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COVER PHOTO: Purple ochre sea stars and painted anemone, Skookumchuck Rapids, British Columbia, Canada by Barb Roy
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Scapa Flow. Photo by Lawson Wood

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Time to get wet

Most of us, at least in the Western world live removed from nature. As we commute to work on busy highways or sit packed tight in mass transit systems we may catch our only glimpse of blue sky and perhaps even some greenery before return home to sit in front of a flat screen.

We may watch awesome footage from some of nature's most stunning spectacles on BBC, National Geographic or Discovery Channel, if we are not surfing Xray-Mag.com and other websites to get our daily dose.

If we live near to the coast chances are that we once in a while will go diving on a Sunday or weekend, and we will probably go on a couple of dive trips each year. But essentially we live removed from nature.

We don't depend on it for our livelihoods in the same manner that the farmers and fishermen, which many of our grandparents were, and we don't see the daily changes and impoverishment of our underwater habitats. Ninety percent of the fish stocks available to us in the year 1900 are now gone due to over-fishing and other mismanagement. We only realise this because of measurements, statistics and science. Without that most of us wouldn't be able to tell the difference, because we haven't seen how diverse and densely populated the sea can really be under natural circumstances. Except perhaps if we are so lucky to travel to some of those remaining spots where the marine life is still plentiful and diverse.

Experiencing these locations first hand, by perhaps going on a dive trip to some exotic location is just one step, one that is not available to all of us as resources, nature's and probably our own financial means as well. But even more important is the realisation of what a diverse natural world is worth, both in terms of medium range economic gains as well as our long term survival as a species.

Whale-watching tourism brings in billions of dollars in revenue, and the value of the marine mammals alive outstrips the value of them dead by several orders of magnitude.

Fish stocks being restored through enforcing strict quotas, no-take zones and marine protected areas will ultimately enable us to revive fishery in many areas, albeit this time in a wiser and sustainable manner. It has only been encouraging to see how fast nature can bounce back, if only we allow it to heal. It seems so in the tropics, and lately we have heard that the haddock was coming back.

"It's not as deep on this side" dive cartoon by syndicated cartoonist and diver, Ralph Hagen. Find it and more on t-shirts at **The X-RAY MAG Store**. Big discounts for retailers and clubs. A percent of all sales goes to ocean conservation. Click on the image to order direct.

But we must not allow ourselves to become lulled into a false sense of security by these occasional bits of good news. Encouraging as they may be, we crave and cling on to good news and tend to placate ourselves with a false sense that everything is going to be okay. I think many of us have a hard time standing all the many doomsday news we get through the news, and we just need to close our eyes to a big part of it all, because otherwise we can't cope or function.

Legendary ocean explorer, Jacques Yves Cousteau, once said, "People protect what they love." Jean-Michel Cousteau later added "We can't protect what we don't yet understand. With understanding comes appreciation, and once we treasure what we see, we will move to protect it.

So, get out of the couch and get your dive gear dusted off. Surely there is a reef, a stretch of coastline or beach somewhere near you that needs your loving attention.

— Peter Symes, Editor-in-Chief

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X-ray mag

News edited
by Peter Symes
& Arnold Weisz

Good
NEWS

Salmon returns to Paris

Reporting by Michel Ribera

Wold salmon is back in the Seine and returning to the French capital for the first time in almost a century. In 2008, 260 individuals were observed by video at the fish pass at Poses dam, upstream from Rouen, and in October 2008, a specimen of 7 kg was caught at the dam at Suresnes, near Paris. A great number of other migratory fish species have also reappeared in Paris.

Historically the Atlantic salmon, *Salmo salar,* used to migrate up the Seine River for part of the year to spawn. But increased pollution of the water and the building of dams after the First World War saw their number dwindle, and by 1970, there were only three species left in the Seine's dirty waters, which washed up hundreds of tonnes of dead fish per year.

But a major clean-up project in the past 15 years—including the building of a water purification plant—has turned the tide for the river's marine life. According to the Union Interdepartmental Clean Agglomeration Parisienne (SIAAP), there are now 32 species of fish in the Seine, against three in 1970.

32 species

Along with the iconic salmon, hundreds of sea trout, shad and lamprey eel have been spotted glinting in the Parisian sunlight this year, with the number of fish species in the river ballooning, officials say. "This year the numbers have exceeded anything we could have imagined," said Bernard Breton, secretary-general of France's National Federation for Fishing. "I would not be surprised if we had passed the 1,000 mark [for salmon]," he told AFP news agency.

Scientists at the French National Institute for Agricultural Research say the return of the salmon is significant—it is a "bellwether species" giving signals about its habitat's state of health. Analysis of their scales concluded that the salmon had spent between a year and a half and three years in the ocean.

Mucus attached to the scales were used to determine the geographical origin of fish. The comparison, conducted by the doctoral student Charles Perrier, indicates a certain cosmopolitanism: more akin to fish populations in Lower Normandy, frequenting the rivers near the Seine. Others come from more distant basins, such as the Allier. Others came from foreign rivers. ■

The Seine and Notre Dame Cathedral from the left bank

Fragile and rare coral reefs on Galapagos to be protected

Some of the world's rarest and most fragile coral reefs and the economies that depend on them will be better protected thanks to a major international marine project led by the University of Southampton.

The three-year, government-funded, Darwin Initiative project, *Galapagos Coral Conservation: Impact Mitigation, Mapping and Monitoring*, was led by Professor Terry Dawson from the University of Southampton's School of Geography. The aim was to assist the Ecuadorian government in protecting the last remaining extensive Galapagos coral reefs of the northern Wolf and Darwin Islands and how they can be managed in a way that still supports the economic activities that are so important to the Galapagos Islands.

Improving management

The coral reefs of the Galapagos Islands contribute significantly to species richness and diversity in the Galapagos Marine Reserve (GMR). They support thousands of species, including many rare and endemic corals. In addition, these reef ecosystems are major hotspots with remarkable numbers of sharks, tuna, turtles and dolphins all ecologically linked to the area's reef complexes. However, their distribution has been strongly affected by extreme climatic events over the last 30 years, especially El Niño events where extensive coral reefs were reduced by 95 percent in 1982–3, with further mortality in 1997–8 due to increased sea surface temperatures as a result of ocean warming.

In addition to the natural threats to the Galapagos, the islands have also become a very popular tourist destinations, being visited by everything from cruise ships to divers. The project also engaged the fishing and tourism industries for improved management of the marine environment through capacity-building of tourism, dive guides and fishers, and established permanent mooring buoys to avoid boat anchor damage.

"This step forward demonstrates how relatively modest external aid can empower applied marine research and lead to management policy. Such steps are critical if natural ecosystem function is to be conserved to maintain Galapagos's intrinsic value and contribution to the wellbeing of future generations," says Professor Dawson.

The Galapagos Islands are experiencing an increase in tourism and suffering as a result. From 2001 to 2006, flights into the Galapagos increased 193 percent.

New species discovered

The project also discovered new species both to science and to Galapagos, including zooanthid species from the genera *Hydrozoanthus, Parazoanthus, Antipathozoanthus* and possibly *Epizoanthus*, although the latter may be an entirely new species as yet undescribed.

Other reef-building corals have been identified, which are new to Galapagos, including stony corals as *Pocillopora effusus* and *Pocillopora inflata*, and the leaf coral, *Pavona chiriquiensis*. In addition, a possible new gorgonian of the genus *Pacifigorgia* (*Octocorallia: Gorgoniidae*) species has been collected, together with a new reef-building coral, *Leptoseris sp*.

The coral species *Gardineroseris planulata* was thought to have gone extinct during the 1997-98 El Niño event, but the project "rediscovered" several separate, but small colonies at the Wolf and Darwin island sites.

This project is not the only one that has been discovering new species at the Galapagos Islands. The National Museum of Natural History (NMNH), part of the Smithsonian Institution, discovered numerous new species —including fishes, sea and sun stars, urchins and mollusks—and documented many species of marine life not previously known in the Galapagos Islands, during their 1999-2000 expedition. It seems like these Pacific islands still have more secrets to reveal, even though it has been 174 years since Charles Darwin arrived in the Galapagos Islands on 15 September 1835. ■

Anemone, North Marchena, Galapagos Islands

Healthy surroundings aid coral recovery

Bleached corals bounce back to normal growth rates faster when they have clean water and lots of sea life at their side, a United States university study indicated.

Better overall ocean health means corals are better able to recover from bleaching events, a recent study by scientists at Scripps Institution of Oceanography at University of California-San Diego, suggests.

The study showed Mountainous star coral on reefs in Honduras and Belize was able to recover from a major bleaching event and grow normally within two to three years when the surrounding waters and reef were relatively healthy, the scientists reported. By contrast, corals living with excessive local impacts, such as pollution, couldn't fully recover even after eight years. ■ SOURCE: PLOS ON

Corals prefer to stay close to home

A recent study published in *Evolutionary Applications* by Australian biologist, Jim Underwood, has found surprisingly that despite the fact that corals cast their eggs and sperm haphazardly into the oceans, certain species of coral show remarkable fidelity to their home range.

Underwood sampled DNA from coral reefs in the Indiana Ocean and found that individual corals located in the same group of reefs are more closely related than previously thought.

These results suggest that since most recruitment of these Indian Ocean coral populations comes from other locally sourced coral, one cannot depend on genetic material from distant populations of corals to replenish or restore degraded local populations. In these regions, marine reserves that maintain high local genetic diversity should be favoured. ■

Coral Sunscreen

Dermatologists say that sunscreens are among our best weapons against skin cancers. Still, sunscreens aren't enough to block out the sun completely. The solution, scientists believe, lies in the natural sun-defense strategies that microbes, plants, and other organisms have evolved.

Compounds that absorb and neutralize ultraviolet beams are ubiquitous in nature, from flavonoids in plants to the melanin that colors human skin. Some of the first sunscreen ointments, developed in the early 1900s, contained UV absorbers such as quinine from the bark of South American cinchona trees and cinnamates from cinnamon trees.

Corals sunblock

More recently, researchers have studied compounds from creatures that bask continually in the tropical sun: coral reefs.

In the mid-1980s, environmental biochemist, Walter Dunlap, and a colleague at the Australian Institute of Marine Sciences in Townsville, Queensland, reported that corals rely on powerful UV-B absorbers, known as mycosporinelike amino acids, or MAAs.

Fisheyes

"Corals that grow on the surface of the ocean have very, very high concentrations of these compounds," Dunlap says. "But as you go deeper, the concentrations diminish." MAAs, it turns out, are found in just about every marine organism. Fish even have them in the lenses of their eyes. ■

Coral offers effective new pain relief

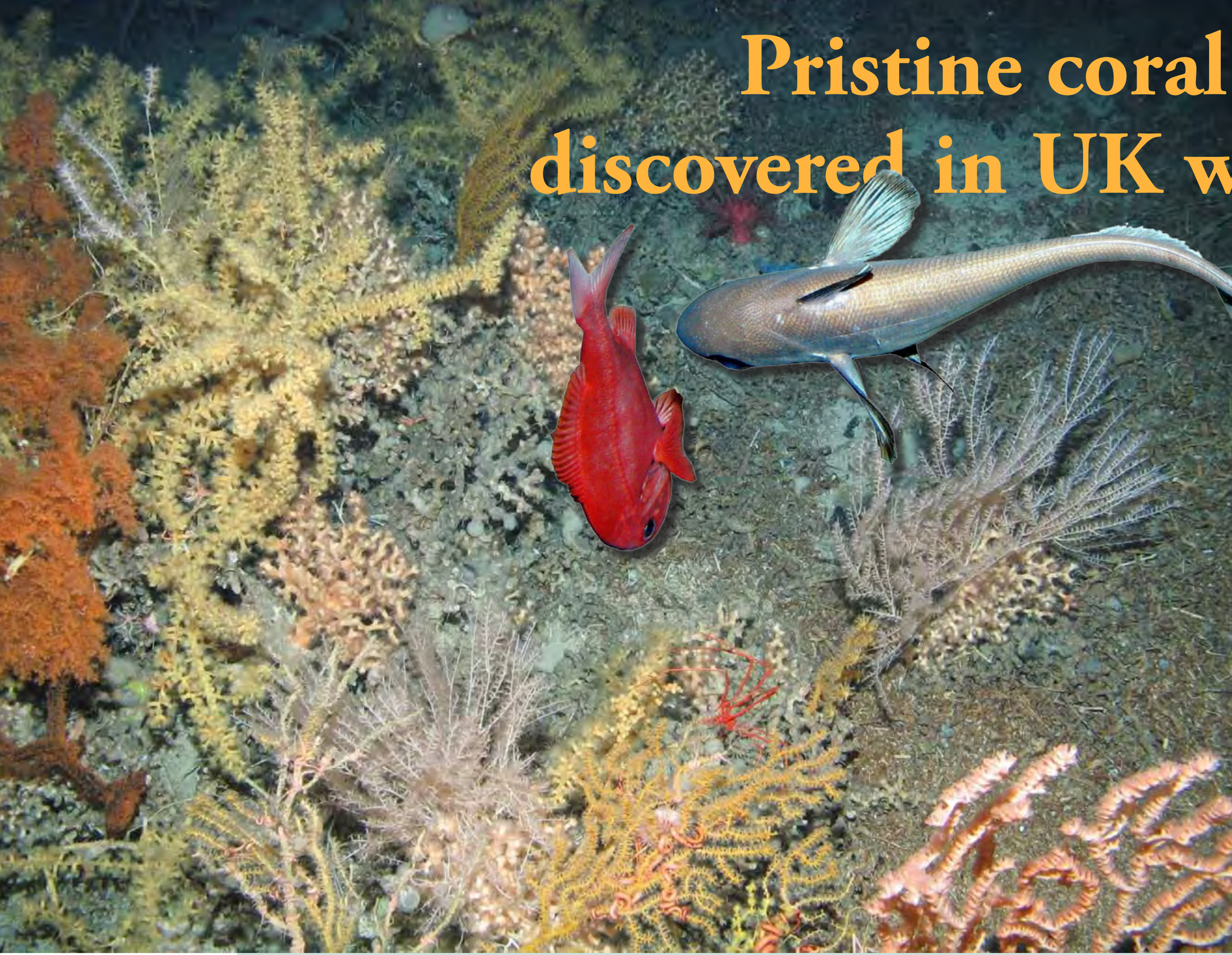
Traditional painkillers like aspirin and even morphine often do little to take the edge off neuropathic pain. Neuropathic pain, which follows damage to the nerves, can be debilitating and is hard to control even with heavy-duty painkillers like morphine.

But research in the *British Journal of Pharmacology* suggests the newly tested chemical which comes from *Capnella imbricata*, also known as Kenya Tree Coral, could provide relief.

Called Capnellene, the compound is isolated from soft coral collected at Green Island, a small island near Taiwan.

The Taiwanese scientists report promising early trial results in rats. ■

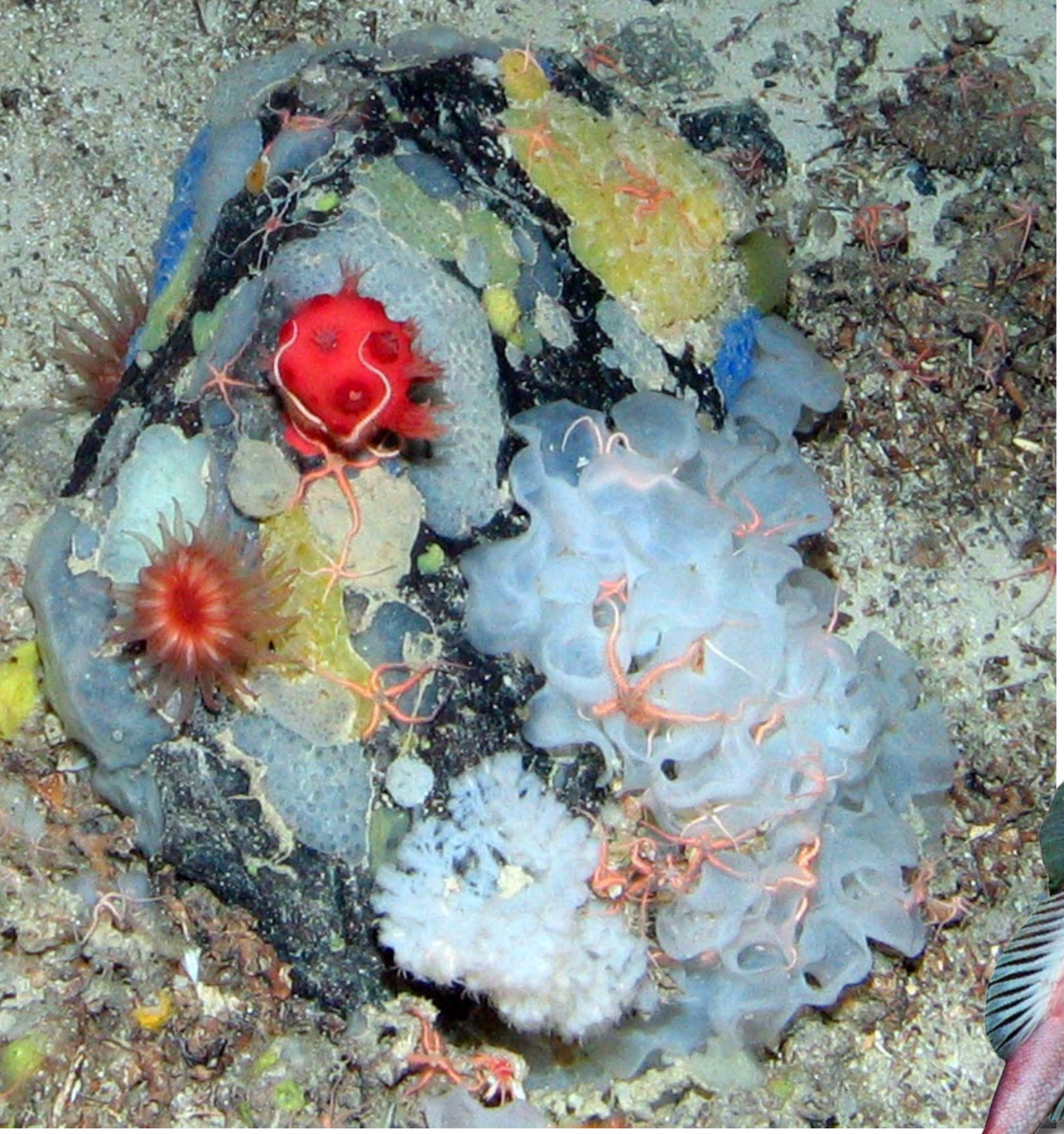
Pristine coral reefs discovered in UK waters



Throughout July, a team of seven marine scientists from JNCC, the British Geological Survey, and the University of Plymouth spent four weeks at sea exploring the seafloor and recording their discoveries.

The team used state-of-the-art technology to map the seafloor in two of the least studied areas of our seas. Anton Dohrn Seamount, the first area under the spotlight, is an extinct underwater volcano rising more than 2100 metres from the seabed, reaching its summit at a depth of 600m. This ancient volcano is in striking contrast to the surrounding flat seabed and creates ideal conditions for an abundance of fish, coral and sponges. The second area was around Rockall Bank, where there are steep cliffs and pinnacles, shrouded in cold water coral reefs with pink and purple brittlestars and yellow sponges.

As well as delicate and ornate sea fans, the reefs were formed



by hard corals, similar to those that built Australia's Great Barrier Reef. In addition to the abundant corals, a truly wide range of animals including sea urchins, basket stars, orange feather stars, yellow sponges and fish were seen living on these reefs.

The majority of the reefs were pristine, appearing completely untouched by human activity. These incredible reefs were filmed using high-tech camera equipment lowered nearly two kilometres (twice the height of Mount Snowdon) beneath the flagship vessel of the survey contractor MMT AB.

"At the beginning when we were planning the survey, we really hoped that we would find evidence of these habitats. We're delighted that we discovered such pristine examples, and I think the images we've captured show some of the amazing habitats that we have in our deep, several different types of coral, including *Lophelia pertusa*," said Neil Golding, JNCC's Offshore Survey Manager.

Following these discoveries, JNCC will consider recommending them for protection, in order to ensure that these rare and fragile habitats can be preserved into the future. ■

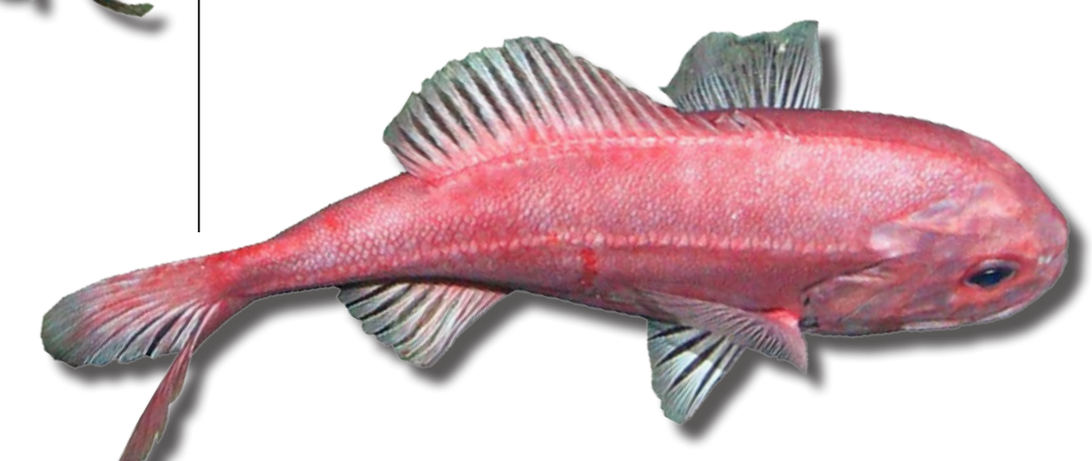
Scilly Island underwater survey turns up rare sponges, corals, slugs and anemones

Divers from Cornwall, Devon and the Isles of Scilly have surveyed the reefs and tidal channels around the Isles of Scilly including sites that had never previously been dived.

The information gained from the surveys feeds into local and national databases and will be used for conservation. Although it has long been known that the Isles of Scilly are important for marine life, the Marine Biodiversity Project offers an unprecedented opportunity to find out where the richest sites are and what these marine communities are made up of.

The surveys looked at sites on all sides of the islands including the Crim Rocks, which are exposed to the full force of the Atlantic. These dramatic reef walls are smothered in anemones and hydroids, and during the survey, hosted large numbers of red nudibranch seaslugs that were breeding and laying eggs.

In the tideswept channels, the team recorded diverse red seaweeds and burrowing anemones in the sandy seabed. Whilst on the more sheltered rocky reefs the sponges, pink sea fans and potato crisp bryozoans flourished. Football sea squirts and yellow cluster anemones were highlights of some of the dives, and the team were lucky to spot the tiny sea fan anemone growing on some of the sea fans. But nothing could beat finding the rare sponge that expert marine biologist, Dr Keith Hiscock, first saw and photographed on these reefs back in the late 1960s; the slime sponge topped off the week. Dr Hiscock has long recognised the importance of the Isles of Scilly for marine life, and led surveys in the 1980s that catalogued the seabed marine life at 46 intertidal and 67 subtidal locations. ■



King crabs go deep to avoid hot water

A study reveals temperature as a driving force in how king crabs have eveolved and spread globally over tens of millions of years. Now rising water temperatures could force king crabs, which thrive in water between 1 and 4 degrees Celsius, to seek deeper water.

Researchers from the National Oceanography Centre, Southampton, have drawn together 200 years' worth of oceanographic knowledge to investigate the distribution of a notorious deep-sea giant—the king crab. The results, reveal temperature as a driving force behind the evolution and distribution of these major sea floor predators.

Old but cool

In deep seas all over the world, around 100 species of king crabs live largely undiscovered. The fraction that we have found includes some weird and wonderful examples, such as the *Paralomis seagrantii,* which has its eight walking legs and claws entirely covered in long fur-like hairs. The related group *Lithodes megacanthus* grows to lengths of 1.5 metres, and has 15 to 20cm long defensive spines covering its body. At temperatures of around 1- 4ºC, these crabs thrive in some of the colder waters on Earth, living and growing very slowly, probably to very old ages. Only in the cooler water towards the poles are king crabs found near the water surface—though temperatures found around some parts of the Antarctic (below 1ºC) are too extreme for their survival.

Soft or hard

A paper, published 15 years ago in *Nature* is thought to show that king crabs evolved from shell-bound hermit crabs—similar to the familiar shoreline animals. Soft-bodied, but shell-free intermediate forms are found only in the shallow waters off Japan, Alaska, and western Canada. By looking at 200 years' worth of records from scientific cruises and museum collections, Sally Hall and Sven Thatje from the University of Southampton's School of Ocean and Earth Science at the National Oceanography Centre discovered that the soft-bodied forms can live at temperatures about ten degrees higher than the hard-bodied forms, but that both groups can only reproduce when temperature is between 1ºC up to 13-15ºC.

"It seems that most shallow-water representatives of this family are trapped in the coastal regions of the North Pacific because the higher sea surface temperatures further south prevent them from reproducing successfully and spreading," said Dr Thatje.

Only in the cooler water towards the poles are king crabs found near the water surface

In order to leave this geographic bottleneck and spread around the world, the shallow water ancestors of current deep-sea groups had to go deep and adapt to the challenges of life in the deep sea. The process of adaptation to constant low temperatures (1-4ºC) prevailing in the deep sea seems to have narrowed the temperature tolerance range of the crabs, where they have emerged to the surface waters in the Southern Hemisphere. With differences of only a couple of degrees in temperature affecting the distribution of the king crab, it is difficult to predict the consequences of range expansion in the warming waters around the Antarctic Peninsular region.

Important commercially

King crabs are of great commercial value, and fisheries are established in high latitude regions of both hemispheres. The red king crab, or so-called Kamtsjakta crab (*Paralithodes camtschatica*), is one of three commercially exploited king crabs in the eastern North Pacific Ocean. This is changing, as this crab species was found only in the North Pacific Ocean until 1961, when Soviet scientists began an eight-year release programme into the Murmansk Fjord to add to the area's value base for residents. Since then, the crab has ranged eastward and westward throughout the southern reaches of the Barents Sea.

Norway and Russia first introduced regular commercial harvesting of the red king crab in the 2002-3 season, although the biological impact of this introduced species still is under hefty discussions in Norway.

Understanding their evolutionary history and ecology is key to supporting sustainable fisheries of these creatures. Recent range extensions of king crabs into Antarctica, as well as that of the red king crab in the Barents Sea and along the coast off Norway emphasize the responsiveness of this group to rapid climate change, said research student Sally Hall. ■

STEIN JOHNSEN

We hope that our efforts and people's generosity will, together, honour Cillian's memory, as well as all the children who suffer serious illness.

World's Longest Scuba Dive

In memory of a son and nephew, two Irish brothers are to make a daring scuba dive in an attempt to enter the Guinness Book of World Records and raise funds for sick children.

Declan Devane has been motivated to take on the fundraising challenge in memory of his two year-old son Cillian, who died on 6 February this year.

Declan, along with his brother Paul Devane, hope to spend 40 hours underwater, under the supervision of dive-coordinator, Gary Jennings, and with the help and support of Scubadive West and a team of support divers. To set the record, the brothers will not be permitted to break the surface of the water for the duration of the attempt.

What sets this dive apart from other attempts is that it takes place in open sea rather than an aquarium or pool. In the uncontrolled natural environment, the divers will be exposed to the elements and a water temperature of less than 15°C. The team are therefore attempting to claim the Guinness World Record™ for the world's 'Longest cold, open saltwater SCUBA dive'.

Declan wants to honour his son's memory and help other children who suffer serious illness. "By raising funds for St. Raphael's Children's Ward at Beaumont Hospital where Cillian was cared for so well, and for CD's Helping Hands, which supports the families of sick children, we hope to give something back to those who helped us when our little boy was sick."

The Devane brothers have already had huge support from the scuba diving community, who are providing a range of standard and specialist equipment for the world breaking attempt. ■

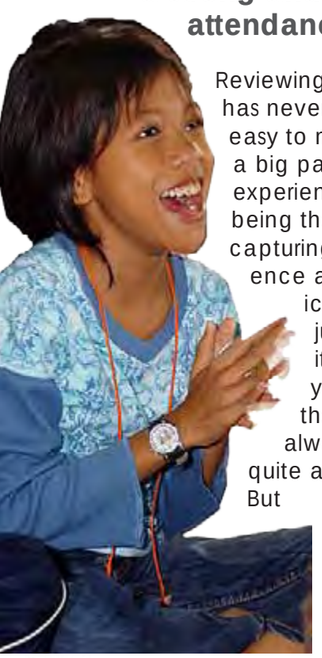
'The World's Longest Scuba Dive' will begin at Scubadive West Dive Centre off the West coast of Galway, Ireland, on Saturday, 10 October 2009. The world record attempt aims to raise funds for the St. Raphael's Children's Ward at Beaumont Hospital and the charity CD's Helping Hands.

MIDE 2009

Each year, a bigger show room had to be booked

Report by Peter Symes

Malaysia International Dive Expo keeps expanding. The 2009 edition saw a strong and lively attendance.



Reviewing dive shows has never come easy to me. Such a big part of the experience is about being there and capturing the ambience and dynamics without just rubbing it in that you missed the party has always been quite a challenge. But this is the rare pleasant exception from the rule.

MIDE is one of the young and rising dive expos on the planet, and the way things have been going lately, it is becoming one of the biggest, if not *the* biggest, dive expo in region. Certainly, it is already a force to be reckoned with. As an international exhibitor who, as one of the very few media doing so, tour the United States, Europe and Asia dive expos, we call tell the difference. This is where we have to go to find the new dynamics in the field.

It is encouraging to witness the youthfulness and enthusiasm of the local dive community and see how new markets are developing before our very eyes. I am only half-heartedly sorry to acknowledge that by comparison, they make the attendance at many European and US expos stand out like grumpy retirees. But mostly, I feel encouraged by taking part and hope that the rest of world will watch and learn.

I have to hand it to the organiser for the manner in which they have somehow managed to draw in the general public whole families at a time and especially for giving so much attention to the children. The kids were captivated and an enthusiastic audience.

MIDE isn't a show where new innovations get presented first—that role still falls almost exclusively to DEMA in the United States—nor can it boast having a stellar range of speakers. But more presentations will be added next year and admission is still free.

" Busy, busy, busy"

I think the show is vastly underappreciated by the international diving community, in particular the big brands and manufacturers who seem to be missing out on a very opportune moment to get a foot in the door. As far as we are concerned, we have already booked our space for next year where the show is projected to grow well past 200 exhibitors. ■

More images and impressions will be posted on X-RAY MAG'S website shortly. Visit: **www.mide.com.my**

wreck rap

Edited by
Mathias Carvalho

"They are between 1,600 and 1,900 years old, and were laden with - among other things - jars for carrying wine, olive oil and fish sauce."

Five ancient Roman shipwrecks found

Underwater archaeologists in Italy working with an American archeological expedition group belonging to the Aurora Trust have discovered the wrecks of five ancient commercial Roman vessels in the Mediterranean, with their cargo still largely intact.

Resting at a depth of 100 meters, and being covered under some 3 to 5 meters of mud and sediment have protected the wrecks from being destroyed, and they are thought to be fairly well preserved state. The ships also sank without capsizing allowing examination of the cargo in almost the form it had been loaded. The biggest of the ships discovered is about 20 metres long (60 feet).

Amphorae

The ships, which date from between the 1st century B.C. and the 4th century, carried amphorae —vases used for holding wine, olive oil and other products—as well as kitchen tools and metal and glass objects that have yet to be identified, Italy's Culture Ministry said.

The oldest of the ships has a cargo of wine amphorae from southern Italy, some stacked in their original position, AURORA said. Another one was carrying moratoria, large bowls used to grind grains. Another was loaded with African amphorae carrying garum, a fish sauce that was a delicacy in ancient Rome.

Safe haven?

The spot was highly trafficked, and hit by frequent storms and dangerous sea currents.

According to the information made available at the **Aurora Trust website**, the teams lead archaeologist, Timmy Gambin, suggested that the ships probably tried to reach a safe harbor, but didn't make it on time. Ventotene, where they sunk, belongs to a small archipelago half way between Rome and Naples and was used as shelter in the Tirrena Sea during thunderstorms. In Roman times, the place was also used as exile for noblemen; Emperor Augustus sent his daughter, Julia, to Ventotene for adultery charges, and the Italian dictator Benito Mussolini used it as a prison camp. ■

ITALIAN CULTURE MINISTRY AND THE AURORA TRUST

Archaeology officials say they have found five well-preserved Roman shipwrecks on the seabed off the coast of Ventotene, a small Mediterranean island, with their cargo of amphorae, pots and other objects largely intact. Amphorae are believed to be of Spanish origin, dating back to the first century A.D.

ITALIAN CULTURE MINISTRY AND THE AURORA TRUST

The cargo of amphorae, pots and other objects date from the 1st century B.C. to the 4th century and carried wine, kitchen tools and some metal and glass objects that have yet to be identified, Italy's Culture Ministry said.

Seeing Shipwrecks With Sound

How does one go about finding a shipwreck? It's a question that's been asked ever since there have been shipwrecks!

Until the mid 20th century, there was really only one way though—by touch. Searchers would drag the bottom with hooks attached to ropes until they found something. Or, divers would swim down to the bottom to identify what was there. This later technique is still used today! But, when the water is too deep or dark neither method is very effective.

The use of sonar developed during WWII as a means of detecting enemy submarines. An electric sound was projected from a vessel on the surface. When the sound made contact with a solid object underwater it would make an audible "ping"—which most movie-goers are familiar with.

"...it can also produce images of shipwrecks so detailed that you'd swear they're photographs!!"

Text by Rob Rondeau
Marine Archaeologist
ProCom Diving Services

But the problem with early "echo" sonar was that it couldn't distinguish between a submarine lying on the bottom, a big rock, a shipwreck or something else.

After the war, geo-scientists in both the public and private sectors saw the potential for using sonar for mapping the seafloor. Side-scan sonar quickly became the norm.

Side-Scan Sonar

Side-looking transducers send out signals in pulses. The transducers receive the sound that is reflected off the bottom or off objects on the seafloor. The data is transmitted to a graphic recorder that displays an image of the scan. It displays continuous scans and creates detailed pictures of the seafloor at relatively shallow depths.

Lower frequency systems provide wide swath coverage and are used to create mosaics of the entire survey area. Higher frequency systems can provide higher resolution images.

Multi-beam Sonar

Originally called "swath echo-sounders", multi-beam sonar systems were developed by the United States Navy to map large swaths of the deep ocean—to assist American submarines navigate underwater. Echo data is collected and integrated with the precise location and attitude of the survey vessel through the use of a Global Position System and an Inertial Motion Unit. By integrating the vessel's attitude measurements with the timing of the sonar echo, a very accurate bathymetric record can be produced.

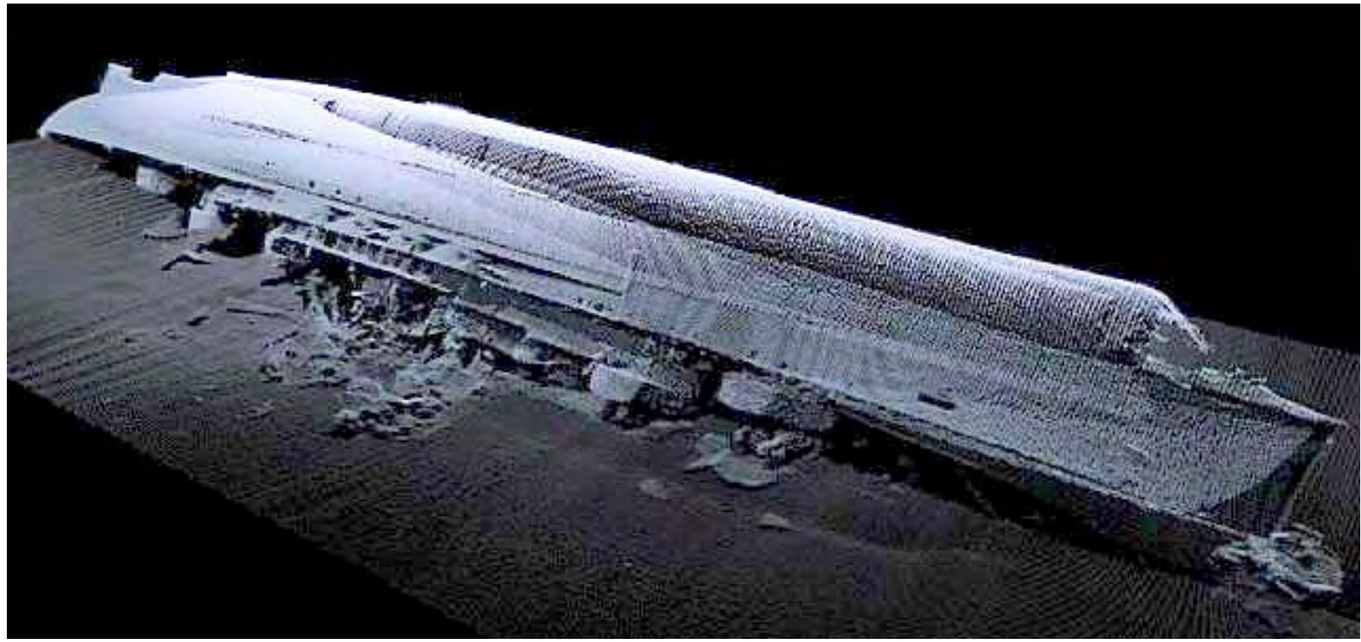
As multi-beam sonar technology improved, higher frequency systems suitable for high-resolution seafloor mapping were developed. Today, multi-beam sonar is used mainly for geological and oceanographic research and offshore oil and gas exploration. But, it can also produce images of shipwrecks so detailed that you'd swear they were photographs!

Sub-bottom Profiling

Sub-bottom profiling systems allow its user to see what's beneath the seafloor. Like side-scan and multi-beam sonar, a sound source emits a signal vertically down into the water, and a receiver monitors the return signal that has been reflected. When it penetrates the seafloor, the acoustic signal is reflected when it encounters the boundary between two sedimentary layers. The rate at which sound travels through sediments differs and can be measured.

Today, the majority of sub-bottom profiling systems operate at a low frequency. These can penetrate the seafloor down hundreds of meters. Such systems are well suited for geophysical applications in very deep water.

However, existing systems aren't good at identifying objects buried underneath ►



This almost iconic image of the *Royal Oak* has been made with the latest in multi-beam sonar technology by a UK group, ADAS, **www.adus.org.uk**. The *Royal Oak* rests in Scapa Flow which is featured in another article in this issue

the seafloor. The higher a sub-bottom profiler's frequency, the better its imaging ability.

But, depth penetration is reduced substantially. In order to achieve the image resolution needed to identify buried artifacts, the "business end" of the profiler can only be several meters above the seafloor. This rules out the use of a towed or vessel-mounted array.

ProCom Diving Services is presently developing a high frequency sub-bottom profiler for deepwater use. The plan is to mount the profiler underneath a submersible. It will emit a narrow acoustic beam downward. The submersible will be able to maintain a constant "shallow altitude" of only a few meters above a wreck site at depth. This will allow the profiler to make detailed images that depict small, buried features in the top few meters of sediment.

At least this is what we're trying to accomplish. We expect to conduct field trials of the proto-type in early 2010.

The Future

The use of sonar technology, in its various forms, holds exciting promise for the field of marine archaeology. It's helping archaeologists study sites, specifically to determine if they're worthy of excavation.

The ability to precisely map the seafloor, and beneath it, in three dimensions is critical for understanding shipwrecks as archaeological sites. ■

Iron steamer found off Victoria's coast

—could it be the *Glenelg*?

The Southern Ocean Exploration diving team, after hours searching for the wreck, found it at the last minute, almost calling search off.

According to group leader, Mark Ryan, the discovery led to "yelling, screaming, and more than a few high fives on the boat", mainly because the dive's difficult conditions and the wreckage being at 32 meters deep.

The divers recovered a plate from the shipwreck to confirm the wreck's identity, and the location and dimensions of the ship suggest it is in fact the *Glenelg*, which vanished in 1900 during a routine run along the Victorian coast, between Bairnsdale and Melbourne. The *Glenelg*, thought to be one of Victoria's worst maritime tragedies, left 31 people dead and only 3 survivors, and the inquiry made never explained what caused the ship to sink. Now some answers might surface.

Group leader Ryan said, "The three survivors from the *Glenelg* said in their official report that the hull plating had separated at the stern and filled the ship up with water, and we believe that is correct."

It all started with the discovery of an unusual dinner plate, something that aroused the interest of the divers and led them to contact the Heritage Victoria's Maritime Unit. According to the institution, the plate found suggested that the wreck could belong to the Tasmanian Steam Navigation Company, and as it was purchased by the Union Steam Ship Company, the documented proprietors of the *Glenelg*, the ships identity has a good chance of being verified.

Ryan said the dive team will return to document the find with photos and video footage, but there is no reason to remove any more artifacts.

"Apart from that, it'll just be down there forever," he added. ■

Returning cultural heritage to its rightful owner

Text by Rob Rondeau
Marine Archaeologist
ProCom Diving Services

One June 3, a United States federal court judge made history when he ordered a Florida-based treasure hunting company to return 17 tonnes of gold and silver coins to Spain. Odyssey Marine Exploration of Tampa made the spectacular find off the coast of Portugal in 2007. Odyssey refused to divulge the identity of the shipwreck the coins came from or its location. But the company was forced to do so last year by the same judge, Magistrate Mark Pizzo.

Earlier this summer, the government of Spain successfully argued that, under the terms of international Sovereign Immunity, it never abandoned or otherwise relinquished its ownership of the *Nuestra Senora de las Mercedes*, which sunk during a sea battle with the British Navy in 1804. At the time of its loss, the *Mercedes* was sailing back to Spain from South America.

Odyssey has said that it will appeal Judge Pizzo's ruling and will "vigorously defend" its right to the treasure. The 500,000 plus coins remain under lock and key in the company's warehouse.

Finders Keepers?

This isn't the first time that the "owner" of cultural artifacts has refused to return said to its country of origin. Typically, their position is that they were doing the world a favor—saving the items in question from the ravages of time and/or the environment. When it comes to shipwrecks, this is often referred to as the "tides and time" argument.

This is the case with, arguably, the world's most famous case of "questionable ownership", the Elgin Marbles. They are a collection of classical Greek marble sculptures from the Parthenon and other buildings on the Acropolis of Athens in Greece. They were removed by laborers working for Thomas Bruce, the 7th Earl of Elgin, in the early 19th century and were later sold, by him, to the British government.

Elgin, who was the British ambassador to Greece at the time, argued that if he hadn't taken what he did, when he did, they would have been destroyed. The practice at the time was for Athenians to burn ancient marble for its lime, which they then used to make concrete for new buildings.

Air pollution over the years has also taken its toll on the Parthenon's remaining sculptures.

ROB RONDEAU

The stuff of dreams! Financially significant artifacts recovered from shipwrecks off the coast of Florida

In Britain, Elgin was criticized for his actions, labeled by some as vandalism. Others described him as a looter. After much public debate, the British government purchased the Elgin Marbles in 1816 and placed them on display in London's British Museum—where they remain to this day.

Legitimacy?

However, the modern-day state of Greece argues that the Parthenon sculptures were removed illegally. It challenges the authenticity of the government document that Elgin alleges he was issued, allowing him to remove the artifacts. Elgin destroyed the original.

Goodwill Gesture

The remains of the great Egyptian pharaoh, Ramesses I, had been lost to history until they were found on display in a tacky "Freaks of Nature" tourist exhibit in Niagara Falls, USA, in the mid 1990s. The three thousand year-old royal mummy eventually made its way to Emory University in Atlanta, Georgia.

In 2003, Ramesses I was returned to Egypt with full official honors—a gift from the people of Atlanta to the people of Egypt.

"It was simply the right thing to do," said the university museum's curator, Peter Lacovara.

Since then, the general director

ROB RONDEAU

An 18th Century Spanish gold coin similar to ones found at the wreck site of the *Nuestra Senora de las Mercedes*

WIKIPEDIA PHOTO.

Elgin Marbles on display at the British Museum in London.

of Egypt's Supreme Council on Antiquities, Zahi Hawass, has put other museums around the world on notice, saying that he expects Egypt's cultural artifacts returned. The G'psgolox Pole, a native mortuary pole from British Columbia, Canada, now resides at a museum in Stockholm, Sweden. The Canadian government allowed the totem pole to be exported to Sweden in the 1920s. Today, the people of B.C.'s Kitamaat First Nation want their pole back!

The Swedes have agreed to do this, but on the condition that a suitable museum is built to house it.

Museums, from Los Angeles to the Vatican, have recently repatriated art and artifacts deemed important to a nation's cultural heritage.

In recent years, technological advancements have allowed treasure hunters to find and salvage many shipwrecks. This has lead to the loss of many particularly valuable archaeological sites, according to Koichiro Matssura, the director general of UNESCO.

Escalating prices on the international market for shipwreck artifacts is also adding to the problem. International auction houses hawk gold artifacts and jewelry recovered from Spanish galleons. And online, a person can buy 8th century Chinese ceramics looted from a shipwreck in Indonesia or coins from a 17th century shipwreck found off the coast of West Africa.

As Matssura points out, artifacts from marine archaeological sites are not treasure to be discovered only by those who have the ability to appropriate them. ■

800 year old Chinese artifacts to be recovered

Marine archaeologists have recently been given the green light to recover more artifacts from China's most ancient wreck.

Discovered in 1987, off the Yangjiang coast, the wreck now dubbed Nanhai No 1, which sank around 800 years ago, is believed to have been one of the oldest and biggest merchant vessels sunk in Chinese waters. The vessel, identified as belonging to the Song Dynasty (960-1279) was accidentially discovered during drainage performed by a Sino-British archeological team, who was searching for a 17th century Dutch vessel, the *Rhynsburg*, believed to have sunk some 40 kilometers off shore.

Since 2007, the 30-meter long wreck has been placed submerged in China's Underwater Archeological Center's sealed pool which is 64 meters long, 40 meters wide and about 12 meters deep.

It is filled with seawater and silt in order to replicate the site's original conditions where it rested for centuries. Construction on the Marine Silk Road Museum began in early 2006, costing 170 million yuan (US$ 25 million).

Chinese experts hope to find rare archeological treasures, hidden in the ship's cabins. Archaeologists have already recovered more than 4,000 artifacts from the vessel, including 1,000 porcelain artifacts, many made to feature foreign patterns and styles, and a gold chain, almost two meters long and weighting around one kilogram—also silver ingots and about 6,000 copper coins. ■

NAUI's new HQ finally gets the go-ahead

NAUI Worldwide is happy to announce that the contruction of their new building has officially started. The building is located off the I-75 business corridor in Tampa, Florida. After a long process of meetings with local government official and miles of red tape, permits were finally obtained and ground has been broken

Nitrox online course

Since its introduction in 1996, the PADI Enriched Air Diver Specialty course has been the most popular PADI specialty certification. This popularity has only been rising, and to meet this demand, the PADI organization has launched the PADI Enriched Air Diver Course Online. This online delivery, when combined with course revisions that include a computer-only option, simplifies the teaching process and enables students to get back in the water sooner using Enriched Air. This translates into more Enriched Air student divers and customers.

The PADI Enriched Air Diver Course Online (available in English) follows the same format used in the PADI Open Water Diver Course Online. Student divers enroll and complete all knowledge development online, including all components of the newly revised PADI Enriched Air Diver Manual and Enriched Air Diving video. Then, they complete practical application sessions and open water training (which is still optional, but recommended).

Not only is the course available online, the content itself has been revised, so it is now based on using a dive computer. Although using the Recreational Dive Planner and DSAT Equivalent Air Depth and Oxygen tables remains an option, divers taking the revised specialty course now focus on learning how to properly set and use an enriched air capable dive computer to plan and execute their dives. The new Enriched Air Diver Manual, video and exam also fully support the dive computer option. ■

New Standards

Two new ISO Standards have just been agreed upon for diving. ISO (International Organization for Standardization) is a global body with 161 member countries who aim to align their national business practices with those agreed in ISO standards for various fields. Six ISO standards for diving have been in place for several years already, equating, in the PADI system, to PADI Scuba Diver, Open Water Diver, Divemaster, Assistant Instructor, Open Water Scuba Instructor and Dive Center/Resort. The two new standards equate to the PADI Discover Scuba Diving programme and Enriched Air Diver course.

These two new standards are designated as follows in the ISO system:

- Requirements for training programmes on enriched air nitrox (EAN) diving (ISO 11107)
- Requirements for introductory training programmes to scuba diving (ISO 11121)

When PADI members conduct an Enriched Air Diver course or run a Discover Scuba Diving programme, they can also claim to meet the requirements of these ISO standards. This can be a major advantage when dealing with customers, travel operators and even local governments, as ISO is seen as an independent standard of quality.

For more details of ISO member countries, visit: http://www.iso.org/iso/about/iso_members.htm

- Each ISO standard represents a statement of minimum competency for a level of diver or a service that has been agreed on by an international group representing the diving industry. By being able to show compliance with these standards, you have increased liability protection.

- They enable consumers to make comparisons regarding a product (in this case diver training), allowing them to compare it with an independent benchmark.

- ISO standards may be used as a tool by organizations such as tour operators to help them make decisions as to which training agencies or businesses they want to partner with.

- Countries or local governments sometimes decide to impose regulations on scuba diving. They are more likely to use the ISO standards as a basis for these than to invent new ones, and if we must have regulations, it is far better to have meaningful, workable ones. ■

travel news

Edited by
Scott Bennett

Is Your Carry-On Bag Legal?

Don't run the risk of being forced to 'gate-check' a fragile and valuable item you hoped to carry onto a plane.

Many luggage stores sell suitcases described as 'carry-on', but these suitcases are sometimes larger than the size most airlines will accept. Not only are luggage stores and manufacturers not always truthful whether their bag is legally sized or not, but they also frequently mismeasure their bag. Their measurements generally are for the inside of the main compartment, and assume that any external pockets are of zero thickness, rather than stuffed full of things (which can easily add another inch or more) and ignore any external framing such as wheels and carry handle (which can also add another couple of inches). The safe maximum size is 115 cm (45 inches), in the form of a 56 x 36 x 23 cm (22 x 14 x 9 inch) bag. Some airlines allow up to as much as 140cm (55 inches), but most do not. ■

—How about this for something different?

Helicopter Scuba Diving in Curacao

HTTP://DIVECHARTERCURACAO.COM/

This is one of the bits we stumbled upon by accident. Experience the thrill of flying in a helicopter in full dive gear.

Dive Charter Curacao is, according to their website, the only dive operator in the world that makes helicopter diving possible for all divers. For everybody's safety and fun, the operator requires a minimum certification level of Open Water and recent dive experience, or relevant dive experience. It is important that you are comfortable with your equipment and that you carry the correct amount of weights. Depending on your experience level, you can choose between several dive sites.

The divers usually are taken to the sites in pairs and are dropped into the water at a height of around ten feet. They descend immediately and enjoy their dive. When they surface, they join the dive boat, which is there waiting to pick them up.

The flight takes you through the center of the town, under the big Juliana bridge. Prices start from 250$. Groups can get discounts. **divechartercuracao.com** ■

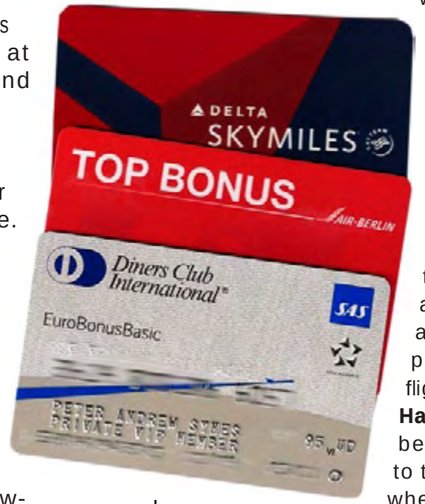
What *could* get you upgraded

The following advice are totally unsubtantianted but according to seasoned travellers this is what could get you picked for an upgrade the next time you fly.

1. Dress properly. Worn jeans, a stained t-shirt and down-at-heel shoes won't do the trick. An ironed shirt and decent-looking pants will increase your chances for an upgrade.

2. Collect airlines member cards. Get hold of as many member cards as possible. If you can accidentially show a card, it gives the impression that you are not only a loyal customer but may also have enough air miles to deserve an upgrade.

3. Make yourself important. It is kind of cheesy, but it works. Use your title or conduct yourself in a cool and nonchalant manner but don't be arrogant.



4. Come late. Make it to check-in and the gate in the last minute. You run the risk of being bumped off the flight all together if you arrived too late. But you may also be fortunate enough to turn up just at that very moment when the attendants start looking for prospects to upgrade on today's flight. And there you stand. D**5. Have good manners.** Probably the best advice. Be polite and smile to the attendants in the situations where everyone else is giving them a hard time over long queues or delays. Ask about their day and thank them for their assistance when you ask about how long the flight is. Perhaps that will land you on business class. ■

South Africa regulates shark diving and whale watching

The issuing of permits to regulate whale watching and shark cage diving businesses will begin this month, the South African environmental affairs department said mid August.

Boat-based whale watching would be allowed in 27 coastal areas, while Great White diving would be limited to Seal Island in False Bay, Dyer Island in Gansbaai, Quoin Rock at Quoin Point, Seal Island in Mossel Bay, and Algoa Bay in the Port Elizabeth area.

"The policies are aimed at providing and improving regulatory and compliance frameworks in both sectors, growing both sectors through the allocation of a greater number of permits and transforming the industries," the department said in a statement. ■