxury cottage in 2021 costs US $5682pp (two sharing). That includes transfers from Manado, boat dives and nitrox.

▸▸ bunakenoasis.com

DIGITAL TOUR OF TURKEY

Turkey was still red-listed last time we looked, but if you're in the planning stages it could offer more diving possibilities than you realised, including well-known areas such as Bodrum, Kas or Fethiye but also some that might prove harder to reach but look promising, one example being Hatay. It's a big country.

The temptations are laid out in a useful new resource, a new scuba guide produced by well-established Turkish diving expert Mahmut Suner.

The guide provides useful general information before getting down to the regions, and the high-quality underwater photos grab the attention.

Find it on the Flipsnack site – enter "Flipsnack *Underwater Wonders of Turkey*" in your search engine.

▸▸ flipsnack.com

A new career in Belize

Volunteer travel organiser GVI is offering a Belize Diving & Marine Conservation Internship. It would take you to the small tropical island of Ambergris Caye, near the Belize Barrier Reef (the world's second-largest).

You'd train as a PADI pro diver and coral-reef researcher, carrying out underwater surveys and assisting with various conservation initiatives.

"The clear, warm Caribbean waters flourish with parrotfish, eagle rays, sea turtles and a vibrant array of corals," says GVI, and the work aims to tackle threats from tourism, coral-bleaching, invasive species and pollution. The programme costs £3395pp for four weeks to £10,545 for 24 weeks, with training, accommodation, meals and as many dives as can be fitted in.

▸▸ gvi.co.uk

Pack your kit and drive to Ireland

Fully vaxxed Brits no longer need to quarantine on arrival in Ireland or returning to the UK, opening up a number of possible Atlantic diving getaways. If you want to cross over with a vehicle, Irish Ferries said in late July that it had availability on peak cruise ferry and Dublin Swift fast ferry services between Holyhead & Dublin and Pembroke & Rosslare. Early booking fares start from £107 for a car plus driver.

▸▸ irishferries.com

WELL AND TRULY TESTED

A bit different this month: we invited an experienced open-circuit but first-time rebreather diver to try out the Hollis Prism 2. Over to ZOE AGER-HOWDEN – while STEVE WARREN looks deeper into simple dive accessories

REBREATHER
HOLLIS **PRISM 2**

FOR SOME YEARS I HAVE REGARDED closed-circuit rebreathers as over-complicated and too technical for my needs, even though I'm aware that they would allow me to spend longer in deep, dark and murky waters.

However, the introduction of the Hollis Prism 2 gave me the opportunity to find out more about the CCRs and to give one a try.

The Prism 2 is relatively new to the UK but its antecedents stretch way back. The original Prism was invented in this country back in the early 1990s.

The initials of Peter Readey's Incredible Steam Machine gave the unit its name and it won its aficionados. In 2007 Readey sold the rights to Hollis in the USA.

Hollis's new and improved Prism 2 appeared in 2012 but it was only in late 2019 that the unit finally gained CE approval in the UK, so you could say it's been quite a slow-burning affair.

The unit, very similar to previous versions apart from details of threads and labelling to suit it to European consumers, is distributed by South Coast-based Rebreathers UK, but before the expected launch events could be held in the spring of 2020, Covid-19 put in an appearance and the plans were disrupted.

Only recently was the launch programme able to resume, and I went along to NDAC, the inland site in Gloucestershire, to find out more about CCRs and try out the Prism 2.

Rebreathers

The closed-circuit rebreather is a tool for particular jobs. It's easy to achieve a three-hour-plus dive at significant depth once freed of the restrictions imposed by open-circuit on the amount of gas you can carry.

The gas efficiency of a rebreather means that you need only small cylinders, which is why CCR divers often carry 3-litre units rather than big twin-12s.

Used gas flows back into the loop rather than being exhaled into the water, and passes through a scrubber that removes the carbon dioxide content, allowing you to use it again.

Another advantage is that a rebreather calculates the optimum gas mix for your depth, so you breathe what it deems to be the best gas for most of your dive.

It does this by mixing the two gases in the cylinders, one on each side of the unit.

Usually the cylinder on the right will carry oxygen and the other the diluent.

With open circuit you would choose the most efficient gas for a particular depth, but should you be diving an upright wreck, say, you might well not be diving the most efficient gas at all times throughout the dive.

The rebreather's automatic adjustments help to reduce your deco-stop time and narcosis build-up.

The Design

My initial look at the Prism 2 suggested that everything appeared sensibly ordered, all packed into a compact lightweight and apparently robust unit, branded with Hollis' smart red and black colour scheme.

A more detailed inspection of the unit showed that thoughtful attention had been applied throughout – to everything from having red O-rings for high visibility to the positioning of the stainless-steel stand, engineered to ensure that the unit can stand safely and independently without adding excessive weight.

A radial CO_2 scrubber is standard and 3-litre cylinders are mounted on each side, although it's worth noting that the P2 can take bigger or smaller cylinders to suit your needs.

The scrubber is housed in a clear, solidly engineered thermoplastic bucket, allowing your buddy to carry out an underwater inspection if required – principally that would be to ensure that no water was getting in.

The first stages are designed to ensure that all hoses can connect to the top and will not be required to bend awkwardly or to require elbow joints.

This minimises the need for extra O-rings and potential additional failure-points.

All hoses are routed to come straight up the back of the unit and over each shoulder to the connection at the front.

The pressure gauges also follow this same simple routeing, making them clearly visible at the front of the unit throughout your dive without you having to hunt around or struggle to reach them.

The P2 uses a standard 11in centre stainless-steel backplate with a continuous harness. This is a familiar piece of kit for most twin-set divers, a factor that might be helpful in making the transition to CCR. It's a simple system that works, so why reinvent the wheel?

The unit can be supplied with an aluminium backplate, allowing user-customisation from the off. Another benefit of having a standard set-up is that if you're travelling and need to save weight on your flights you could always consider hiring a backplate/harness at your destination.

Counterlungs

The counterlungs allow the loop to expand and contract when you breathe, keeping the total volume of gas in the system (your lungs and the loop) constant throughout the cycle.

The user can choose between front- or back-mounted counterlungs. The former sit over your shoulder in front of you and are supposed to help to make the work of breathing slightly easier, although it still felt easy enough to me using the back-mounted counterlungs.

Trying on both units I found the comfort level much the same – but I preferred the back-mounted counterlungs, simply because they sat out of the way and left my front uncluttered.

Simple safety features help when setting up, including colour-coded labelling and markings to distinguish the oxygen and diluent and ensure that you don't connect the wrong hoses.

Less-visible elements include an oxygen restrictor to reduce the risk of hypoxic (insufficient O_2 supply) and/or hyperoxic (excessive O_2 supply) loop conditions, as well as providing safer oxygen pressurisation.

Hollis has opted to follow other CCR manufacturers and use the Shearwater Petrel as the main controller and decompression computer.

Shearwater computers are commonly used in the technical-diving community and are known for their simplicity, clarity and ease of use, and the philosophy fits perfectly with the Prism 2.

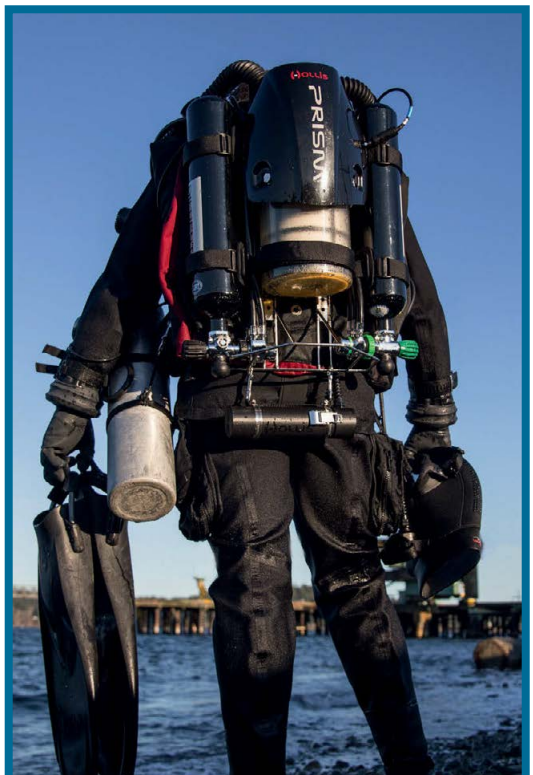
For me as a first-time CCR user, it was nice to have the familiarity of a set of computer graphics that I knew and understood. Shearwater computers have a very clear display that is visible in almost any light and come with Buhlmann ZHL-16C gradient factor decompression software as standard. VPM is available to download from Shearwater at additional cost.

The unit also comes with a head-up display (HUD) consisting of brightly coloured LEDs in three columns, one for each corresponding O_2 sensor, running a code of blinking lights.

There is also a red (danger) light at the end of the HUD should there be a problem with the unit, designed to alert you and/or your buddy. You can turn the HUD on or off by pressing a small button on the end, but should you forget to turn it on before jumping in, a wet contact acts as a fail-safe.

This automatically turns the HUD on, so you can't complete a dive without it.

The batteries are user-replaceable. Worth considering is that there are separate batteries for the secondary and HUD controllers, which run a 3.6V lithium or 1.5V alkaline or lithium battery. Dual 9V batteries drive the solenoid, and these are easy to source and replace.



Setting Up

After a morning spent exploring all the P2's features I turned my attention, with the help of my instructor for the day Peter Black from Deep Blue Pirates, to setting up the unit I would be diving. It had back-mounted counterlungs with a standard dive supply valve (DSV) on the breathing loop.

From the moment I put the P2 on it felt comfortable and light – significantly lighter than my 12-litre twin-set! This seemed a lovely bonus, because carrying the twin-set around can be a lot of work, though the slight downside was that I needed to dive with 4kg of weight.

However, adding a small amount of weight on a belt (or a large P weight) is a nice trade-off compared to that heavy twin-set.

There is more involved with the set-up of a CCR than simply turning it on. With open-circuit you connect your tanks and regs, turn on and go play. With a CCR you first need to pack your scrubber, which involves adding the CO_2 absorbent lime slowly and carefully.

It takes about 10 minutes to pack and then rebuild the unit.

Hollis strongly recommends following its provided check-list to ensure that every component of the rebreather is functioning properly before entering the water.

We worked our way through this list, which I found very intuitive and easy to understand.

The total time to carry out full pre-dive checks is around half an hour, the pay-off being the additional time available once in the water.

You need to allow time to do a five-minute pre-breathe, a standard procedure across all CCR units to ensure that the loop is functioning correctly – that is, that the unit is injecting oxygen and maintaining a stable set-point.

In Use

One giant stride off the platform and I was into a very familiar place, but in a completely different way. As I floated at the surface before descending, the wing gave me plenty of buoyancy, and I sat in a good upright position.

Once I had deflated my wing and drysuit that was it – I was on my way down to immerse myself in CCR diving. Getting to about 4m, I took up a horizontal position.

The unit still felt comfortable on my back and was not tipping me one way or another.

The obvious difference with closed- as compared to open-circuit is that you don't exhale bubbles, so you find yourself in a very silent, peaceful world – clearly a big benefit if you want to get close to wildlife.

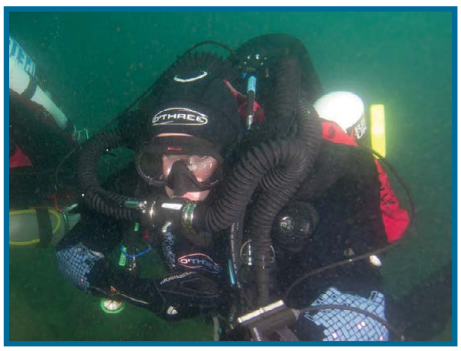
As much as the loop feels big when you're at the surface, once under water you don't notice this, and the mouthpiece sat quite comfortably in my mouth. I also appreciated that other advantage of a closed-circuit unit, that you can breathe lovely moist and warm air.

My adjustment to CCR wasn't all plain sailing. Diving open circuit allows you to adjust your position in the water by adjusting your breathing in and out, and you can't do this on closed circuit, so a change of mindset is required.

When diving open circuit, should you knock your regulator out of your mouth it's fairly easy to clear and pop back in, whereas with closed circuit there is a vital extra stage involved should you need to bail out and swap to open circuit.

You need to ensure that the DSV is closed first, to prevent you flooding the loop with water.

RBUK says that it supports all P2 users, no matter where they bought their unit. Its factory service centre is in the UK and there is a growing dealer network, so should you buy a unit you won't need to ship it abroad should you need any assistance.



Conclusion

At the end of the try-dive there seemed to be generally good vibes from the divers who got to try the unit.

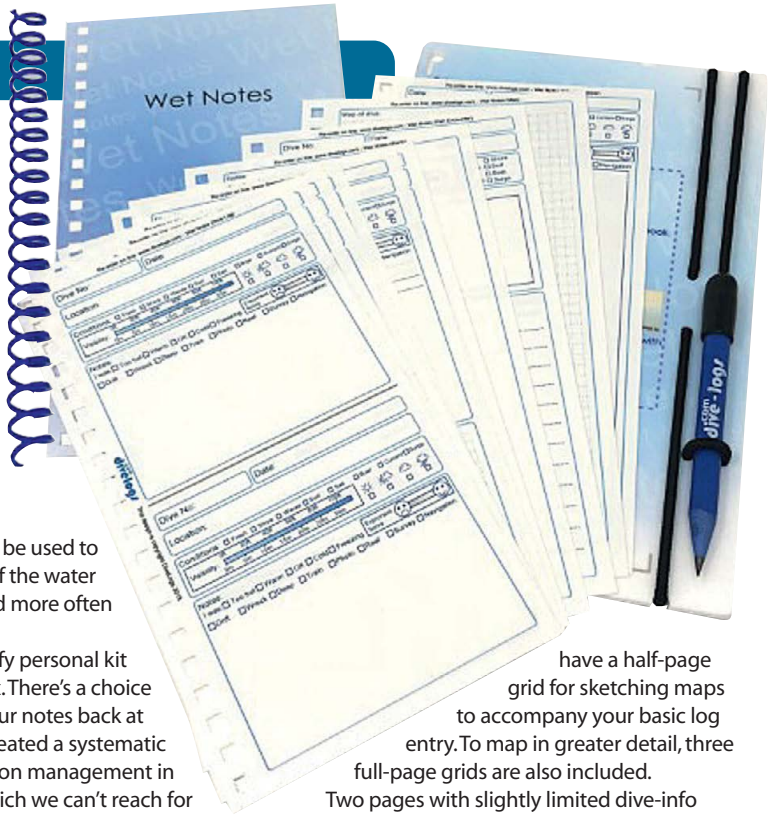
A good rule to live by, I usually find, is to keep things simple wherever possible, and the Hollis Prism 2 appears to be a well thought-out, straightforward rebreather.

Now I have had the opportunity to compare the CCR experience to my usual open circuit, I wouldn't hesitate to use a P2 should I decide to explore further into the rebreather world. ■

SPECS

TESTER ›› Zoe Ager-Howden
PRICES ›› From £7040
DIMENSIONS ›› 53 x 43 x 23cm
WEIGHT ›› 21kg with tanks
SCRUBBER FLOW ›› Radial
COUNTERLUNGS ›› FM 3.5 litre, BM 4 litre
SENSOR LIFE ›› 100hr dive-time
BATTERY LIFE ›› 40hr
CONTACT ›› rebreathersuk.com

LOG
DIVELOGS WET NOTES



GETTING TO TEST AND REPORT on dive-gear is a bit of a dream job for me. And writing up my tests doesn't always begin with my laptop – often, I'll be taking notes under water. Since I became **DIVER**'s Technical Editor more than three years ago, I've relied on Divelogs Wet Notes to do this.

Typically I batch-test, meaning that a lot of kit has to be tried out over a number of dives, so sometimes tests are combined.

Before even submerging I might first check a BC's surface-flotation performance. Under water there are other BC features to try out, such as valves. I might then head to 30m for a deepwater regulator test with two of us breathing from the unit, followed by going into deco to evaluate the guidance displays on two or three computers.

All these tests require the keeping of records. For example, to check a BC my criteria include measuring how high above the surface it floats me, the speed at which it inflates and the stopping distance if I fully inflate it at depth, let go of the bottom and hit the dump.

A heavy-duty air-sharing exercise requires a record of start and stopping times and starting and ending tank pressures, so that I can calculate the amount of gas used. For a dive-computer, I might have to take instructions along on the dive so that I can access functions I can't be sure I can select from memory, such as how to switch gases.

I also rely on a check-list to ensure that I've carried out all the tests, because narcosis-induced amnesia and task-loading could make it all too easy to overlook a drill.

The Design

Divelogs offers an extensive line in waterproof literature, including logbooks for recreational, technical and commercial divers. It also offers pre-printed guides with layouts to help you navigate to points of interest on wrecks, and marine-life ID slates that can be used for fish surveys.

Owner Mike Fenney also provides a service to create bespoke logbooks, slates and tags. This enables dive-centres to sell corporate keepsakes to clients and clubs to brand logbooks.

Custom slates can be printed with data for recording marine-biology censuses and archaeological surveys for scientific diving. Name-tags can be used to log divers in and out of the water (people get left behind more often than they should).

Tags can also identify personal kit and confirm a gas-mix. There's a choice of binders for filing your notes back at home. Divelogs has created a systematic approach to information management in an environment in which we can't reach for our tablet.

The set I use is meant for logging recreational dives. At the base is a 20 x 12cm white slate. It's 5mm thick, enough to keep it rigid so that it acts like a clipboard for the pages themselves.

The writing area is about 9 x 17cm. A plastic-coated spiral spine clips the pages to the slate, allowing you to remove them for filing ashore and add replacements.

A bungee cord wraps around the slate and pages to keep everything from flapping about. A nice touch are the notches that keep the cord neatly in place. A pencil is attached to the end of the bungee by a push-fit cap.

The A5 pages for logging dives come with pre-printed blocks for adding info such as date, location and dive number. You use a set of tick-boxes to note environmental conditions such as visibility, whether waves, current or surge were present and whether the water was salt or fresh.

You can also cross off the purpose or type of dive. Was it to take photos, a deep or wreck dive, and did it involve navigation? A blank space provides for more personalised information, such as who your buddy was or how the dive went.

Each page has space to log two dives, giving you 16 standard entries. Four additional sheets have a half-page grid for sketching maps to accompany your basic log entry. To map in greater detail, three full-page grids are also included.

Two pages with slightly limited dive-info boxes are dedicated to noting wildlife species, numbers and activity. Finally, two full blank pages allow for more extensive note-taking.

In Use

For logging dives, Wet Notes can be used to fill in dive details topside while still dripping water. But you can keep them in most BC or thigh pockets, or clip them off using the eyelet, so there's no reason not to take them under water.

The slate can carry your navigation plan or be used to record any special features of the dive, such as where on a wreck you found a point of special interest for return dives.

Of course, it's also handy for communicating with a buddy when sign language, gesturing and shouting fails. On a dive to test scooters, when my towing bridle had not been adjusted properly, there was no hand-signal to explain the problem.

But my buddy got the message when I passed him my slate. It simply read: "My nads hurt".

Conclusion

What all this means is that Wet Notes are a far more versatile tool than a standard logbook. That

applies to recreational divers, but the product also lends itself well to use by students taking advanced courses with elective speciality dives, such as fish-watching or practising navigation, because relevant data fields are already included.

You can take an eraser to the slate and pages so that they can be reused after the data has been transferred topside, which makes it a good loaner wet logbook for instructors to hand out.

When you're a new diver or have comparatively modest qualifications, proving your experience to a dive operator might be essential, as when some liveaboards demand a certain number of dives before allowing you to join a charter.

Training agencies might require instructors to have logged experience of dives in a specific discipline, such as deep- or wreck-diving, before they can teach it as a speciality.

Unlike the electronic record in a dive-computer, a written logbook allows for a verification signature from a buddy or instructor.

I'm clearly going to highly recommend Divelogs' recreational Wet Notes – but with a caveat. The sheer range of variations it offers makes it worth checking in case another model suits your needs better. Being spoilt for choice is a nice problem to have.

Now, if I could only read the notes I tried to make riding a DPV while narced… ■

SPECS

TESTER ›› **Steve Warren**
PRICE ›› **Set tested £16**
CONTACT ›› **divelogs.com**

DRYBAG
AKONA **ARIZONA 10 DRY STUFF**

70KG OF GEAR IN THE HOLD, 15kg in cabin luggage, that's my rule of thumb. Anytime I do a run to test equipment, that's what it adds up to, sometimes more but never less.

And believe me, the kit is crammed in tight. I don't take much of my own dive-gear with me on test trips, other than cameras, but what I do like to have is a drybag. The conflict for me is the sheer bulk and weight of conventional heavy-duty vinyl ones for travelling.

Akona makes wetsuits, sun-protection clothing and, especially, dive luggage. Among the roller, duffle, mesh and backpack bags you'll find an interesting selection of drybags.

The Arizona 10 Dry Stuff Bag is the model reviewed here, but it's part of a drybag system.

Why use dry bags? The obvious reason is to separate wet from dry kit so that, for instance, your towel and swim costume don't mix with your manuals after a pool session. Or to seal in the scent of drysuit underwear after a week's diving.

You might be carrying suntan lotion, shampoo and defogger in your hold luggage with your clothes and want to be sure that a spill is contained. They can also be used as portable rinse tanks, or pressed into service as surface marker buoys, though not as delayed SMBs, because they lack relief valves.

The Design

The Arizona has a 10l capacity and, when full, is cylinder shaped, measuring 50cm in length with a 19cm diameter. The usual roll-top is secured with a small side-release clip and, once clipped together, the loop forms a handle.

A plastic D-ring allows you to attach the Arizona to other kit. So far, just another drybag.

What sets it apart is the material. Cordura, a type of nylon and a popular choice for making BCs, comes in various grades. This is 70 denier (BCs start off at 420). A polyurethane coating provides waterproofing.

The advantage for travelling is that you get a bag that feels so soft you'd think Andrex made it. This allows it to pack up small and weigh in at only 57g. It comes with its own carry pouch and that takes up only 15 x 10cm, the size of a pocket tissue-pack.

Dip Tank in Your Pocket

Jump into a swimming pool and there's a fair chance you're swimming in other people's pee, diluted but there. Use dip tanks others have used before, and what was fresh water becomes increasingly concentrated with salt. On hot days evaporation boosts that salt content.

So dip tanks often don't deliver the protection from corrosion you might require for items such as regulators, computers or cameras.

In a hotel, you might have a bath in which to soak kit, but often there is only a shower. This helps to flush salt out of hard-to-reach places, but the best way to dissolve it is to soak your kit in fresh water and flush through by changing the water a couple of times.

A drybag can give you more control over preventative maintenance. I half-filled the Arizona with water for an hour and was pleased to see that it didn't leak, so that's it – a pocket-sized dip tank for expensive kit.

Photographers

The small size of this bag and its ability to mould around kit means that underwater photographers can consider keeping all their gear in the same case or bag while avoiding cross-contamination between wet and dry kit.

Much of their equipment such as cameras, lenses, batteries and chargers should not get damp or be exposed to salt-laden air.

As much as divers try to rinse and dry housings and strobes before packing them away, any service technician will tell you how much salt is left behind.

Store that housing with unprotected electronic items and it can set off corrosion.

I used to advise clients to bring their underwater photography kit home, rinse it again and then store it outside the case or bag that can so easily accumulate salt.

For those who would like to consolidate their kit in one case or holdall, watertight boxes add weight, and self-seal bags can split or unseal. With the Arizona you can separate items in the main bag or case very easily.

It's flexible, so isn't affected by pressure changes if you squeeze out excess air before sealing it. You can also minimise the space it takes up.

It happily took my mirrorless housing, grips and port, so I could seal it and put it in my camera bag knowing that no salt air would leak out.

Conclusion

The Akona Arizona is one of those bits of kit that is easily overlooked but it's now a must-have for me. Highly recommended. ■

SPECS

TESTER ›› **Steve Warren**
PRICE ›› **£16**
CONTACT ›› **midlanddiving.com**

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NEW BUT UNTESTED

The latest kit to hit the dive shops

Nanight Micro Tech 2 Canister Light ▲▲▲▲▲

This canister light might be budget-priced but Nanight says it has enough performance for most divers. Powered by six ni-mh AA batteries, it emits 1500lm of light at a beam angle of 10°, and this can be boosted to 4000lm with an optional li-ion battery-pack upgrade. A soft Goodman handle is included, with hard carbon or aluminium handles optional. It costs 300 euros plus VAT.

nanight.se

Scubapro S-Tek BPW System ▲▲▲▲

Scubapro claims to have reinvented the classic backplate and wing system with S-Tek, which it says focuses on adjustability, fit and comfort for technical divers. S-Tek Donut Wings are said to offer reliable buoyancy control whatever the diving position and come in 13, 18 and 27kg lift capacities. The S-Tek Pro 3D backplate with harness includes adjustable TEK LOC shoulders and moulded Monprene pads, while the stainless-steel or aluminium Pure version adopts the DIR minimalist philosophy. S-Tek Pro or Pure accessory sets, Expedition reels and Spinner spools complete the system.

scubapro.johnsonoutdoors.eu

Ball Roadmaster Ocean Explorer ▶▶▶▶

Another limited edition diver's watch (1000 units), this one has a bezel that indicates high and low tides for a two-week period, while the in-house movement module reveals spring and neap tides alongside an illuminated moon phase indicator. Featuring Super LumiNova illumination and anti-reflective sapphire crystal, it comes in a 41mm stainless-steel 100m-rated case and costs £2630 (£650 off if ordered before the start of September)

ballwatch.ch

LifeJacket Mineral Sun Stick ▶▶▶▶

For head protection when out on the water, this zinc-based SPF 50+ UVA product is designed to be handy to carry and apply. It comes in a 15g "swipe and go" dispenser, doesn't feel greasy and is said to be both water-resistant and reef-safe – free of oxybenzone or octinoxate, you'd even be allowed into Palau with it. But rub in well or you'll resemble a mime artist. £15.

lifejacketskinprotection.com

Azoth Systems O-Dive Sounder ◀◀◀◀

This personal Doppler ultrasound device links to your dive-computer after dives to analyse your vascular microbubbles, telling you how fizzy you are and helping you to make necessary adjustments to your personal diving style. There are four depth-rated versions: Sport (to 40m, £640), Advanced (to 60m, £690), CCR (to 85m, £790) and Technical (to 125m, £840).

nautilus.uk

Shearwater Swift Wireless Pressure Transmitter ◆◆◆◆

Shearwater says that AI technology enables the Swift to create a "highly reliable" connection, communicating only when the channel is clear. This means that divers can use multiple transmitters close to each other without fear of interference. It is compatible with all existing Shearwater AI-enabled computers, and its user-replaceable 3v CR2 lithium battery is said to last up to 300 hours. The 200m-rated 135g unit costs 335 euros.

shearwater.com

Linde Werdelin Oktopus Nord Watch ◆◆◆◆

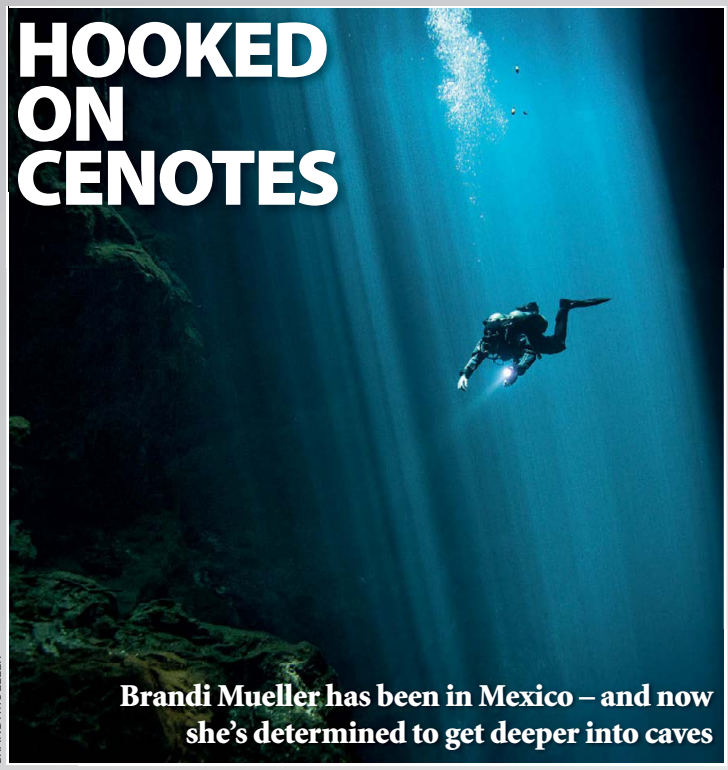
Added to its already extensive Oktopus diving timepiece range, the 300m-resistant Nord limited edition is inspired by the colours of the North Sea's deepest waters, says the watchmaker. Powered by a Dubois Dépraz double date movement, it has a full titanium 44x46mm case "inspired by diving bells". A range of straps are available. There are only 88 numbered Oktopus Nord watches and the price is £9600.

lindewerdelin.com

Waterproof W7 Wetsuit ▲▲▲▲

Now available in two thicknesses and 15 male and 12 female styles, the W7 uses soft, flexible Neoflex 100% CR neoprene in grey and black Lycra for four-way stretch and a comfortable fit, says the Swedish maker. There are soft kneepads, Kevlar and Duratex reinforcement, a double-zipper seal system, double seals in Glide-skin for wrist and legs, thermal lining and two pockets. A detachable neck-seal is an option. Price is £349 (5mm) or £385 (7mm).

cpspartnership.co.uk



BRANDI MUELLER

NEXT ISSUE

After Dark
Steve Warren considers the lure of night-diving

Mega-Maldives
You thought Tiger Zoo was special for sharks? Read this

Constructed for Divers
Dubai's tech experience, and a stone forest in Cyprus

A Virtual Dive
More on freediving with a camera, the Mark Harris way

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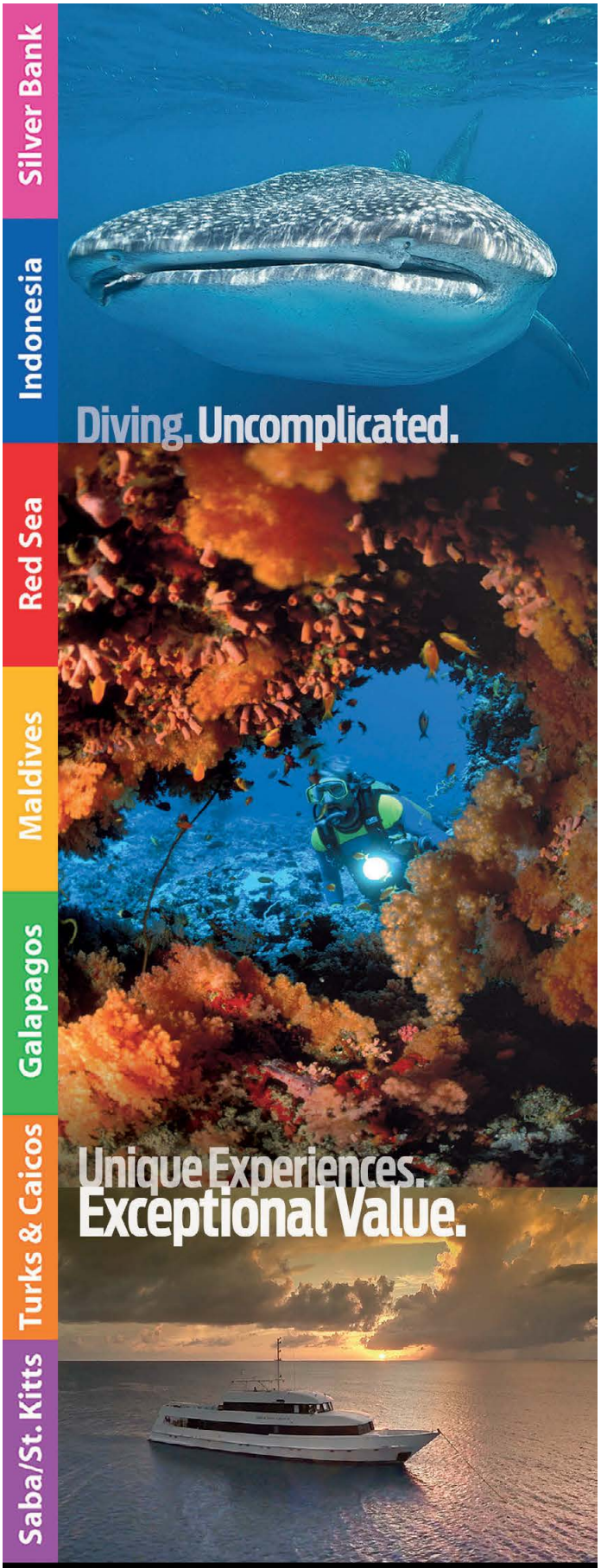

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Lymington - "Wight Spirit". Diving West Wight, East Dorset, English Channel. Beginners to technical and small groups. Electric lift. Easy access, easy parking. Owner/skipper Dave Wendes. Tel/Fax: (023) 8027 0390, e-mail: wightspirit@btinternet.com www.wightspirit.co.uk (70252)
Dive Littlehampton "Final Answer". Shallow to deep, we cater for all. Skipper and crew on board, availability 7 days a week. Maximum 10. Tel: (01243) 553977 or 07850 312068. Email: ourjoyboat@gmail.com www.ourjoy.co.uk (73415)

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Venture Dive Charters. For quality diving from Plymouth, visit: www.venturecharters.co.uk or Tel: 07948 525030. (73533)

DIVERNET
www.divernet.com

DIVING MEDICALS

Diving Medicals - Nottingham. Sport Diving medicals: £55. HSE Commercial Diving medicals: £120. OGUK Offshore medicals: £110. HGV/PSV medicals £55. Student and Group discounts. Combine any two medicals and pay only £5 extra for the cheaper of the two. Tel: 07802 850084 for appointment. Email: mclamp@doctors.org.uk(70407)

HSE MEDICALS and phone advice – Poole

Dr Gerry Roberts and Dr Mark Bettley-Smith.
Tel: (01202) 741370

Diving Medicals - Midlands (Rugby) - HSE, Sports Medicals and advice at Midlands Diving Chamber. Tel: 01788 579555 www.midlandsdivingchamber.co.uk (72756)

CLUB NOTICES

FREE OF CHARGE. (Max 25 words). Non-commercial clubs, no sales.

Arnewood Divers, Christchurch - where diving is safe and fun from our own hard boat. Training from beginner to Instructor. Find us on Facebook or https://sites.google.com/view/adsac/home
Active and friendly BSAC club. All year diving in local lake. New and qualified divers of all agencies welcome. Own clubhouse with 7m RIB and compressor. For further information visit www.mksac.co.uk (64403)
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.
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. (65792)
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.chelmsfordiveclub.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, Larkswood Leisure Centre E4 9EY. Information: www.dive365.co.uk Email: loughton divers365@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 out website: www.esacdivers.co.uk (65879)
Ellon 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.flintsac.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.guildford-bsac.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)
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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.lsac.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.oddy@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.

Merseyside training club, new and active divers from all agencies, weekly pool session. Own Rib towing vehicle Contact www.wapsac.org.uk or wapsacsac@gmail.com

Millennium Divers. Active, friendly club for all levels and certifications of diver, based in Portland, Dorset. UK diving and holidays. Club social nights www.millenniumdivers.org (68351)

Mole Valley Sub Aqua Club. Surrey based SDI club, own RIB, active diving UK & Abroad, training and social events. Trainees/crossovers welcome. Contact: 07410 949268 or email: info@mvsac.org.uk (68691)

Monastery Dive Club (Dunkerton Branch). New divers welcome to join our club. Trips to Plymouth and NDAC. GSOH is a must. South Wales area (Crosskeys, Risca.) Text: Flinty 07971 432803 or email: welshflinty@ hotmail.com (65305)

Nekton SAC. Based in Bromley, we are a friendly and active SAA Club that welcomes experienced and new divers alike. Info@nekton.org.uk or call Steve: 020 8467 4599.(68387)

Nemo Diving Club. Small friendly dive club offering dive trips and training for non/experienced divers in Retford and surrounding areas. Contact: www.nemodiver training.co.uk (69640)

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North Glos BSAC 80. Friendly, active club welcomes new and experienced divers. Own boat and equipment with weekly pool sessions, Thursdays, 8.30pm at GL1 Gloucester, (Gloucester Leisure Centre). www.nglos.co.uk (68483)

Nuneaton. Marlin BSAC welcomes experienced divers to Pingles pool every Thursday. Active training, diving, social programme in a flourishing club with no politics allowed. www.marlinsac.com (69322)

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Plymouth Sound Dive Club welcomes qualified and experienced guest divers. See www.plymouthdivers. org.uk for more information/weekly club notices. Contact relevant dive manager or divingofficer@ plymouth divers.org.uk to join a dive. 72219)

Preston Divers SAA 30. The friendliest dive club. Come and meet us at Fulwood Leisure Centre, Preston on Monday nights between 8.00pm - 9.00pm. www. prestondivers.co.uk (64198)

Reading Diving Club. Experience the best of UK diving with a friendly and active club. All welcome. Tel: 01183 216310 or email: info@thedivingclub.co.uk www. thedivingclub.co.uk (69447)

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Richmond Sub-Aqua Club (Surrey) welcomes new and experienced divers. Very active diving, training and social calendar for about 100 members. Contact: contact.rsac@gmail.com, www.richmondsubaqua.club, 07843 959 775.

Robin Hood Dive Club. Yorkshire based and one of the most active in the country with a full 2019 calendar of trips. All agencies and grades welcome. No training or pool, just a growing bunch of regular divers. www. robinhooddiveclub.com or find us on Facebook. (59245)

Rochdale Sub-Aqua Club. Beginners and experienced divers welcome. Full training provided. Pool session every Wednesday. Club has two boats. More info at www.RochdaleDivers.co.uk or call Mick 07951 834 903. (65103)

Ruislip & Northwood BSAC. Friendly, active club, RIB, welcomes new and qualified divers. Meets Highgrove Pool Thursday nights 8.30pm. www.rnbsac.co.uk Tel: 07843 738 646 for details. (69469)

Scotland Plug Divers. Small, friendly dive club welcomes newly qualified and experienced divers to join us. Regular hardboat diving around Bass Rock/Firth of Forth/ Eyemouth and trips abroad. Tel George: 07793 018 540. Email: plugdivers@btinternet.com (64638)

Selby Aquanauts SAA 1117. Family friendly club, welcomes new and qualified divers. Regular trips UK & abroad. Meet every Thursday, Albion Vaults, Selby at 9pm. Contact Mark: 07831 295 655. (69261)

Sutton Coldfield SAC, friendly BSAC club, welcomes all divers from trainee to advanced. All agencies. Own RIBs and compressor. Meet every Wednesday, 8.15pm at Wyndley (3.4m pool). For free try dive call Alan: 07970 573638 or Mark: 07787 106191. (64974)

Sheffield BSAC36. Friendly, social and active dive club welcomes newcomers or qualified divers. Trips, socials, weekly pool and club/pub meetings, club RIB. See www.bsac36.org.uk (69191)

Slough 491 BSAC; small friendly club welcomes divers at all levels. Meet at Beechwood School Fridays 19.30. Diving holidays and South Coast. Email: malcolm@uv.net or tel: Tony (01344) 884 596. (69722)

SOS Divers (SAA 263), Stourport, Worcestershire. Founded 1979. Friendly family club welcomes qualified and trainee divers. Own RIB. Contact Althea by email: arannie123@outlook.com (57542)

South Coast Divers (SAA 1150) Portsmouth. A friendly and active club welcomes new and experienced divers from all agencies. Email: southcoastdivers@hotmail.co.uk or call Darren: 07449 794 804. (69224)

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Steyning Scuba Club, West Sussex. All divers welcome. Steyning Pool , Monday evenings at 8.30pm. Contact Andy Willett on 07786 243 763. www.seaurchin divers@hotmail.co.uk (63956)

The Bath Bubble Club SAA777 seeks new members. New and qualified divers of all agencies welcome. Weekly pool training, every Wednesday at 9pm, Culverhay Sport Centre, Rush Hill, Bath. Regular diving programme from club RIB. www.bathbubbleclubuk.co.uk (68434)

Wells Dive Group. Friendly, active club in Somerset welcomes new or experienced divers. Meeting/training at The Little Theatre or the pool on Thursdays, try dives available. Regular RIB diving, trips around the UK and abroad. Visit: www.wellsdivers.co.uk or Tel: Rob, 07832 141250. (69653)

TridentDivers.co.uk (find us on Facebook) Cardiff-based SAA club taking on new trainees and crossover members contact us on 07547 398802. (71656)

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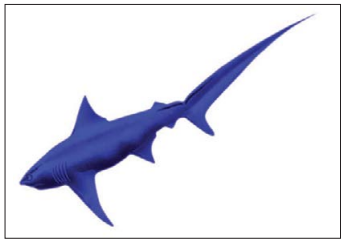

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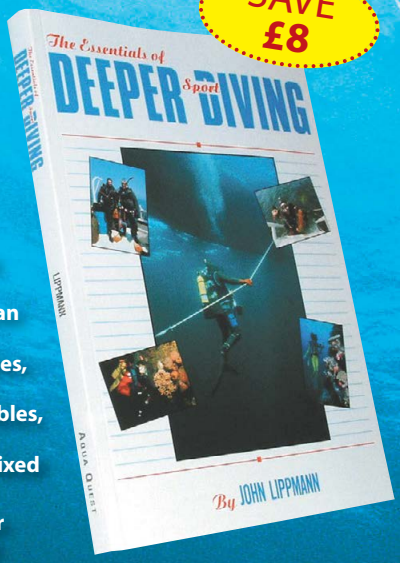

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DEEP BREATH

Why I love the sea and try to set the right example

Sixteen-year-old snorkeller ALEXANDER SANCHEZ SOIZA lives in Gibraltar and is a volunteer with The Nautilus Project.

MY INTEREST IN THE SEA began at a very early age. I was only four when my stepdad Lewis introduced me to the mysteries that lie beneath the ocean.

Also my grandfather Brian had always been an avid angler, with a few European and world fish species records to his name. Both my stepfather and grandfather have a great passion for the sea and have always respected it. They instilled a love and respect for the sea in both my younger brother Aaron and in me.

My grandad, who is now 67, began river-fishing when he was just a small boy living in the UK. He recalls leaving the first fish he ever caught out in the rain for three days, trying to revive it!

When he moved to Gibraltar, he took up sea-fishing. At one point he joined the local club and, in a bid to protect local species, became a pioneer in making sure that the sizes of fish caught were limited. He still carries the same ruler to measure them when he's unsure!

When he's out on his boat *Freedom* he collects all the floating plastics he can and brings it back to shore to recycle it.

FIVE YEARS AGO Lewis, who is a marine biologist, and my mum Melanie decided to launch The Nautilus Project, a voluntary marine-science educational programme.

This runs different activities such as the Great Gibraltar Beach Cleans, science talks and field trips for schools, snorkelling and boat trips.

We have carried out 60 beach-cleans along our coastline and retrieved tonnes upon tonnes of plastics debris already.

My role in The Nautilus Project team is to snorkel and help my stepdad find and bring out marine invertebrates on a catch, learn and release basis.

I catch sea-cucumbers, sea-urchins, sea-slugs, starfish, conchs, crabs and even octopuses. We make sure that all these animals are returned to their habitats once Lewis has taught the school-children all about them, which he does in a fun way that my friends really enjoy.

Lewis has taught me how to become a strong, confident swimmer and how to snorkel responsibly.

I take my job very seriously and I love learning about the sea with him.

Snorkelling is one of my favourite pastimes, and the historic Rosia Bay basin is the perfect place to learn and marvel at its amazing sea life.

On a recent snorkel I found a really large clam shell, *Pinna nobilis*, which The Nautilus Project now uses at schools.

Although I'm proud of having found it, I'm saddened by the fact that these clams are decreasing in numbers around the Bay of Gibraltar.

I also spotted a cuttlefish at Rosia Bay, and took my chances to try to catch it with my hands. I was able to touch it but when I went to grab it, it slipped out of my hands and swam away. I was so close!

I think my stepdad was impressed.

As part of our family project, we have been raising awareness in Gibraltar on the effects single-use plastics have on the sea.

My brother and I now use bamboo toothbrushes, reusable water-bottles, and carry bags for life in our satchels in case we have to run errands for my mum on our way back from school.

We carry paper straws, and recycling is a big part of our lives. We tell all our friends at school that small changes can make big differences in the Bay in Gibraltar. The lady at the pet-shop now greets me as "the boy that refuses the plastic bags!" My mum always says that we must lead by example.

A COUPLE OF SUMMERS AGO we found a spider crab (*Maja squinado*) tangled in nylon fishing-line. Luckily we were able to cut off all the line and release it back into the sea.

These crabs are protected in Gibraltar, so I was truly happy to be able to rescue one, and for it to live another day.

Recently I was sent out on a rescue mission. A sunfish had become stuck between some rocks and was in distress.

I jumped into the sea with the fish and ensured that it didn't scratch itself against the rocks. When the rescue vessel arrived, I helped push the poor sunfish out to sea, near the boat. Chances are that it survived!

I was humbled to receive the Rotary Young Persons award.

Some dolphins, turtles and marine birds have died on our shores because of plastics and this is heart-wrenching.

Aaron and I want to show Gibraltar and the whole world that children care about our ocean and marine animals. We want to make a difference and protect them.

If we all do our bit, together we can make a big difference. Our motto is #BeTheChangeYouWishToSee.

I hope that you've enjoyed reading this and that you will join my family and I as we help to protect our sea animals. They really deserve for us humans to do better!

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