X-ray mag

GLOBAL EDITION
June - July
2005
Number #5

Ecology
Tagging Whalesharks

The Philippines
Cabilao

Siberia
CaveDiving

Ireland
U-89

Norway
Narvik Wrecks

Profile
Cathy Church

Portfolio
Sam MacDonald

Cayman Islands
Bloody Bay Wall
Coral Spawning

COVER PHOTO BY ALEX MUSTARD

DIRECTORY

X-RAY MAG is published by AquaScope Underwater Photography
Copenhagen, Denmark - **www.aquascope.biz**
www.xray-mag.com

PUBLISHER
& EDITOR-IN-CHIEF
Peter Symes
psymes@xray-mag.com

MANAGING EDITOR
& ART DIRECTOR
Gunild Pak Symes
gsymes@xray-mag.com

ADVERTISING
Claude Jewell
cjewell@xray-mag.com

SENIOR EDITOR
Michael Symes
msymes@xray-mag.com

TECHNICAL MANAGER
Søren Reinke
sreinke@xray-mag.com

CORRESPONDENTS
John Collins - Ireland
Yann Saint-Yves - France
Jordi Chias - Spain
Enrico Cappeletti - Italy
Gary Myors - Tasmania
Marcelo Mammana - Argentina
Svetlana Murashkina - Russia
Tomas Knutsson - iceland
Jeff Dudas - United States
Garold Sneegas - United States

Further info on our **contacts page** on our website

CO- EDITORS
Andrey Bizyukin
- *Caving, Equipment, Medicine*
Michael Arvedlund - *Ecology*
Dan Beecham - *Photography*
Michel Tagliati - *Videography, Rebreathers, Medicine*
Leigh Cunningham
- *Technical Diving*
Edwin Marcow
- *Sharks, Adventures*

REGULAR WRITERS
John Collins
Nonoy Tan
Amos Nachoum
Robert Aston
Bill Becher

CONTRIBUTORS THIS ISSUE
Alex Mustard
John Collins
Peter Symes
Michael Symes
Lawson Wood
Nancy Easterbrook
Enrico Cappeletti
Andrey Byzuikin
Dan Beecham
Peter Batson
Robert Aston
Edwin Marcow
Craig Nelson
Jim Tierney and Tim Carey
Sam McDonald

SUBSCRIPTION
X-RAY MAG International Edition in English is FREE.
To subscribe, go to: **www.xray-mag.com**

COVER PHOTO
Stingrays of Stingray City, Grand Cayman Island
Alex Mustard, PhD

contents

Feather worms, Little Cayman

JOHN COLLINS

Don't be part of the silent majority

We have clearly arrived at a point of no return.

Either we continue blithely on our way as we nearly always have done—hoping for the best, and ending, if not in complete disaster, then at least in permanent misery for all. Or, we can make far-reaching decisions. Difficult as they might be now, that will ensure the world will be a good place for us all to live in.

This is very clear from reading the conclusions of the Millenium Ecosystem Assessment (recommended reading, page 7) where 1300 scientists have assessed the state of the Earth's resources, of which many are being exploited beyond sustainability. This is hardly surprising to anyone who reads newspapers regularly. What is now painfully clear, however, is that there is so little time left to make the necessary decisions to change course before we are left without any options at all.

The Assessment's good news is that we do still seem to have a chance to change direction. But how? We can't just revert back to more simple societies where we all move to the countryside and live off the land. Aside from the planet being far too small for

The Assessment's good news is that we do still seem to have a chance to change direction

that, we are also now dependent on our complex infrastructure where our manufacturing plants pollute as do our means of transportation. Every time a diver, for example, flies to the Caribbean or the Red Sea to go diving, the aircraft burns about 40 gallons of fossil-fuel per mile per passenger. None of us can avoid the taint of being eco-damagers.

As the Assessment points out, there are problems with unsustainable overfishing and logging, loss of fresh water supplies, deforestation, increasing urban human pathogens, loss of biodiversity, increasing poverty, etc, etc, etc. There are problems everywhere, not just in the Third World countries but also in the industrialised nations, which very often cause the environmental problems. It is a bleak picture.

Yet, the picture is not completely black. Something can be done. To take the local example of the big windmill park out at sea in Copenhagen, Denmark, just where incoming aircraft are on their final approach to the international airport. Former US President Bill Clinton was recently

editorial

Psst! *X-RAY MAG* is free – pass it on...

in Copenhagen where he commented that the Danes were smart because they had all these windmills, whereas the US was so dependent on oil.

Yes, it was a smart decision at the time, because it now also makes sense economically. It is not just a feel-good thing that was done to help us feel greener in our hearts. But most importantly, the whole windmill-story is based on a political decision and vision.

The politicians decided to support and develop this industry. There was a need, dating back to the late 1970's and 80's, among some foresighted politicians (yes, there really are some) to support greener alternatives. And now, it also pays off economically, as Denmark has become the leading exporter of windmill technology in the world, and the country now gets 30% of its energy from various renewable resources.

In times of great stress, a World War for example, whole societies shift into another mode and state of mind, and a lot of new inventions are made. Most of these are very unpleasant, but human beings can be so immensely ingenious when the pressure is on. And the pressure is definitely on now. We are, in fact, fighting a war for the ecological survival of our planet. If we can find the right solutions, we probably won't even have to give up our cell phones and café lattes, but we may have to accept that hydrogen-powered or electric cars don't accelerate quite as fast as our current cars.

The Millenium Ecosystem

The Assessment was the result of a grass-roots initiative of scientists from around the world. And you, too, can take an active part in protecting the environment by writing to your congressmen or members of parliament, and keeping up the pressure.

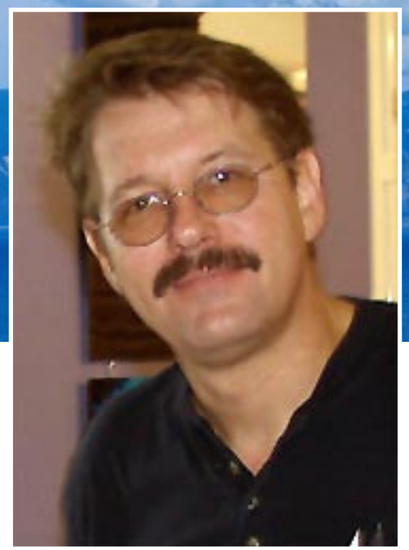
Don't just be a member of the silent majority. It's your planet too.

Peter Symes,
Editor-in-chief

In memoriam

John Neuschwander

1952-2005



Legendary John Neuschwander, editor-in-chief for the Dutch dive magazine, *Duiken*, co-editor of *X-Ray Mag* and a leading industry figure suddenly passed away on Friday, May 6, 2005.

John will be missed very much. Always larger than life, never boring and full of fun and adventure – he was a fantastic friend and colleague. Active in dive journalism for more than 25 years, with 15 of them as editor-in-chief and figurehead for leading Dutch monthly, *Duiken*, author of multiple books and always keen to set up events to which he invited all his colleagues from abroad. Most professionals in the European dive industry knew John. If not in person, which was more likely than not, because John was very outgoing, then at least by his reputation running ahead of him. One of the very special things about John was his ability to connect, heal and set a good example. The reason why so many European dive magazines now enjoy a fine colleagial relationship doing joint projects and aiding each other rather than being at odds a with one another in cut-throat competition can to a very high degree be attributed to John.

Characteristically, he was in the process of setting up the Curacao dive festival when he suddenly passed away. Still working at his desk, he was struck down by massive bleeding within his heart.

The dive festival was meant to occur the very next week, and as usual, he made sure that all his colleages were invited. In a world divided into takers and givers, John was a giver with a capital *G*. And herein lies the great legacy of John. This year's planned event on Curacao has been cancelled, but next year the event will be held in his honour and many of his colleagues at other magazines have some sort of tribute to John in the planning.

Despite his apparent superstardom, John was always very level-headed, down to earth and, in his own unique way, just went about doing his business, which he clearly loved and enjoyed.

John was no angel. He could roll his eyes and express his feelings quite well with a colourful array of various expletives when he was dismayed. But thank God for that. Angels can be really hard to live with—they are so unreal. John was easy to be with, and he was indeed real, and a real gentleman too. Many testimonials have come from novice divers or the random holiday diver that he helped out or buddied-up with on dives without them knowing who he was until later.

He always wanted to create something. Full of constructive ideas, he wanted to share his ventures and projects generously. Many a good invitation has come from John, ranging from trips, events and some fabulous dinners in his own home. Characteristically, John was an excellent cook and a generous host.

I was so fortunate to keep company with John and his life partner, Brigitte, on a number of trips. His sense of exploration was always a joy to witness. John was a decade older than me, but he made me feel young again. Yes, John was a good friend to those who knew him – he was very loyal. I guess, I got to see him in only a few moments of his whole exciting life, but those he shared with me I am very grateful for.

I hope John is in a better place now, although I can hardly imagine what could be better than being in the water, behind a camera, together with the rest of us. John was one of those fine people that the world can hardly afford to miss. He will live on in our hearts, but I, for one, will miss him very much.

Goodbye my friend, and thank you for everything. We will meet again some other place.

Peter Symes
Editor-in-Chief

John Neuschwander was also co-editor with X-Ray Mag and Ocean Realm

John Neuschwander authored several books. This dive guide to diving in the Dutch region Zeeland is one of his classics

Book of condolences

John's colleagues at the Dutch magazine, Duiken, have made a book of condolences on their website .

As we go to press, it can still be read at: ***www.duiken.nl/condolence_john.php***

Underwater adventures with Brigitte (left) and John (right) in Lake Baikal, Siberia

John Neuschwander is in the background. Fellow friend and co-editor, Andrey Byzuikin, is in the foreground. Siberia 2002

John at the Antibes-show 2004, pouring champagne into a dive helmet. This dive-professional was also easy-going and fun

John and lifepartner Brigitte Veldman on the shores of Lake Baikal, Siberia

X-ray mag

News edited by Peter Symes

knee deep NEWS

Octopus rigs can lead to breathing difficulties under certain circumstances

Test results have been published by the Health & Safety Executive (United Kingdom)

The HSE commissioned research following difficulties experienced by some divers using second stages as octopus rigs in emergencies. Key areas of concern are where an octopus set-up, in which two second-stage demand valves operate off a single first-stage regulator, is based on a less expensive, lower-performance first stage; and where the second stages feature either inefficiently old or inappropriately paired units.

The research found that the performance of a first-stage regulator is a vital factor when determining the performance of a complete system, and that reduced breathing performance was experienced when using low cost/performance first-stage regulators compared to high cost/performance models. Tests also showed that the poorer performing demand valve of any octopus pair will experience a greater loss of performance with increasing depth and ventilation rate when compared to the better performance valve.

It was recommended that a high-performance first stage should be acquired if an octopus rig is to be based on it. Any two demand valves set up as octopus partners should be of similar performance. Older valves, or ones where performance may have degraded, should not be used. Although octopus rigs are used by most divers, the HSE stressed that they are best avoided altogether when considering emergency arrangements.

The use of a completely independent secondary gas supply system is recommended, for example a pony cylinder set-up. Thus, if there is a problem with the octopus system, or if a buddy pair become separated, divers have a much increased chance of survival in the event of running out of air. An alternative is the twin-cylinder set-up, which works well for the wearer, though not of course for another diver if separation occurs.

The HSE report, Breathing Performance of *Octopus* Demand Diving Regulator Systems, can be obtained from HSE Books, tel: + 44 (0) 1787 881165. ■

Prosecution of dive training company owner

HSE issues warning over recreational dive training

The Health and Safety Executive (HSE) has warned those who make their living from recreational dive training to ensure it is adequately controlled and managed.

In April, the owner of a dive training company was fined for failing to adequately plan, manage and conduct a diving project, for failing to ensure the safety of those taking part in the diving activity, and for failing to report a dangerous incident to HSE.

The prosecution followed an incident in which a diving instructor suffered decompression sickness during an Advanced Open Water Course. Whilst diving, one of the students in the party began a rapid ascent to the surface. Although the instructor managed to catch him and slow him down, he subsequently required treatment for decompression sickness. People on the dive were exposed to unnecessary risk because they were allowed to dive to a depth significantly greater than that stipulated by PADI recommendations. In addition, the instructor did not have an approved medical certificate of fitness to dive.

Under the law, people who organise recreational dive training have a duty to ensure the safety of those taking part.

A wide range of advice, guidance and useful links can be found on the HSE website at: **http://www.hse.gov.uk/diving/index.htm** ■

TANYA STREETER. PHOTO: PETER SYMES

Breath-Hold Diving Medical Conference

June 2006 at Orlando, Florida

Dr Peter Lindholm is organising a 2-day conference dedicated to breath-hold diving. The scientific meeting will be held adjacent to the 2006 Undersea Hyberbaric Medical Society annual meeting.

The program will discuss the diffent aspects of breath-hold diving with focus on physiology and pathophysiology. The invited speakers are: Dr F. Butler, Dr G. Ferretti, Dr M. Ferrigno, Dr P. Lindholm, Dr C. Lundgren, Dr N. Pollock, Dr E. Schagatay, Dr R. Wong, Kirk Krack, and Tanya Streeter. The program will also be open to submission of abstracts for free presentations.

More information will be posted on the two websites **UHMS.org** and **diversalert-network.org** during the fall 2005. ■

The Millennium Ecosystem Assessment

More than 1300 scientists in 95 countries have taken four years to put together the Millennium Ecosystem Assessment (MA). This first global inventory of natural resources demonstrates conclusively that if we continue living beyond our means we will damage our global environment beyond repair.

The MA recorded no new data itself, but draws together all available information on the state of the planet's ecosystems. This thoroughly peer-reviewed research amounts to the fullest ever assessment of the present state of ecosystems, and paints an ominous picture of what things will be like if we carry on with business as usual.

The MA has no direct link to the people in power as it is the result of a grass-roots initiative from scientists. So governments are under no obligation to pay attention, not to speak of actually doing anything. However, the MA warns that there is a clear link between healthy ecosystems and healthy humans. Destroy those ecosystems and our economies will suffer together with our quality of life.

It is stated that approximately 60 per cent of the planet's natural products and processes that support life, such as water purification, are being degraded or used unsustainably; and that this degradation increases the risk of abrupt and drastic changes, such as climate shifts and the collapse of fisheries. According to the report, fisheries and supplies of fresh water are now so degraded that they are already well beyond levels that can sustain existing demands, let alone provide for future needs.

It is stated that approximately 60 per cent of the planet's natural products and processes that support life, such as water purification, are being degraded or used unsustainably

Overview

The MA takes a global overview of both the state of ecosystems and their impact on human well-being. It focuses on the importance of ecosystems to people: how they feed and water us, clothe us and help us stay warm and dry. It states that human activity has changed ecosystems more rapidly and extensively in the past 50 years than at any other time in human history. The most obviously irreversible trend is the loss of biodiversity. Some 10 to 30 per cent of the world's land vertebrates are now threatened with extinction. And, for example, the world has lost 35 per cent of mangroves and 27 per cent of coral reefs in the past few decades.

Nature, obviously, ignores national frontiers, yet governmental policies are set mainly at the national level, so damage inflicted by one country may have huge impact in another. The primary concern is generally economic growth, yet few assign economic values to their environment. As a result, policy on, say, logging takes no account of impacts such as the reductions in water capture, recreational value and rainfall that follow deforestation. There is also a mismatch between the four years or so during which democratic governments expect their policies to deliver and the much longer timescales on which many ecosystems work. So the full impact of a damaging change may not be seen for decades.

Traumatic changes

World population has doubled since 1961 but we now produce more than 2½ times as much food. However, people in developing nations will not be able to escape poverty and hunger because their ecosystems are collapsing around them. If you focus only on reducing poverty in the short term, you're going to compromise your ability to reduce poverty and hunger in the long term, because that depends on ecosystem services.

The MA concludes that there is still tremendous scope for action that could mitigate these problems. If we act now, we can revive the world's ailing ecosystems.

Another problem is that changes in ecosystems, such as deforestation or draining wetlands, can affect the distribution of human pathogens. Many tropical urban populations already suffer from diseases associated with inadequate water and sanitation. Similarly, deforestation is linked to increases in malaria because it leads to more swampy habitat where mosquito larvae develop.

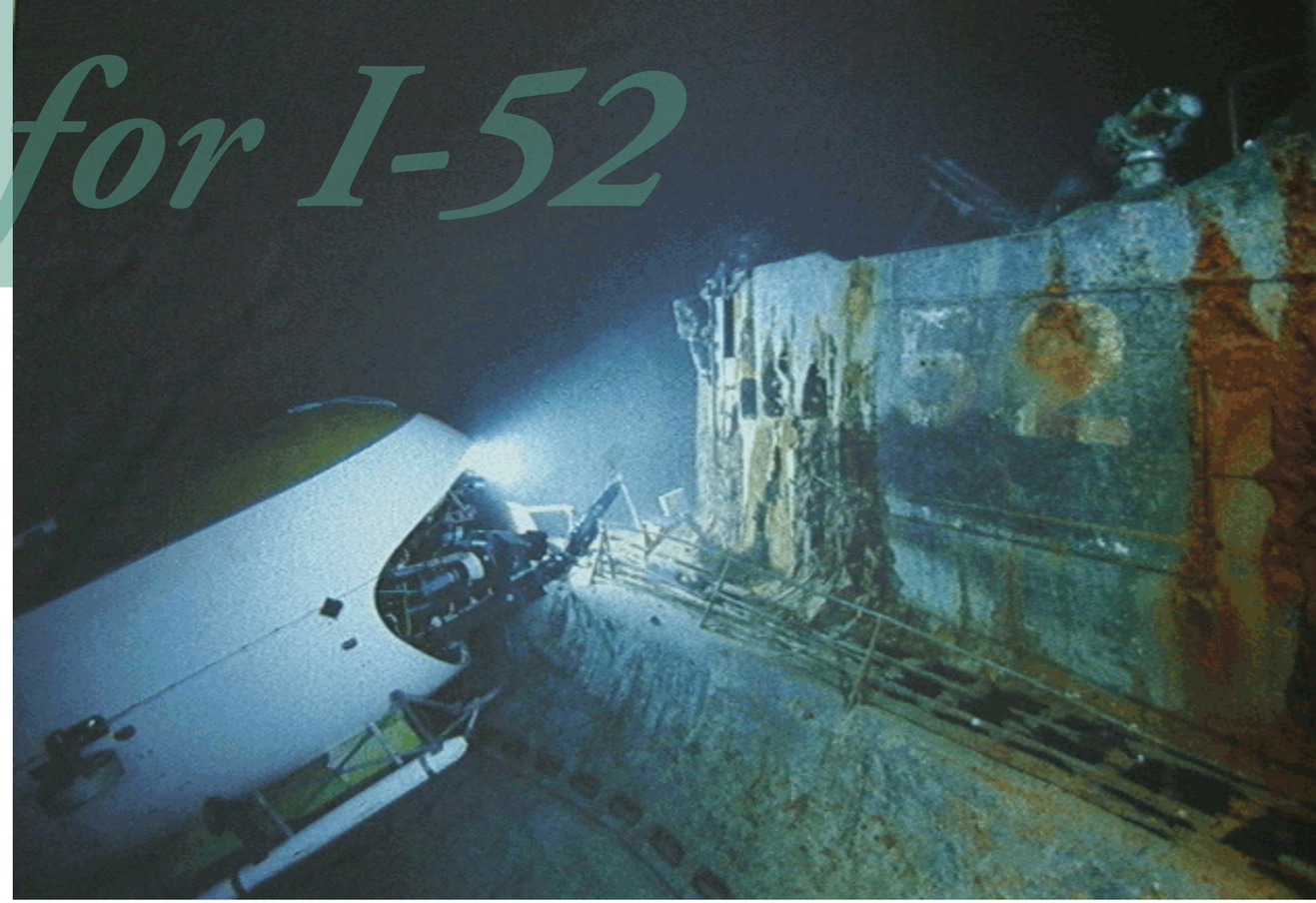
And pressure on ecosystems is set to intensify. As the average person in the world becomes more wealthy they will demand more fish and more meat, and so if we are to avoid environmental calamities like the collapse of the Atlantic cod stocks in the early 1990s as a result of overfishing, then the world must find less destructive ways of exploiting ecosystems.

However, despite all these difficulties, the MA concludes that there is still tremendous scope for action that could mitigate these problems. If we act now, we can revive the world's ailing ecosystems. It presents examples of policies that will let people coexist more successfully with the life around them. They require politicians to think not nationally but regionally or globally, to think long-term and to develop economic indicators for environmental health, or to broaden their thinking beyond the economic. Many countries have started to think in these ways. For example, European farmers are beginning to be paid not to produce food but to protect biodiversity, while trading of permits to emit sulphur dioxide has worked in the US to reduce acid rain, although these measures are only a tiny step in the right direction. ■

For more information, visit:
www.millenniumassessment.org

Edited by
Peter Symes &
Michael Symes

The Hunt for I-52



Gold-laden Japanese WWII submarine to be salvaged

But does it contain something of much greater interest?

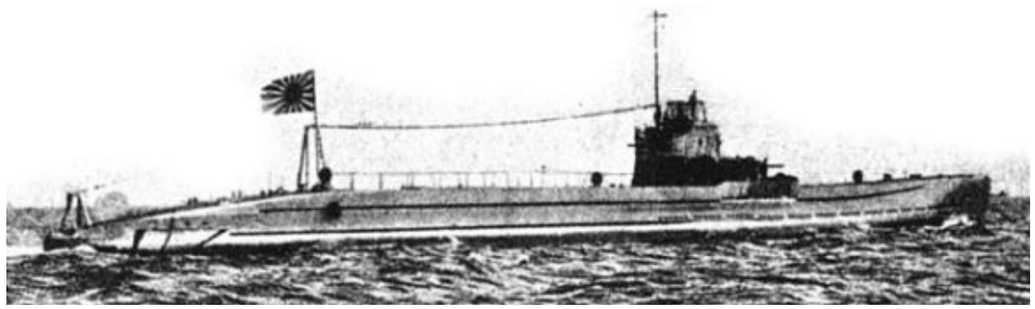
Possibly the most advanced submarine in the world at the time, the 2564 ton Japanese submarine I-52 left Kure, Japan, in March 1944, bound for Singapore. There it picked up a cargo containing, among a large amount of strategic materials, two tons of gold, and 2.3 metric tons of opium, probably intended for conversion into morphine painkillers. But perhaps it was also carrying something else of much greater historical significance.

After passing through the Indian Ocean, it headed for the Atlantic, with its final destination the port of Lorient, in western France. In mid-ocean, she was to rendezvous with the German submarine U-530, which would provide her with fuel, a radar detector and a navigator familiar with the Bay of Biscay, that should have enabled her to enter Lorient undetected. However, unknown to either the Japanese or the Germans, their codes had been broken and Ultra intercepts had revealed their plans. The I-52 had been closely watched all the way from Singapore!

Sink the I-52!

That was the order given to the escort carrier USS Bogue, en route to the United States from Europe. Arriving in the rendezvous area off Cape Verde and Barbados, the carrier began launching flights of Grumman Avenger torpedo bombers to search for the submarines. Late at night on 23 June, one of the Avengers detected a surface contact. The area was then illuminated by flares, and depth charges were dropped, exploding just to starboard of the sighted submarine, which then immediately dived. Sonobouys were consequently dropped which transmitted any underwater noise back to the aircraft carrier. A newly-developed type of acoustic torpedo was thereafter dropped, which homed quickly in on the sounds of the submarine. After a few minutes, the sonobouys transmitted the sounds of an explosion and noise from mechanical break-up

Although the submarine was thought to have been destroyed, some faint propeller noise was still thought to be heard in the area. A second attack was therefore ordered, but nothing more was detected. The next morning, destroyers reached the site and found flotsam: a ton of raw rubber, a bit of silk, and even human flesh. The I-52 had been destroyed, 1600 kilometers from the nearest land, but the U-530 escaped undetected.



The mission to sink the submarine had apparently been acomplished. But what was so important about this vessel that it had to be sunk? The answer to this question could perhaps only be solved by salvaging the I-52.

The wreck of the I-52

In 1995, Paul Tidwell, an American shipwreck salvager, located the wreck 5240 meters deep, mostly upright. Her conning tower is intact and her hull number is still visible. The bow is broken up, probably due to impact on the bottom, and a large hole, undoubtedly caused by one of the torpedoes, is aft of the conning tower. Debris is scattered over a large area. A metal box from this debris field was brought to the surface in the hope that it would contain some of the sunken gold, but when opened, the salvagers found not gold, but opium.

Plans were made to raise the submarine and recover the gold. However, the Japanese government objected, stating that they considered the wreck site to be a grave. Tidwell has now worked on the proper procedures with the Japanese government, and has received the blessing of the war graves' authorities in Japan. Tidwell took down a Japanese Naval Ensign and fixed it to the

wrecked submarine.

Paul Tidwell said that he is now planning an expedition to raise the I-52 within a year, and thereafter perhaps even return the submarine to Japan. He stated that they wanted to return all the human remains to the Japanese families, and that the Japanese government was giving its full support. The salvage operation is expected to take about 30 days, and then another two weeks would be needed to transport the submarine to the United States before it is eventually returned to Japan.

With a large quantity of opium still thought to be on board, the US drug enforcement administration says it wants to post two agents on the salvage ship.

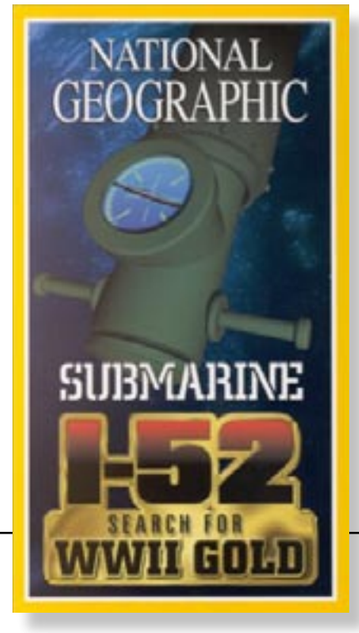
But was it also carrying a secret offer of peace?

Tidwell uncovered the story of the submarine, with its treasure of gold, when searching declassified documents in Washington, D.C., in 1990. He was then driven to find out everything possible about the submarine and what her mission was. Because of the dangers to surface ships in 1944, when the Atlantic Ocean was teeming with allied vessels, the only practical way to carry senior military officials, messages and cargo between Japan and Germany, was by submarine.

He believes the submarine was on a mission of such extreme importance that the Allied powers took exceptional pains to make sure it was sunk before it reached the coast of France. Initially he thought the submarine might have been carrying information on atomic bomb research. However, some historians now believe officials aboard the submarine may have had an offer of peace that they were hoping to coordinate with the Germans.

But could Japan really have been preparing to seek peace with the Allies more than a year before the war ended? Paul Tidwell believes the wreckage could contain a peace proposal from Tokyo that never made it into the hands of its intended recipient.

According to the declassified documents, Yoshikazu Fujimura, the assistant naval attache in Switzerland, had been in secret peace negotiations with a US representative, Allen Dulles. Mr Fujimura was sent to the port of Lorient in German-occupied France to meet the I-52, and, some historians believe, to receive the peace proposal. When the sub failed to show up, he returned to Switzerland empty-handed. Mr Tidwell hopes to have ended the speculation by this time next year. Because of the depth, paper is preserved, and therefore the salvage may clear up such speculation.



Mr Tidwell has been able to fund the project himself with earnings from several lucrative salvage operations. He has ploughed $6m into the project and expects to spend a further $10m on raising the submarine. But Tokyo has agreed to reimburse him if the operation is successful, and he will receive a 10% cut of the gold. ■

German WWII submarine to be re-housed in Chicago

After a lengthy repair and thorough conservation, a captured German U-505 submarine was ready for its move to a new exhibit in Chicago. The U-505, the only Type IX-C U-boat remaining in the world, will be placed in a new climate-controlled, underground vault at the Museum of Science and Industry.

The 252-foot, 700-ton sub was lowered into its 42-foot-deep permanent home in April 2003 after spending nearly 50 years outside the museum exposed to bitter Midwest winters. The exhibit, two years in the making, features interactive exhibits, nearly 200 artifacts, archival newspapers and photos, radio transmissions, re-enactments and videos of U.S. sailors who captured the vessel in 1943. ■

WW II wreck-fields off Hawaii

Vast fields of World War II wreckage exist as incredibly valuable archaeological sites beneath the blue-green ocean off Hawaii. There is so much to be seen that finding the more interesting artifacts is a real challenge

A World War II Japanese submarine, scuttled by the U.S. Navy, is the latest significant find made by the Hawaii Undersea Reasearch Laboratory among thousands of wrecks. The ship is one of two I-400 Sensuikan Toku class subs captured in the Pacific a week after Japan surrendered in 1945. Both subs were deliberately sunk by the United States when Russian scientists demanded access to them.

In 2002, the waters off Oahu also yielded a Japanese midget submarine that was hit an hour before Japan's aerial attack on Pearl Harbor in 1941.

The value of Hawaii's undersea wreckage is historical rather than monetary, as most cargo ships navigating the island chain in the 19th century carried goods that would have disintegrated by now, such as sugar, lumber, phosphates, sandalwood and furs. Therefore, hunters scouring the Hawaiian ocean bottom for golden treasure are more likely to find submarines, old whaling and merchant ships, and fishing boats. ■

Sunken submarine restoration efforts continue at Gallipoli

Gallipoli is a peninsula forming the southermost European shore of the Dardanelles, the channel forming the first part of the strategic waterway linking the Mediterranean and the Black Sea. During World War I, in April 1915, an Allied force, predominantly British and Australasian, landed on the peninsula in an attempt to eventually open up a route to assist Russia in its fight against the Germans. Because the Australians suffered such great losses in this, as it turned out to be, futile campaign, the name of Gallipoli remains imprinted in Australian folk memory.

This is one of the reasons why an Australian restoration team are continuing their efforts to protect the wreck of the Australian submarine AE2 which sank near Gallipoli 90 years ago.

The project is also aimed at protecting remains such as beach jetties, breakwaters and Army stores that form part of Gallipoli's battlefield heritage. ■

news

Edited by
Peter Symes &
Michael Symes

Does Lake Toplitz really hide Nazi gold?

Perhaps a final new dive will tell us

High up in the Austrian Alps, in dense mountain forest, lies secluded Lake Toplitz. It isn't large, but it is deep. It was to here that a group of fanatical Nazis retreated in the final months of the second world war. By April 1945, Hitler was

dead in Berlin, and the Allies were closing in. Many of the last leaders of the Nazi regime fled here, some to make a last stand, others to try to save some remnant of the Reich in hope of starting over one day.

With the Third Reich on its last legs, a large number of boxes were transported to the edge of the lake and sunk. Some believe they contained gold while others believe that they contained documents showing where assets confiscated from Jewish victims were hidden in Swiss bank accounts.

There have been many attempts over the past 60 years to locate this possible treasure trove, all of which have failed. In 1947, a US navy diver became entangled in Lake Toplitz's many submerged logs and drowned. In 1959, a team financed by the German magazine Stern had some luck, when £72m in forged sterling currency hidden in boxes, and a printing press, were retrieved. In 1999, the Austrian government agreed to lease the lake for 30 days to Oceaneering Technologies, Maryland. Oceaneering Technologies employed the Phantom, which is is a deep-diving robot operated by a tether connected to a pilot on the surface. This expedition would be the first comprehensive search of Toplitz.

The first thing Oceaneering found was a layer of silt on the bottom that often blew like a blizzard, blinding the camera. To the tethered mini-sub, the lake floor was a minefield. Oceaneering had expected trees but not underwater forests. Trees had fallen from the mountain and were stacked 60 feet high in some places. Finally, towards the end of the scheduled period, a discovery was made - not the intact boxes the crew hoped to find - but only the remains of something decades old, pieces of wood that might have come from the Nazi crates. And that was that, until now.

In what will probably be a final attempt to solve the mystery, the Austrian government has licensed Norman Scott, a hi-tech American treasure hunter, to make an expedition to the bottom of the lake. Under the terms of the deal, which allows the US team to dive for the next three years, any treasure found will be divided between the Americans and the Austrian state. Obviously, if they recover anything which has an identifiable owner, under Austrian law they will have to give it back.

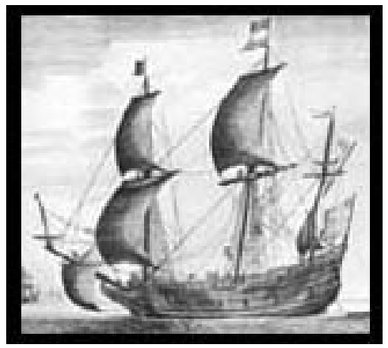
Mr Scott, 72, claims to have discovered fresh clues in archives in Berlin and Washington, pointing him towards the gold, though he refuses to give details. He will soon begin a detailed underwater survey of the 107 metre deep lake. Getting to the bottom of Toplitz is quite a feat. After 10 meters it gets dark, and below 30 meters the water is nearly freezing. And as there is no oxygen in the water there are neither plants and nor fishes here. ■

What happened to Northwest Airlines Flight 2501?

On June 23, 1950, Northwest Airlines Flight 2501 disappeared over Lake Michigan with 58 people aboard. For two weeks after the disappearance, human remains, clothing, personal effects and debris were washed ashore all along the coastline of Allegan County. However, no whole bodies were ever found nor any large pieces of the plane. The cause of the crash remains a mystery to this day.

Now, nearly 55 years later, a local and an international group are teaming up to search for the wreckage. The local group, Michigan Shipwreck Research Associates, and an international organization, National Underwater and Marine Agency, have renewed interest in finding the wreckage of the DC-4. The local group is hoping to go deeper than the 1950 search for the wreckage.

The goal is to determine what happened to the plane and offer closure to the families. ■



North Carolina to allow diving near Blackbeard's ship

Recreational divers will be permitted to explore near a wreck that some archaeologists believe is that of Blackbeard's pirate ship off the N.C. coast. The state program, called Dive Down, would allow 320 divers a year to visit the wreckage off Atlantic Beach on trips arranged through dive shops. State officials said the wreck site is under regular surveillance by the Coast Guard and state agencies.

Nine years ago, researchers found a major shipwreck at Beaufort Inlet. Officials of the state underwater archaeology branch say that they think the wreckage is that of Blackbeard's Queen Anne's Revenge, the pirate's flagship, sunk in 1718. They later located 23 cannons resting on the ocean floor. Archaeologists have recovered some of them, along with other 18th century artifacts, which they say all point to the famous vessel.

However, not everyone agrees. Some archaeologists at East Carolina University are not so sure. They believe that there is as yet no evidence that this really is the Queen Anne's Revenge. They say that from the evidence, it looks like that this could be a merchant vessel from about the same time.

One of the largest pirate ships ever, Queen Anne's Revenge was Blackbeard's flagship for seven months, from her capture in November 1717 in the eastern Caribbean until she was wrecked in June 1718 at Beaufort Inlet, North Carolina.

History

Queen Anne's Revenge is of considerable historical importance. It is possible that Queen Anne's Revenge's nationality and appearance changed at least twice in her relatively short lifetime of eight years. It appears that she may have been launched in England in 1710, during the War of the Spanish Succession. While flying the British flag, she may have been named the Concord, with a capacity of 300 tons, and armed with 20 cannon.

Sometime in late 1710, she was taken by French privateers, and brought into a French port. In early 1711, she was modified so that she would be more suitable for use as an armed transport. This later caused confusion as to her origin. The spelling of her name was also changed to Concorde.

A Concorde of 300 tons and 20 guns was part of a French squadron which left Brest in the summer of 1711 for South America. The war was still raging and Portugal had allied itself with Britain. At the end of the war in 1713 the Concorde became an armed merchantman.

The Concorde taken by Blackbeard, captured off the island of St. Vincent in the eastern Caribbean in November 1717, is described as being 300 tons, and carrying 26 guns. Apparently, she was sailing from Africa to Martinique when captured. Blackbeard increased her armament to as many as 40 guns and carried as many as 150 pirates. She was then his flag ship until a few days following the Charleston blockade in May 1718. The Queen Anne's Revenge was then run aground off Beaufort Inlet to enable Blackbeard to escape with a small group of hand-picked men and the recently taken valuables.

Blackbeard

Blackbeard himself, vile though he was, is not really as interesting as his ship. Born before 1690, he was British, and his name was thought to be Edward Teach. As a young seaman, he had served on a British privateer based in Jamaica. During the War of the Spanish Succession he became an experienced sea robber, and after the war he joined a group of Caribbean pirates, terrorising all who sailed these seas. He soon became captain of his own ship – stolen of course - creating even more terror. He eventually made his home base in North Carolina, then a British colony, near a string of islands called the Outer Banks. In the autumn of 1718 he returned from sea to his favourite hideaway off Ocracoke Island to enjoy himself together with a number of his croneys. It was here that he was caught by the Royal Navy and, after a fight, beheaded. End of story – except that his ship might now have turned up again.

The archaeological excavation, which began in the autumn of 1997, will undoubtedly answer many of the questions generated about the pirate and his ships. This project will also offer a glimpse into a society which remains little understood by historians and archaeologists. In addition to its association with Blackbeard, the physical remains of the ship itself should provide fascinating clues into ship construction practices and naval architecture during a period, and for a class of ship, where limited information survives today.

However, whether or not the wreck proves to be that of Queen Anne's Revenge, a dive here could still be very interesting – that is, if you are lucky enough to be one of the permitted 320! ■

Boeing 737 to be new artificial reef in Chemainus area dive tourism

The Artificial Reef Society of BC announced that a Boeing 737 airframe will be sunk near Chemainus, on Vancouver Island, instead of near Comox as previously announced

Tex Enemark, President of the Artificial Reef Society of BC, and Peter Luckham, of 49th Parallel Diving, Chemainus, said that there had been enough discussion of the project in the community, and sufficient funds had been committed by the Province and by the community, to satisfy the ARSBC that there was broad support in the community for the project. However, further funds to complete the placing of the artificial reef are still needed. It is felt that once the airplane is in Chemainus, this fund-raising should be easier.

"The ARSBC had previously announced plans to place the plane in the waters of Comox/Courtenay. However, the Comox Valley Dive Association was unable to raise sufficient funds to complete the project', said Enemark.

"We want to express our appreciation to those in Comox and Courtenay who wanted the 737 sunk there, particularly the Mayors and Councils of the two communities. We regret this decision very much", said Enemark.

Enemark, speaking for the ARSBC said, "The dive community in the Chemainus- Ladysmith-Duncan area have wanted an artificial reef sunk nearby since the BC artificial reef program started a dozen years ago but, for a variety of reasons, it has never happened. This will be a very interesting and unusual artificial reef," he continued. "It will add hundreds of thousands of dollars per year to dive tourism in the area. ■

Whales

Edited by
Peter Symes

Can the endangered right whale survive?

Increase in births could save the right whales

The endangered North American right whale was fished to near-extinction in the 18th century, but an increased birth-rate gives hope of a revival. However, there are still fewer than 350 North Atlantic right whales in existence, and they are being battered by shipping off the East Coast of America.

Researchers at the New England Aquarium in Boston report that 27 whales were born, bringing the worldwide population to almost 350. Nevertheless, the whales have already suffered heavy losses running the gauntlet of East Coast shipping on their way from their calving grounds off Florida and southern Georgia to the Bay of Fundy in Canada. This journey takes the whales through some of the most crowded and dangerous waters in the Atlantic, where there is a very high risk of ship strike or fishing gear entanglement. At least five whales have been killed by ships and fishing equipment in the past six months, including at least two pregnant mothers and two females that were of breeding age. A sixth whale was probably fatally injured last month when it was hit by a yacht travelling at 20 knots. Researchers at the New England Aquarium estimate that more than 72 per cent of the surviving right whales carry scars from entanglements with ropes at sea, and that up to 84 of them become entangled every year. Five percent of all reproductively active female right whales have died in three months

The whales form one of three populations of right whale in the world. The others inhabit the North Pacific and the South Atlantic. They were called right whales because their thick layer of blubber kept them afloat when dead, making them easy to bring aboard and the "right" whale to kill. ■

Gray whale dies stuck between pilings

A 9-ton gray whale died after being found wedged tightly between vertical pilings near Bremerton, in Puget Sound. It was a little older than a yearling, and very thin and emaciated. It was stated that the awkward location was an indication the whale was not in good condition to start with.

West Coast grays are now making their annual migration between their winter breeding grounds off Mexico and summer feeding grounds off Alaska. About 10 gray whales are currently in Puget Sound waters, mostly around Whidbey Island. It is believed that as the gray whale population increases, more gray whales are venturing to inland waters such as Puget Sound to feed..

Grays are bottom feeders who churn up the ocean floor and use baleen - bony plates in their mouths - to strain out the tiny sea creatures that sustain them. ■

Japanese at loggerheads with the Australians

Japan to double whale kill in Antarctic waters

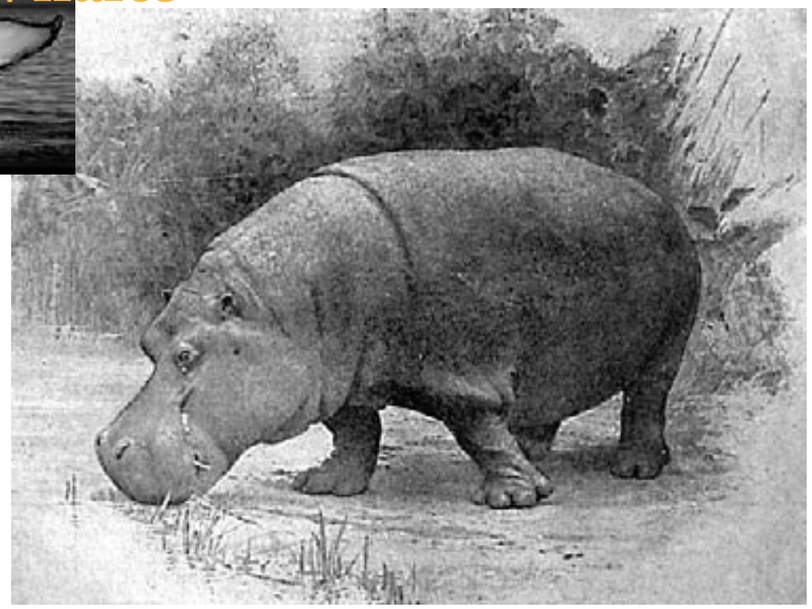
It is understood that the Japanese government intends to double its catch of minke whales in the Antarctic Ocean late this year, and begin hunting humpbacks and fin whales, too, as part of its research whaling program.

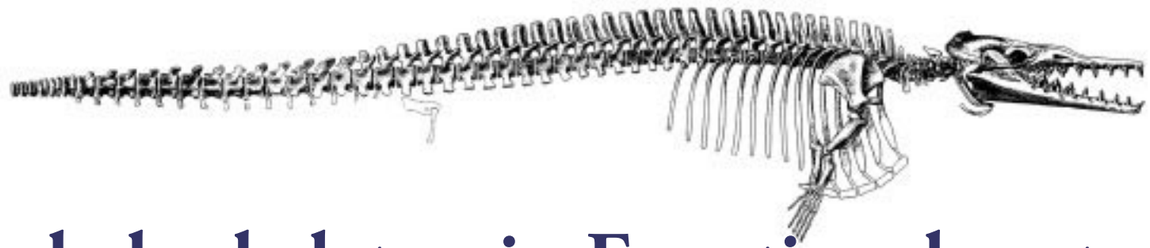
A moratorium on commercial whaling is in effect, but research, or scientific whaling is permitted under International Whaling Commission (IWC) rules. An IWC spokeswoman said the organization has received the Japanese proposal, which would bring its minke whale catch to 800 from the present level of 440 per season.

Japan argues that there is a need to increase its target species to analyze the ecosystem of the Antarctic Ocean and develop a method to manage whale resources. Conservationists say there is no scientific need to kill whales and non-lethal methods of study would be just as effective.

Discussions on lifting the commercial whaling moratorium will be held at the upcoming IWC meeting, divisive talks that have been held at every annual IWC meeting for the past decade. A decision to end the moratorium needs a 75 percent vote in favour, and to date, the anti-whaling nations have been able to hold off the Japanese who want to hunt whales for commercial use. But every year the margin gets slimmer as Japanese officials persuade small island nations hungry for financial aid that it is in their best interests to allow commercial whaling.

Japan, along with Iceland, uses a loophole in the moratorium to hunt whales for so-called "scientific research", but Humane Society International claim that there is absolutely no scientific case for killing whales, and neither are there economic grounds for Japan expanding its Antarctic hunt. Under IWC rules, any meat that results from research whaling must be utilized, and Japan sells whale meat in markets and restaurants. Japanese officials maintain that eating whale meat is part of the Japanese culture. But HSI claim that the demand for whale meat in Japan is falling, and the hunt is already heavily subsidised by the government. ■





Fossilised whale skeleton in Egyptian desert

An American palaeontologist and a team of Egyptians have found a nearly complete fossilised skeleton of the primitive whale Basilosaurus isis in Egypt's Western Desert. Basilosaurus isis is one of the primitive whales known as archaeocetes, which evolved from land mammals and later evolved into the two types of modern whale. The well-preserved skeleton, which is about 40 million years old, was found in a desert valley known as Wadi Hitan (the Valley of the Whales) south-west of Cairo.

The 18 metre-long skeleton could throw light on why there are so many fossilised remains of whales and other ancient sea animals in Wadi Hitan, and possibly how the extinct animal swam. Modern whales swim by moving their horizontal fluke up and down in the water, while fish swim by lateral undulations.

Wadi Hitan is unusually rich in fossil remains from the period, trapped in a sandstone formation that then formed the sea bed. The fossils include five species of whale, three species of sea cow, two crocodiles, several turtles, a sea snake, and large numbers of fossilised sharks and bony fish.

It is a protected area to be developed as a national park under an Italian-Egyptian cooperative program and it has been nominated as a UNESCO World Heritage site because of its natural beauty and scientific importance. ■

Whales and hippopotamuses linked by fossil

40-million-year-old fossils provide a missing link

A genetic study suggests that the whale and the hippopotamus are close relatives. Now, a team at the University of California at Berkeley, the University of Poitiers in France and the University of N'djamena in Chad say they have found more evidence in the fossil record.

There is a 40-million-year gap between fossils of early cetaceans, i.e whales, porpoises and dolphins, and early hippos. The earliest cetacean fossils date back 53 million years ,while the first hippopotamus fossils date to about 16 million years.

The team's new theory proposes that whales and hippos had a common water-loving ancestor that lived 50 million to 60 million years ago. From it evolved two groups, the early cetaceans, which gradually moved into the water full-time, and a large and diverse group of piglike animals called .

This proposed family tree of modern whales and their first cousin, the hippopotamus, shows how the now-extinct anthracotheres serve as the link between their distant ancestors. These animals flourished, forming 37 distinct genera across the world before dying out and leaving just one descendant 2.5 million years ago, the hippopotamus.

The theory would class whales, dolphins and porpoises with cloven-hoofed mammals such as cattle, pigs, and camels. ■

Wholphin

Meanwhile....

Whale-dolphin mix

The world's only known whale-dolphin mix has given birth to a female calf at Sea Life Park, Hawaii. The new wholphin is one-fourth false killer whale and three-fourths Atlantic bottlenose dolphin. Her slick skin is an even blend of a dolphin's light gray and the black colouring of a false killer whale.

The calf was born to Kekaimalu, a mix of a false killer whale and an Atlantic bottlenose dolphin. Kekaimalu, which means "from the peaceful ocean," was born 19 years ago after a coupling between a 14-foot, 2,000-pound false killer whale and a 6-foot, 400-pound dolphin.

Although false killer whales and Atlantic bottlenose dolphins are different species, they are classified within the same family, not being that far apart in terms of taxonomy. False killer whales do not closely resemble killer whales. They grow to 20 feet, weigh up to two tons and have a tapering, rounded snout that overhangs their toothed jaw. Atlantic bottlenose dolphins reach a maximum size of 12 feet and can weigh up to 700 pounds.

There have been reports of wholphins in the wild. ■

Bob Hunter, co-founder of Greenpeace, has died

After suffering from cancer, Bob Hunter died on May 2nd 2005

Hunter, from Winnipeg, Manitoba, helped set up the environmental campaign group in 1971, and was the Greenpeace Foundation's first president, from 1973 until 1977.

He initially became involved with a few people who wanted to stop a US nuclear weapons test off Amchitka. On September 15, 1971, he and 11 other activists sailed out to challenge the might of the USA in a rusting fishing boat they called "The Greenpeace." In doing so, they set off a wave of public support and protest which closed the US-Canadian border for the first time since 1812, ultimately shut the testing programme down, and created a new force for environmental and peace activism which continues to this day.

Hunter coined the term "rainbow warriors" to describe Greenpeace activists, and he also raised public awareness about nuclear testing and the hunting of whales and seals. In 1978, he chronicled the birth of Greenpeace in his book Warriors of the Rainbow.

Greenpeace has now over 2.5 million members in 40 countries. ■

GREENPEACE / ROBERT KEZIERE

Bob Hunter en route to Amchitka to oppose US nuclear weapons testing on *Phyllis Cormack* together with Ben Metcalfe. July 1971, Pacific Ocean, Canada

Plankton can resist strong currents

Ocean currents sweep zooplankton into patches or clusters, and it has long been suspected that the clusters form when zooplankton swim against these currents. However, until now, researchers have not had a way to track the motion of these miniscule sea creatures.

In the May 6 issue of the journal Science, a team of researchers from Israel, the United States and Germany showed that zooplankton keep their position at various depths by "treadmilling" against currents.

Using a newly developed, 3-D imaging system called "Fish TV," developed by Jules Jaffe of the Scripps Institution of Oceanography, the team could track individual zooplankton at two coastal sites in the Red Sea. Scuba divers attached Fish TV's sonar transducer to a large underwater tripod extending 20 feet above the sea floor. The transducer was connected by a cable to a control unit with a computer and other electronic hardware. They were able to see 375,000 individual zooplankton, many as small as 1 millimeter in length, as they were swimming, and could capture images of such tiny creatures in three dimensions from two meters away.

These organisms aren't simply at the mercy of physical forces like currents, they are altering their position in the environment in unique ways. The small zooplankton are capable of remaining at a constant depth with a precision of centimeters, sometimes in the face of strong vertical currents, implying that these organisms have extremely sensitive depth sensors. ■

SCRIPPS INSTITUTION OF OCEANOGRAPHY

Project Seahorse

ADVANCING MARINE CONSERVATION

The international marine conservation organization, Project Seahorse, is pairing up with the Belgian chocolatier, Guylian, who makes the famous chocolate sea shells one can find in many upscale gourmet food markets throughout Europe. They have set up a challenge for you: Photograph a seahorse in its natural habitat and submit your image to the competition.

Every entrant will receive a box of Guylian Belgian Chocolate Sea Shells and winners of the competition will receive prizes worth a total of $14,000, including a week-long dive expedition to Australia's Great Barrier Reef with Mike Ball Dive Expeditions. Sponsors who are making these prizes possible include Sport Diver Magazine and Guylian Chocolates.

Project Seahorse is seeking the help of the world's best amateur and professional underwater photographers to gain new images and knowledge on known and yet to be discovered species of seahorses. Entries will be used in educational settings and scientific study. Send in your print or digital image of a seahorse in its natural habitat taken since January 1, 2000. Deadline for submission is July 1, 2005.

The project is the brainchild of biologist Sara Lourie who identified images by photographer Denise Tackett as one of the world's smallest species of seahorse. It was named Hippocamus denis in Denise's honour.

With their sharp eyes and keen skills of observation, photographers play an important role in the scientific process by capturing images of new species, here to for unseen animal behavior and many new discoveries. ■

seahorse.fisheries.ubc.ca

DENISE TACKETT

Hippocampus denise in its natural habitat, a gorgonian seafan

news

Edited by
Peter Symes &
Michael Symes


PETER SYMES

Hyderabad may get under-water world

Hyderabad, the fifth largest metropolis of India and the state capital of Andhra Pradesh, is likely to have an underwater-world showcasing thousands of marine species sharks.

The project, first-of-its-kind in the country,will probably be set up on the 90-acre Sanjeevaiah Park located on the banks of Hussain Sagar. Singapore-based Centosa Leisure Group, which runs a similar project in that city state, has evinced interest in setting up the underwater-world project.

Apart from the underwater-world, a 3D and 4D movie screening facility, where the audience will travel through a simulated real-life experience, is also being planned by the Centosa group in Hyderabad.

While the state has grown big in medical and spiritual tourism, it is still lagging behind in recreational tourism. This is all the more required in places like Hyderabad where people from the fast growing IT and bio-tech industry and other professions look forward to quality recreation. ■

Conservation of the World's oldest water-level records

Underwater museum in Chongqing nearing completion

Baiheliang Ridge of Rocks, about 1.6 kilometers long and 15 meters wide, contains detailed recordings of the lowest water levels in the Yangtze River each year for the last 1,200 years. It also contains the work of many famous calligraphers. Located at the upper reaches of the Yangtze River, Baiheliang only emerges from the water during dry seasons, as it was submerged in the Three Gorges Project construction in 2003.

The ellipical underwater museum, about 70 meters long and 23 meters wide, was built to protect the middle ridge, with its inscriptions. Tourists will be able to descend to the underwater museaum by elevator from above the water. There is also a 2,000 square-meter exhibition hall on a nearby bank.

Wang Hongju, mayor of Chongqing, will apply for Baiheliang Ridge of Rocks to be listed as a UNESCO World Heritage Site. ■

Text by Enrico Cappeletti

Fancy a fancy dive boat?

The great Garbo yacht story

If you ever dreamt of owning a diveboat with a fanciful history, now's the chance. Our Italian correspondent Enrico Cappeletti found the legendary diva's yacht rotting in an Italian port on the Adriatic coast. There are no apparent owners, and it seems probable that it is just a matter of time before the port authorities clear it out.


ENRICO CAPPELETTI

This is what we have been able to piece together. The boat, 35m long and weighing in at 100t has been sitting in Ravenna since February 1995, where is was protected by the Coast Guard. She was then moved to a new location, Porto Garibaldi, some 36 km (20 miles) further north to be scrapped.

The yacht was built by Brooke Marine Company, England, It has two decks, one saloon with loungebar and only one big sleeping room. It is known that Greta Garbo, accompanied by her secretary, travelled extensively in the Mediterranean on her yacht. In 1970 the yacht was based in some harbour along the Tirrenyan coast. Later the boat was in the Adriatic sea.

As for the progression of ownership the picture is patchy and difficult to put together. In the mid 1970's, she was bought by Pier Giorgio Pasi from Porto Garibaldi and used for taking tourists fishing. She was then sold to a Giordano Placuzzi from Ravenna.

The last owner on record was a company from Salerno, south Italy, The Fratelli Trapani, who apparently didn't take care of the boat. She was then left in Ravenna harbour, where the Coast Guard watched over her from 1995 to the end of 2000. The Coast Guard has the right to keep an eye on any abandoned yacht, ship or boat, and since the Garbo yacht was inside at harbour they finally removed her from where she was waiting for someone to show up.

She was taken up north to be scrapped. Now the *Alimuri*, which is her last name, still sits there, now half sunk, as the pictures show. I visited the yacht- it's now quite rusty and water is all over and it certainly doesn´t look good anymore. I did search for the old owners but came up with nothing so far. The very last owner is probably unknown or they were able to hide the documents. Nobody seems to know and the Brooke Marine Company is now part of FBM Babcock Marine. ■


ENRICO CAPPELETTI

Ned & Anna DeLoach educate and entertain guests at Buddy Dive Resort Bonaire

The entire month of September world-renowned marine naturalists Ned & Anna DeLoach will be at Buddy Dive Resort Bonaire to offer its guests a wide range of educational activities, from guided boat dives and snorkel trips to slide shows in the evening. Ned & Anna are the authors of the Reef Fish Identification and Reef Fish Behavior books. For more info on their work see **www.fishid.com**

Activities start on Wednesday August 31st and continue until the 25th of September and are free-of-charge for guests staying at Buddy Dive Resort. To celebrate the stay of Ned & Anna at Buddy Dive Resort, the premium dive resort of Bonaire is offering its special promotion "Buddies-Dive-for-Free" For more information please contact your favorite travel partner, call 1-866-GO-BUDDY, e-mail **buddydive@travelmarketing.com** or visit our website **www.buddydive.com**. For non-US reservations call your favorite travel agent, contact us at **reservations@buddydive.com**, call + 599-717-5080 or fax + 599-717-8647. ■

DivePhotoGuide.com

DivePhotoGuide.com launched in beta during the Beneath the Sea show in March. Since then over 600 divers and photographers have signed up for the beta-membership. DivePhotoGuide.com is on the way to becoming the most comprehensive dive operator directory in the world, catering mainly to underwater photographers and videographers. But there is far more to the site than the directory. Currently, divers and photographers can sign up for a free beta-membership with access to photo galleries from some of the top underwater photographers in the world, photo contest calendars and breaking news. The DPG Dive Operator Directory will officially launch over the summer.

It will include detailed information about the facilities of dive operators, dive resorts and liveaboards around the globe. Divers can search based on general facilities, photo subjects, schedules, rates and most importantly photo specific facilities (down to the size of the rinse tanks and the availability of charging stations, international power adapters and much, much more). Each dive operator will also be ranked on their environmental responsibility, in conjunction with non-profit organization OceanNEnvironment. DivePhotoGuide.com promises to be a resource that no underwater photographer or videographer can live without! ■
www.DivePhotoGuide.com

Oriskany on tow from New Jersey to be cleaned in Texas

USS Oriskany

To sink or not to sink

After numerous delays and frayed nerves, the USS Oriskany will be towed to a Naval docking area in Texas from Pensacola, Florida, and back again to Pensacolo where it will become an artificial reef. The Navy is towing the ship to Texas in order to protect it from the hurricane season said Navy officials. They will spend 1.8 million more USD over the 12 million already spent on the vessel to prepare it for becoming an artificial reef. Navy spokesperson, Pat Dolan, said the towing was less expensive than completely scapping the ship. The 888-foot (271 m) Korean War era aircraft carrier will have been towed four times across the Gulf of Mexico between 2004-2006 before it is finally laid to rest on the seafloor. Once sunk, the vessel will draw tourism to its attractive home for sea creatures and improve fishing in the area of Pensacoloa. The city won the bid to receive the artificial reef from the Navy over the city of Corpus Christi, Texas. ■

DiveBIZ 2006 to have consumer day

ConvEx Show Management, producers of DiveBIZ 2006, has added a consumer show segment to their January 2006 diving trade show. Travel and Dive Expo, a consumer day, will be held on Saturday, January 28, 2006. The Expo will follow two trade-only days: Thursday, January 26 and Friday, January 27, 2006 at the Las Vegas Convention Center. "Many of our exhibitors have asked us to consider the addition of this one day on which consumers may have the opportunity to view the products that will be available at their local retailers for the forthcoming dive season. Because we are dedicated to maximizing the return for our exhibitors, we felt the investment and opportunity more than justified the addition of a consumer aspect to the DiveBIZ event," said Guy Miller, International Marketing and Sales Manager for DiveBIZ. The show dates moved one day to include the Saturday consumer day. ■
www.divebizexpo.com

News release May 2005

New Luxury live-aboard vessel headed for Papua New Guinea

Following her March handover, "True North" has arrived and entered scheduled service in the remote Kimberly wilderness. Owner / operator, North Star Cruises has reported strong interest in cruise options including this year's "Over the Top" cruise from Darwin to Cairns and, the new "Adventures in Paradise cruise" - untamed Papua New Guinea in ultimate luxury.
As the attached picture clearly shows this larger replacement vessel offers passengers the highest levels of comfort and facilities, but is still small enough to access the most breathtaking the region has to offer. Elsewhere in the yard the 38 metre research vessel for a private owner is undergoing final sea trials prior to shipment and delivery. ■

ZEAGLE Manta Wing Bladder

NYHEDER

ZEAGLE Stilletto BCD

WEEZLE Undersuit
fra 1.798,- DKK

ZEAGLE Expedition GS
suits fås både med front og back zips.
Udført i 4½ mm compressed neopren

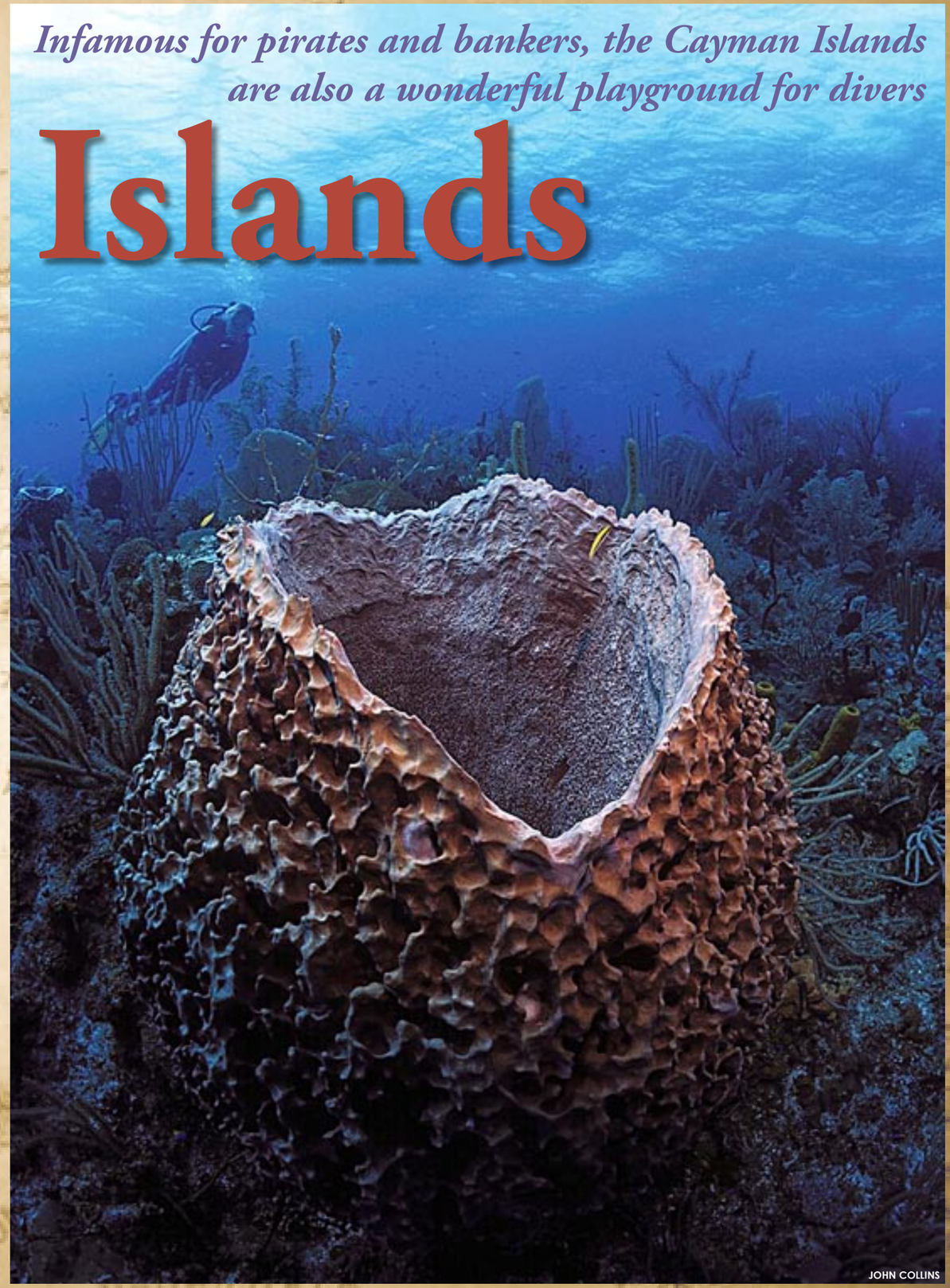
MAGNUM TEC 3
PAKKEPRIS
2.998,- DKK
Magnum TEC 3 lygte,
med Goodmanhandle,
Lomme til lygte,
S.S. clip (carabin)

Ocean Dive Explorers ApS
Sønder Fasanvej 47
2000 Frederiksberg
Telefon: 3833 7778
Email: info@oceandive.dk

The Cayman Islands

Infamous for pirates and bankers, the Cayman Islands are also a wonderful playground for divers

Introduction text by Michael Symes
Photographs by John Collins and Peter Symes


JOHN COLLINS

Situated in the sparkling Caribbean Sea, the three Cayman Islands, known as Grand Cayman, Cayman Brac and Little Cayman, lie some 250 km south of Cuba and about 300 km west of Jamaica. Geographically speaking, they form part of the Cayman Ridge which extends westwards from Cuba over towards the Bay of Honduras. The Cayman Trench, which goes down to a maximum depth of 7686 meters, separates the islands from Jamaica.

The Cayman Islands were first sighted by Christopher Columbus on 10 May, 1503, when he was blown off course en route to the island of Hispaniola, now known as Haiti and the Dominican Republic. He decribed two very small and low islands which, like the surrounding sea, were full of turtles, and for this reason he named these islands Las Tortugas. The two islands were Cayman Brac and Little Cayman. A map from 1523, showing all three islands, gave them the name Lagartos, meaning alligators or large lizards. However, by 1530 the name Caymanas was being used. It is derived from the Carib Indian word for the marine crocodile, which is now known to have lived in these islands.

On his 1585-86 voyage to these waters Sir Francis Drake, with a fleet of 23 ships,

RIGHT: Diver and large Barrel sponge, one of the largest marine organisms in the Caymans, reaching over 2m across. Bloody Bay, Little Cayman

NEXT PAGE: Diver encounters one of the large deep water gargonians or fan corals on the Cayman reefs

stopped at Grand Cayman and reported that the island was not inhabited, but crocodiles, alligators, iguanas and numerous turtles were to be found. However, it was the ample supply of turtles and their meat that made the islands a popular calling place for ships sailing the Caribbean. This eventually led the local waters to being denuded of the turtle, although the green turtle is still found in the seas surrounding the Islands where their fishing is allowed under licence.

Piracy

The first recorded settlements were located on Little Cayman and Cayman Brac when Sir Thomas Modyford was Governor of Jamaica in 1661-7. Although Spain had recognised British possession of the Islands in the 1670 Treaty of Madrid, there were still many Spanish privateers plying their piracy at this time. For this reason the settlers were called back to Jamaica. Often in breach of the treaty, British privateers also roamed the area taking their prizes, probably using the Cayman Islands for replenishing stocks of food and water and careening their vessels. During the 18th century, the Islands were certainly well known to such pirates as Blackbeard, even after the Treaty of Utrecht, in 1713, was supposed to have ended privateering.

On 8th February, 1794, an event occurred which grew into one of Cayman's favourite legends, 'The Wreck of the Ten Sail'. A convoy of more than 58 merchantmen sailing from Jamaica to England found itself dangerously close to the reef at Gun Bay, on the east end

JOHN COLLINS

JOHN COLLINS

Juvenile spotted drum, 5cm long, Little Cayman

Caymans

Before slavery was abolished in 1834, there were over 950 slaves owned by 116 families.

When Jamaica achieved independence in 1962, the Islands opted to remain under the British Crown, and an administrator appointed from London assumed the responsibilities previously held by the governor of Jamaica.

An airfield opened in 1953 in Grand Cayman, replacing the seaplane service which had operated since the 1940s.

The economy has now grown greatly, as governments have pursued policies aimed at developing the infrastructure, of Grand Cayman. Ten of the ships, including HMS Convert, the navy vessel providing protection, foundered on the reef. With the aid of Caymanians, the crews and passengers mostly survived, although some eight lives were lost. The court martial of the fleet's leader, Captain Lawford, revealed that a current had unexpectedly carried the fleet 20 miles north of its course. The incident underscores how common shipwrecks have been in the history of the Islands. At this time the population was about 400.

The first census of the Islands was taken in 1802, showing a population on Grand Cayman of 933, of whom 545 were slaves.

LITTLE CAYMAN DIVE SITES
1. Cumber's Caves
2. Bus Stop
3. Marilyn's Cut
4. Great Wall
5. Joy's Joy

CAYMAN BRAC DIVE SITES
1. Radar Reef
2. Plymouth Rock
3. Snapper Reef
4. MV Capt. Keith Tibbetts
5. Charlie's Reef
6. East Chute
7. Tarpon Reef
8. Anchor Wall
9. Inside Out
10. Rock Monster

BELOW: Grunts schooling in the Cayman reefs. The shallow reefs of Bloody Bay's protected marine park are healthy and full of fish life

There are over 200 dive sites around Grand Cayman Island, including those listed below:

GRAND CAYMAN DIVE
1. Bonnie's Arch
2. North West Point
3. Orange Canyon
4. Big Tunnel
5. Sand Chute
6. Oro Verde
7. The Aquarium
8. Doc Poulson/Mitch Miller's Reef
9. Little Tunnel
10. Trinity Caves
11. Happ's Pipeline
12. Ghost Mountain
13. Stingray City
14. Hole in the Wall
15. Princess Penny's Pinnacle
16. Grand Canyon
17. Babylon
18. Turtle Pass
19. Snapper Hollow
20. Grouper Grotto
21. The Maze
22. Thee Sisters
23. Laura's Reef
24. Pedro's Pinnacles
25. Japanese Gardens
26. Eagle Ray Rock

JOHN COLLINS

Moray eels are commonly seen throughout the Caymans

education, health and social services of the Islands, and fostering the continued growth of Cayman's two main industries, tourism and financial services. The population of the Cayman Islands is now about 40,000, and the main language is English with Spanish frequently spoken as a second language.

Playground for tourists and scuba divers

This is a well-favoured place. The climate is mild, with temperatures seldom going below 21°C or above 32°C. Rainfall over the Islands is seasonal, with the capital, George Town, receiving a monthly average of about 12 cm of rain. The Islands are very fertile with coconut trees, thatch palm, seagrape, almond and casuarina trees abundant. Breadfruit, papaya, avocado, citrus, and mango trees are also to be found, together with bananas, plantains, sweet potatoes, pumpkins, watermelon, cantaloup, green and hot peppers, tomatoes, etc.

The Islands themselves contain few indigenous animals, none of which are dangerous. The most common are non-poisonous snakes, iguana, the hickatee (freshwater turtle), and land crabs. Grand Cayman's rare and endangered Blue Iguana can be seen at the Queen Elizabeth II Botanic Park. And there are more than 180 species of birds here, including the Cayman Parrot, Cayman's national bird.

However, beautiful and attractive as the Islands might be in themselves, it is the multitudinous tropical marine life of all kinds in the surrounding waters, especially in Cayman's coral reefs, that entice scuba divers here from all over the world. The underwater landscape here is dominated by the great Cayman Trench, with its famous North Wall, which plunges down to more than 7000 meters. The


PETER SYMES

Caymans

TOP LEFT: Divers photograph the corals at Grand Cayman where large gargonians can be found emerging from the reef


JOHN COLLINS


JOHN COLLINS

BOTTOM LEFT: Yellow-headed jawfish, darts from its burrow to catch passing food

BOTTOM RIGHT: A mug shot of one of the endangered Loggerhead sea turtles raised on a turtle farm by the sea on Grand Cayman Island

CENTER: Orange ball anemone, night dive, Little Cayman

TOP RIGHT: Goby on coral, Little Cayman

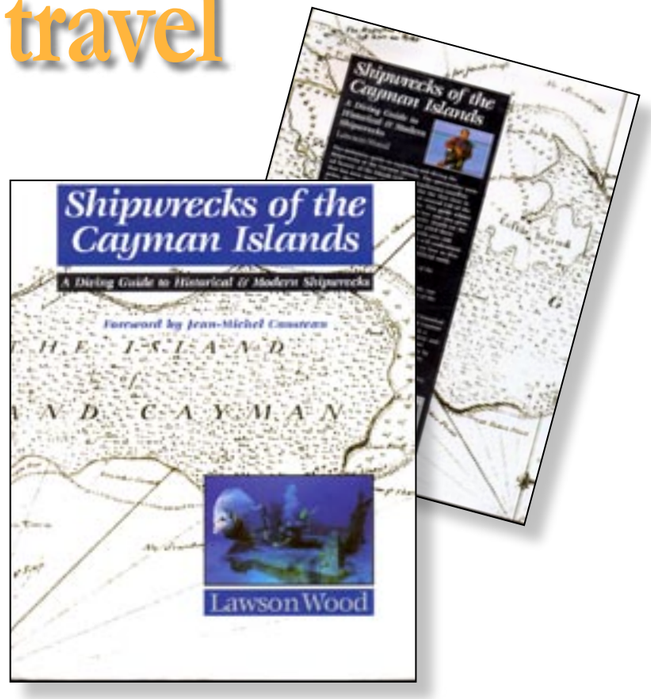

JOHN COLLINS


PETER SYMES

walls of this trench are covered with marine life, including sea fans, barrel sponges and sea whips. And there is also Orange Canyon, at the north end of the West Bay, with its incredible concentration of orange elephant-ear sponges, as well as giant black sea fans. Truly, a super playground for scuba divers. ■

Take Note:

Effective December 31, 2005, all visitors traveling to the Cayman Islands must have a passport, based on the US implementation of the ***Western Hemisphere Travel Initiative***.



World renown underwater photographer and author, Lawson Wood, who is a Fellow of the Royal Geographic Society, the Royal Photographers Society and the British Institute of Professional Photographers, has written two dive guides for adventurous divers who want to explore the reefs of the Cayman Islands:

Shipwrecks of the Cayman Islands

The best guide to diving and exploring the amazine natural beauty of the Cayman Islands. It offers accurate accounts of about 140 of the best-known identified shipwrecks as well as important details about the various types of sailing vessels that have piled up in the area over the last 500 years. A useful reference for any wreck diver interested in exploring the Cayman reefs, it has over 200 photographs and illustrations. Available at Aquapress.
www.aquapress.co.uk

The Dive Sites of the Cayman Islands

A beautifully illustrated guide to over 260 diving and snorkeling sites in the Cayman Seas. It offers ratings of each dive site by island and describes the marine life, depths, access and conditions found there.
www.aquapress.co.uk

The Lost City of Atlantis is Revived on Cayman Brac

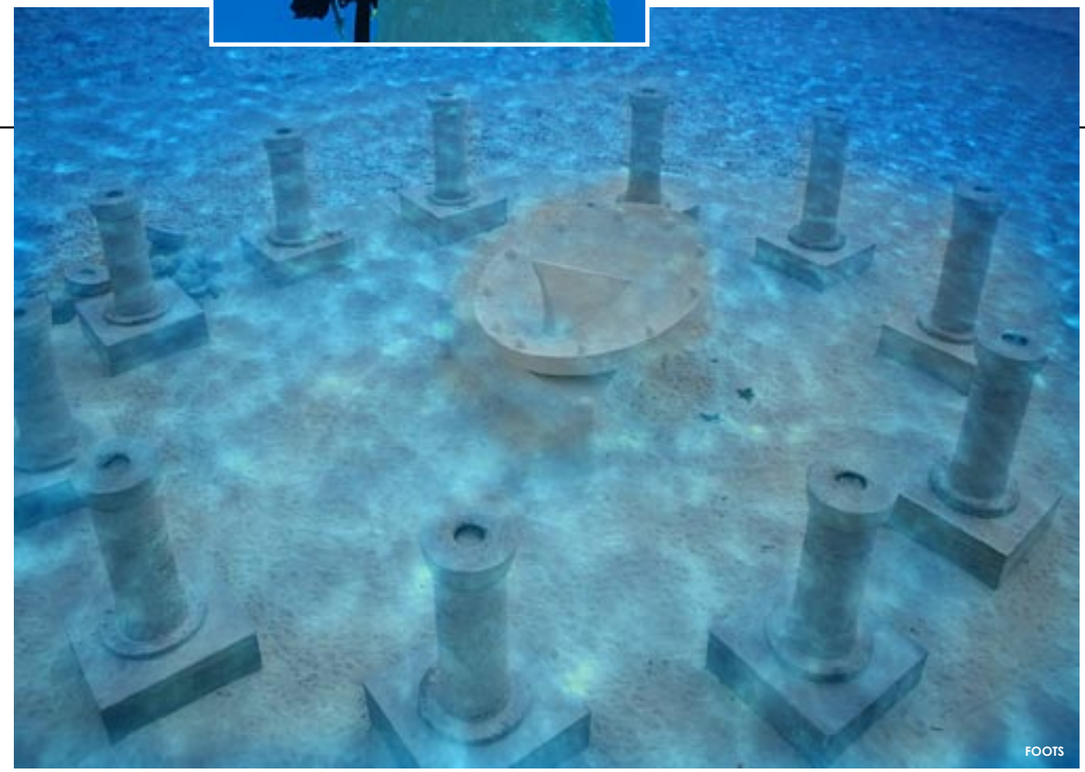
A local artist on Cayman Brac in the Cayman Islands, known simply as *FOOTS* is realising a 40 year-old dream to build the *Lost City of Atlantis* and to have it on permanent underwater display. Now with the full go-ahead from the Department of Tourism and the Department of the Environment, his vision of Atlantis will unfold in the coming months. The first sections were placed underwater off the northern shore of Cayman Brac in the Cayman Islands on July 28th, 2005. Eventually there will be over 100 pieces underwater weighing upwards of 300 tons, constructed on land and placed underwater in a series of phases.

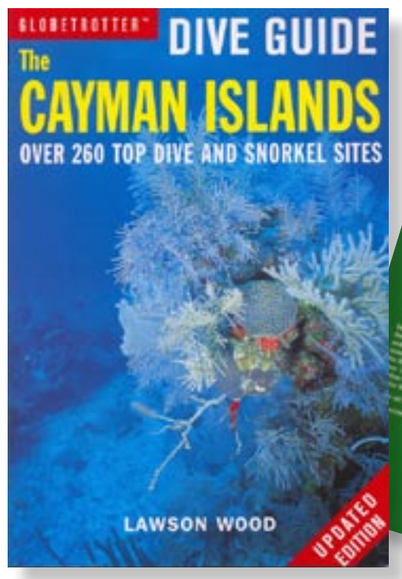
The proposed area is a popular scuba diving and snorkelling location midway along the northern protected shores of Cayman Brac at a site known as Radar Reef off Stake Bay. The Department of Environment have examined the site and have deemed it perfect for a structure of this magnitude. The massive columns are constructed in such a way that they will attract and even aid marine life to adhere to the surfaces, thus advancing the colonisation of natural marine organisms. Each sculpture is set on a massive base, that, should another hurricane come by, their alignment and stature will be minimally impacted by a major storm. Should the columns be knocked over, they are built in such a way that they will anchor themselves to the seabed, thus further protecting the marine environment.

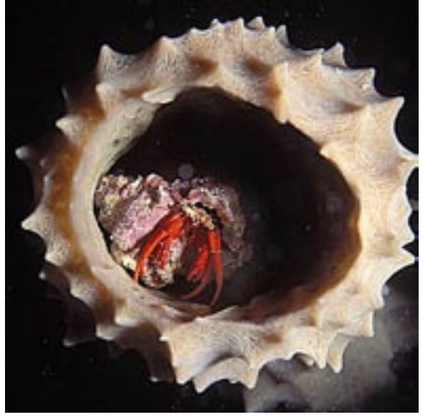
The city will consist of various different types of sculpture including a sundial; variously sized temple columns; a giant archway and a pyramid that will weigh in at over 30,000 pounds. The first phase is now underwater and consists of eleven columns and along with the first of the eleven Elders of Atlantis. Phase two will include the giant archway, more columns and the sundial, they are collectively known as *The Inner Circle of Light*. Once the other ten elders are modelled, they will surround *The Inner Circle of Light*, their closed eyes and clasped hands signifying their long wait for Atlantis to rise again. The models for each of the City Elders will be moulded from life. The Eleven who are deemed worthy will be immortalised by Foots and known as *The Elders of the Lost City of Atlantis*.


FOOTS

The first of these Elders is Lawson Wood, well known to many divers and underwater photographers for his numerous magazine feature articles and dive guides. Lawson has been involved in marine conservation for over 25 years and has written and co-authored over 35 diving related books. He is the founder of the first marine reserve in Scotland and a founding member of the Marine Conservation Society. His wife Lesley said, "It is wonderful for Lawson to be honoured this way, the first statue of him underwater is a testimony to his active life in conservation, protection and promotion of the marine environment". ■


FOOTS





Photographer John Collins takes a look beyond Seven Mile Beach to see what the Caymans have to offer

There is such a choice of quality dive operators and accommodation on Grand Cayman, it is hard to beat. It is a great holiday destination with some fantastic diving. If you venture a little further though, the Cayman islands get even better. I rate the sister islands of Cayman Brac and Little Cayman as the very best diving in the Caribbean. If you have the time and inclination, there is also an unforgettable deep diving experience, unique in the world, aboard the Atlantis Deep Submersible. These are the highlights of the Caymans to me, and should be on your wish-list for a Cayman island trip.

Cayman Sister Islands
Bloody Bay Wall

Text and photos by John Collins

ABOVE: Hermit crab in sponge, Little Cayman

RIGHT: A colourful overhang looks out into the intense blue water of Bloody Bay, Little Cayman

ABOVE: Large sponges are typical of wall dives in Little Cayman's Bloody Bay marine park
LEFT: Sponges, rather than soft corals, dominate wall dives in Little Cayman's Bloody Bay

Sister Islands

The sister islands lie 150 km north-east of Grand Cayman, about half way between the large island and Cuba. They break the surface of the Cayman Trench, the deepest part of the Caribbean, which plunges to 7500 meters. This deep water, coupled with the fact that no rivers run into it, make the underwater visibility particularly good. It can exceed 100 meters: gin-like clarity in vibrant blue water. As they are remote from the main island, they are much quieter. Little Cayman in particular, is an oasis of calm and an ideal get-away for a tired body and mind. Best of all, its Bloody Bay Marine Park is one of the finest diving areas in the world. Year after year, diving publications and their readers award Little Cayman a multitude of *Best of...* awards, from best wall diving, to fish-life, and healthy marine environment. Clearly, this is a very special place.

Most visitors to the sister islands fly to Cayman Brac. It has a bigger airport and a more regular service from Grand Cayman. Little Cayman can be reached by a short boat transfer or by flying into its small airport. There is a choice of fine resorts on both islands for a land-based trip or two

LEFT: Bloody bay wall, a sheer drop-off, covered in corals and sponges
CENTER: Red night shrimp, Little Cayman
RIGHT: Lettuce sea slug, Little Cayman

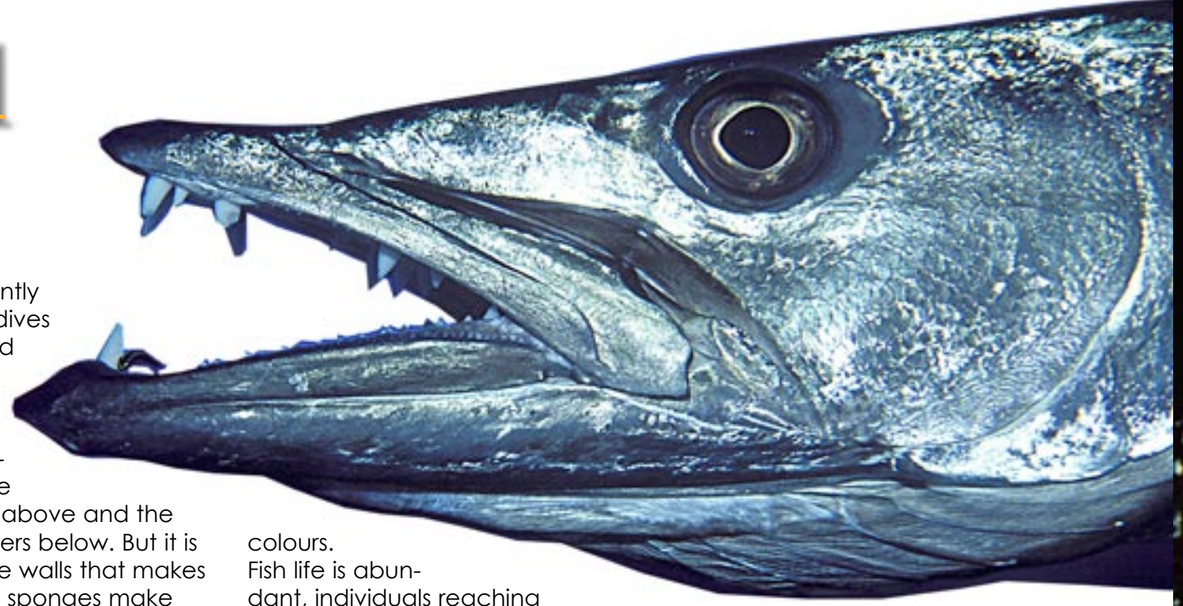
live-aboard options: the Grand Cayman based *Cayman Aggressor*, which includes the sister islands in its itinerary, weather permitting; or *Little Cayman Diver*, a Cayman Brac based boat that spends most of its seven day itinerary at Bloody Bay. I like live-aboard diving and chose this latter boat, and really enjoyed it.

On arrival in Cayman Brac, you are picked up and transferred to the boat. Once settled in, your first dive is on the wreck of a Russian-built frigate, re-named the *Captain Keith Tibbetts* and sunk as an artificial reef in 1996. It was first made safe for divers before a spectacular sinking ceremony gave it a new life on the seabed. The Cayman island authorities bought the 95 meter, 1600 tonne ship from the Russians for $275,000 and carefully sank it in a depth of 25 metres. While the sponges and invertebrate marine life were initially slow to grow, the ship was adopted almost immediately by fish. The bow area and guns are the most striking, though penetrating such a safe wreck is also an option. For those of us who generally do not relish the insides of wrecks, this one is a little more tempting.

Bloody Bay

Bloody Bay Marine Park embodies all of the fine protection measures the Cayman authorities have put in place throughout the islands since 1986. It is regarded very highly by any diver who sees it, and unlike many tropical areas worldwide, many future generations of divers will continue to enjoy it. The regulations protecting the marine parks, replenishment and environmental zones are exemplary. There are permanent moorings to prevent anchor damage at all of the dive sites, and no fishing of any kind is allowed. Divers are briefed and monitored by staff at the dive centres and boats to encourage good diving behaviour.

Typically, a diving day on any of the dive sites along this north shore of Little Cayman will begin with a deep wall dive. There are two walls in the marine park, Bloody Bay wall and Jackson wall. Many of the marked dive sites have a deep cut in the wall, creating a sandy gully which brings you back to the shallow reef at the end of the dive. Spectacular is a word frequently used to describe good dive sites, but here it is truly apt. This is thrilling drop-



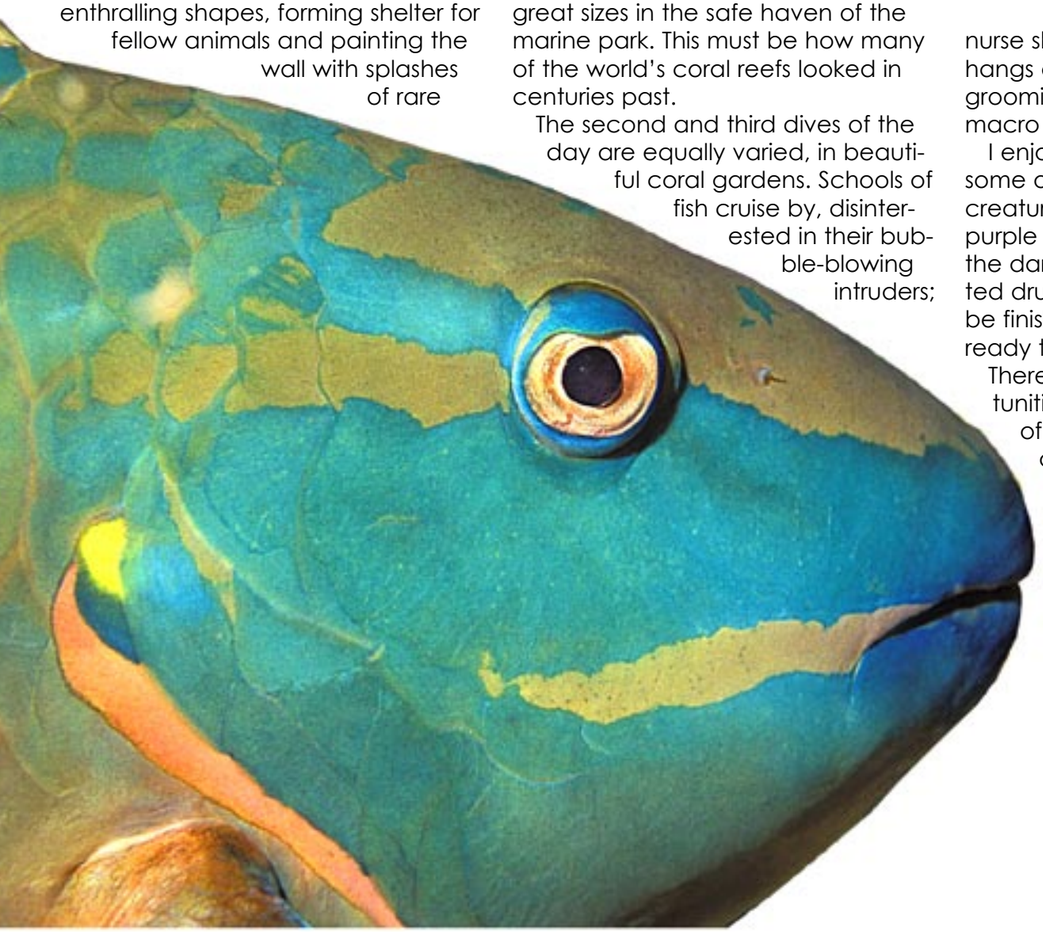
off diving. I frequently paused on these dives to look around and down into the intense blue, neutral buoyancy poising me perfectly between the surface 30 meters above and the sea-bed 1800 meters below. But it is the life along these walls that makes it so special. Huge sponges make enthralling shapes, forming shelter for fellow animals and painting the wall with splashes of rare colours.

Fish life is abundant, individuals reaching great sizes in the safe haven of the marine park. This must be how many of the world's coral reefs looked in centuries past.

The second and third dives of the day are equally varied, in beautiful coral gardens. Schools of fish cruise by, disinterested in their bubble-blowing intruders; nurse sharks snooze under coral overhangs and bigger fish enjoy a little grooming at cleaning stations. This is macro photography heaven.

I enjoyed many long moments with some of the reef's most charming creatures: the delicate ballet of a purple Pedersen's cleaner shrimp or the darting antics of a juvenile spotted drum. Dive and air time will often be finished before you feel you are ready to surface.

There are some night diving opportunities too, one of the advantages of live-aboard diving. Unusual animals are to be seen after dark, like orange-ball anemones and crusteaceans that hide during the day.



ABOVE: Barracuda will often come into shallow reefs for cleaning

TOP RIGHT: Spidercrab in sponge, Little Cayman

BOTTOM RIGHT: Hermit crab, Little Cayman

BOTTOM LEFT:Parrotfish are most approachable on nightdives, when they rest in the reef

TOP LEFT: The stern of the *Kirk Pride*, lost in 1976, now rests on a rock ledge in 240m
TOP CENTER: The bridge of the *Kirk Pride*, the ship's telegraph and chart table still visible inside
TOP RIGHT: The bow area of the *Kirk Pride*, showing anchor windlass equipment

The Deep

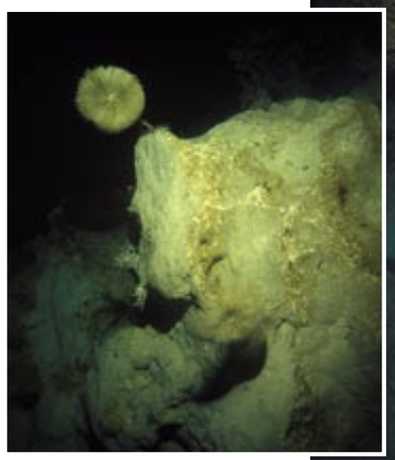
Even if you decide to spend most of your diving time on the sister islands, there are two things you must do on Grand Cayman: the world famous Stingray City and a deep dive aboard the *Atlantis* Deep Submersible. The stingray dive is described elsewhere in this issue and the deep dive is an equally amazing underwater experience: an opportunity to dive in a three person research submersible, 300 metres into the abyss. It is a first-hand deep exploration in the spirit of pioneering dives to our deepest waters. There is even a wreck at 250 meters.

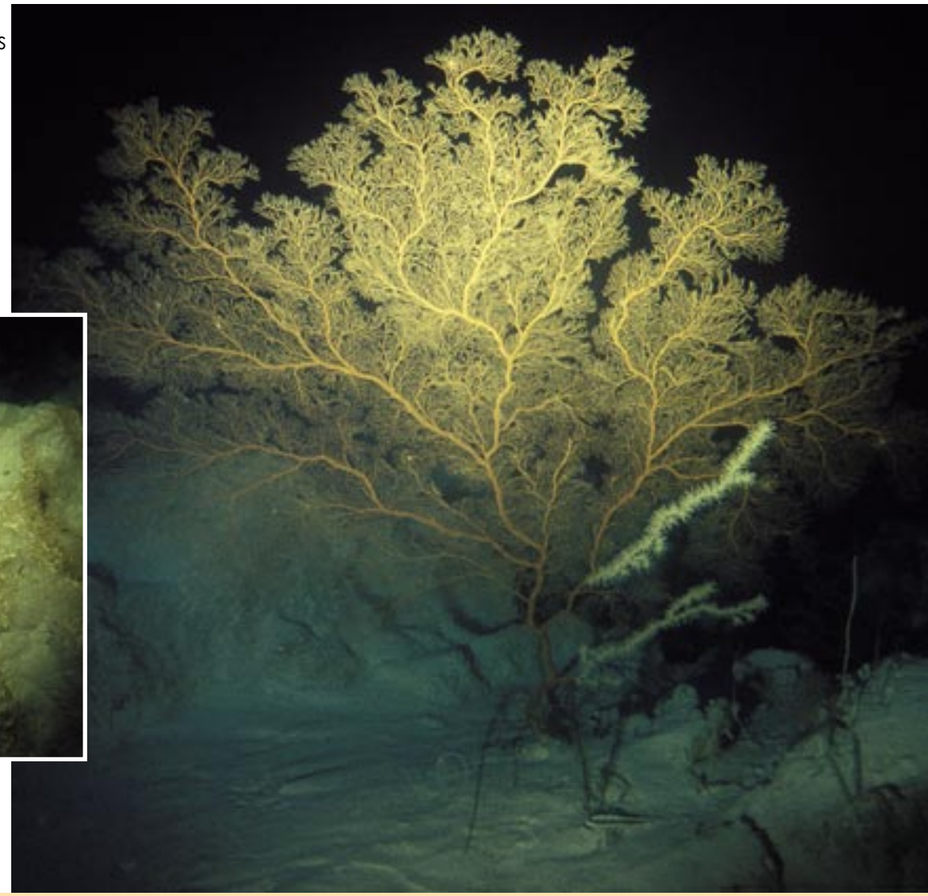
This is not a dive for the claustrophobic. The submersible is small, with room for just two passengers and the pilot. You are even weighed before the dive so that the ballast can be correctly adjusted for the dive. A boat transfer brings you to the dive site, just offshore from Georgetown.

Once aboard, you are seated right in the bow, with a large dome in front giving a panoramic view. The pilot makes his final checks and after a lot of noise and bubbles you are on your way. I really enjoyed the feeling of finally seeing what was beyond diving depths, so tempting on the wall dives earlier in the week.

As the light begins to fade, the blue gradually merges into darkness. More hissing and whirring and we level off, 250 meters down. The pilot turns on the lights and amazingly, there is quite a lot of life, so far down.

Limestone *haystacks* appear like boulders, with stalked anemone-like animals





ABOVE: *Atlantis* Deep Submersible, dives to 1000ft, 300m down the Cayman trench off Georgetown
BOTTOM RIGHT: Giant Gorgonian, over 2m, in 240m, this is one of the largest measured by *National Geographic*
INSET: A stalked anemone on a *haystack*, 250m depth

Caymans

LEFT: Diver investigates the long fronts of a red finger sponge. The walls along Bloody Bay and Jackson wall are sometimes cut, allowing a swim-through back to the top of the reef

TOP RIGHT: Sponge colonies, Little Cayman

BOTTOM RIGHT: Inside the wreck of the Russian frigate, renamed the *Capt Keith Tibbets*, Cayman Brac

perched on their edges. A giant gorgonian sea fan is a remarkable sight, about 1.5 meters across. The pilot maneuvers carefully around it and continues down.

The lights go out for another minute or two as we move through the blackness. Then as the lights go back on, the incredible sight of the stern of a ship appears.

The *Kirk Pride* was lost in a storm in 1976, and is perched on a ledge, as if on display. The rusticles are reminiscent of the first images of *Titanic* when they were shown to the world in 1985. The ship is remarkably well preserved, the bridge area clearly visible, with a collapsed telegraph and chart table on the floor. A few fish move around the bow, mooring ropes and windlasses still intact.

The slow ascent back to the surface allows more time to take in the reef but the deep part of the dive is unforgettable. Due to damage from Hurricane Ivan last year, the deep submersible will not be in operation until November 2005.

The Cayman islands clearly have a lot to offer the diver. The variety of underwater experience is remarkable and the serious protection given to the environment ensures its future. So, whether the luxury and vibrance of the Seven Mile Beach hotels appeals to you, or you prefer quieter sister islands, there are diving adventures in abundance throughout this charming island nation. ■

For more information or to order prints directly from the photographer, please visit:
www.johncollinskinsale.com
For more information about excursions on the Atlantis Deep Submersible, visit:
www.atlantisadventures.com
Little Cayman Diver
www.littlecaymandiver.com
Cayman Aggressor Liveaboard
www.aggressor.com

World Freediving Records

Text by Nancy Easterbrook
Photos courtesy of Divetec at Caymans. Video clips by PerformanceFreediving.com

Thursday, April 14th was the last day for record attempts for Team PFI (Performance Freediving International) off Divetech at Cobalt Coast on Grand Cayman. The event now sees three athletes with four new world records and one national record in the sport of freediving / breath-hold diving.

Freediving or breath-hold diving as a sport is where athletes compete in disciplines involving time, depth and distance with different subcategories in each. The competitive world of freediving emerged in the late 1940's and today is enjoying unprecedented growth and booming popularity with underwater enthusiasts the world over. Although freediving as a sport is relatively new, freediving as a means of sustenance can trace its roots back 4500 years.

Since April 14th, Team PFI has been on Grand Cayman training for a shot at five different world records and one US national record. Mandy-Rae Cruickshank (Canada), Martin Stepanek

Team PFI and Divetec support staff prepare to aid a freediver in a record attempt, Cayman Islands

A freediver returns to the surface from depth

(Czech Republic) and Dr. George 'Doc' Lopez (USA) make up the team with Mandy-Rae and Martin already holding four and five world records respectively prior to the event.

Although the Cayman Islands were damaged by hurricane Ivan September of last year, Team PFI decided to continue with their planning of this years event. "Cayman's infrastructure was more than ready to support the extreme needs of our event from a safety and performance point of view," said Kirk Krack, coach/trainer and organizer of Team PFI. "We're very pleased with the support we've received from the many sponsors and supporters who helped make this event a reality, and without their support and financial assistance, this wouldn't have been possible."

It appears that the sport of scuba diving and freediving alike are getting deeper and deeper with every passing year. Freedivers (breath-hold or apnea divers) are pushing new limits that in prior years would have been thought impossible for a human to attain. This past April in Grand Cayman, Mandy-Rae Cruickshank accomplished a new record to 74 meters in the freediving discipline of *free immersion* (no fins, pulling up and down a line) and Martin Stephanek won the title for the world deepest freediver in the Variable Ballast discipline to 136 meters! (Riding a weighted sled down and kicking back to the surface) And all of this in only a few minutes and on one single breath of air!

Safety strides

As we learn more about the human body and its ability to accomplish incredible feats in the freediving arena, safety and support are also being driven to new limits to figure out how to do all of this in a safe and sound fashion.

In order to provide the best possible support to freedivers, a number of new systems have been devised for safety at these great depths by Performance Free Diving. These are mechanical devise that allow a freediver in trouble several options to get to the surface quickly, including a scuba diver assisted *freediver retrieval system*, a *climbing clamp* that can be snapped onto the line with *pillow-bags* to inflate the freediver and sled and *balanced counter balance*. The key is a fast ascent. The safety divers have their own descent and safety lines to keep them away from the counter line for everyone's safety.

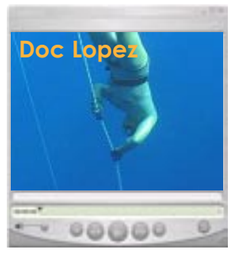
Freedivers enter the water without any scuba tanks, totally bubble free. Then, enters the human factor for the final safety feature — the Closed Circuit Rebreather (CCR) divers.

Closed Circuit divers have the advantage of a number of features that this new technology brings. First of all, there are no bubbles, so vision is unencumbered for the safety divers to be able to monitor the freedivers at all times. In Cayman, with 100 foot -plus visibility, this is a wide range of vision. Then the advantages of a constant PO_2 comes into play by providing a constantly changing mixture of gas to the diver that varies based on their current depth, versus a constant PO_2 as in open circuit diving. This allows CCR divers to stay at depth for much longer times and not even enter decompression.

Along with a myriad of other features, the ability to use a helium based mixture in the CCR with requires an extremely low gas usage, the CCR divers form a huge part of the support and video/documentation team. The safety divers know to give the athletes no more than 10 seconds at the bottom before they deploy the safety ascent bags, that will lift the whole system and the athlete to the surface in case of an emergency.

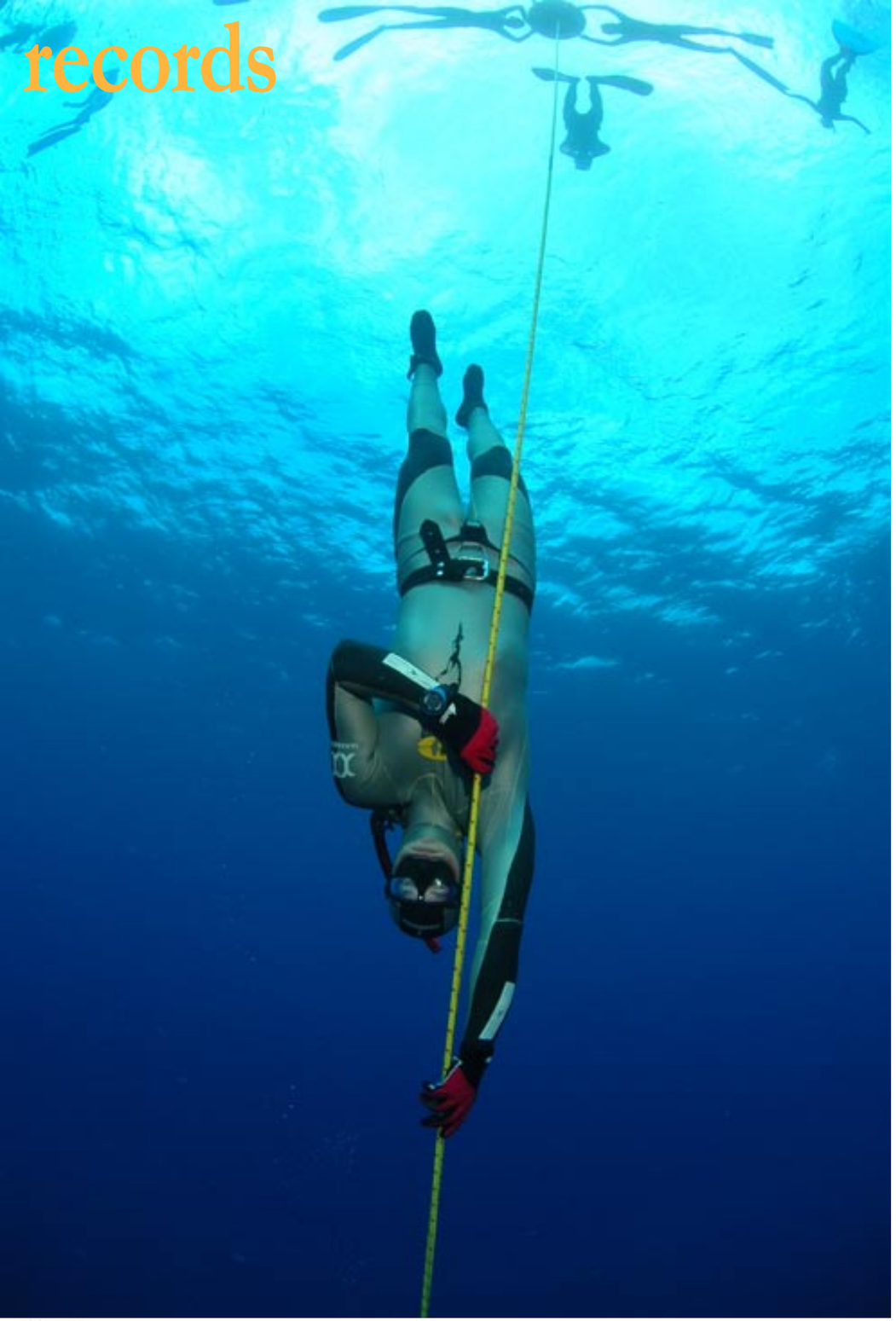
Following over 3 weeks of intensive training, the divers get ready for the world records. After stretching and marking the line, a comprehensive safety and organizational meeting occurs. The athletes, evacuation boats, safety CCR rebreather divers, videographers, photographers, emergency personnel (two paramedics and one doctor), safety freedivers, athletes, schedules, gas blends, run times, emergency protocols, and judges are all coordinated for the world records. Everything, in fact, is done to ensure a safe and successful record day.

"The calculated execution of



◀ Click on the video screen to see clips from the diver's world record attempt.

Links active as of publication



An athlete attempts free immersion where a freediver pulls to and back from depth without fins

the dives is hard work, regardless of the depth. Each of us has our own real and imaginary barriers that we need to chip away at piece by piece. Freediving may seem extreme, but we don't see it that way. Sure, there are calculated risks which we constantly work to evaluate, minimize and/or correct so that in the end we create the most comfortable training environment with the best safety procedures. This is what enables the athletes to perform at their best."

World record events

Divetech at Cobalt Coast Resort has hosted the these world record events for the past 2 years. Divetech offers training in both free diving and technical diving, including CCR's on a year-round basis, as well as training and charters for all divers from beginners to seasoned veterans. The deep, sheer walls of Cayman are only minute's off-shore, with excellent visibility, minimal currents and abundant marine life, providing an environment for all levels of divers to enjoy.

Performance Free Diving trains athletes to be their best in the world of freediving, operating out of Vancouver Canada. Training and clinics are available on a year round basis.

The 2006 World Free Diving Records will be hosted again in Grand Cayman from April 1 - 7th/2006. Packages are available for visitors to come and witness these spectacular events, enquire with Divetech at **divetech@candw.ky** for information. Clinics for everyone will take place for 4 days following the world free diving records.

Mandy-Rae is thirty years old and resides in Vancouver, Canada. Freediving competitively since 2000, Mandy-Rae has now held six world records and currently holds three including the constant ballast world record where an athlete swims to depth and back with fins and retains their ballast. In March 2004 in Grand Cayman, she achieved a depth of 78 m (256 ft) surpassing Tanya Streeter's record of 70 m (230 ft). During this event Mandy-Rae successfully achieved a depth of 50 m (164 ft) in the discipline of constant ballast no-fins where an athletes swims down to and back from depth without fins. In addition, she also set the free immersion world record to 74 m (243 ft) where an athlete pulls to and back from depth without fins.

Joining Mandy-Rae is team member Martin Stepanek of the Czech Republic. Martin is 28 years old and a five-time world record holder now holding four world records also including constant ballast at 103 m (338 ft) surpassing Carlos Costa's record of 102 m (335 ft). In April, Martin successfully achieved a depth of 80 m (264 ft) in constant ballast no-fins breaking the previous record of 66 m (216 ft). The last record attempt of the event was by Martin who reached 136 m (447 ft) in variable ballast previously held by Carlos Coste of Venezuela. Variable ballast has an athlete riding a weighted sled to depth and then fining and pulling back to the surface unassisted.

Partnering with Performance Free Diving International is Dr. George 'Doc' Lopez, CEO of ICU Medical Inc (NASDAQ; ICUI). Doc joined Mandy and Martin in Cayman for his second year and completed a US national record for the United States Apnea Association (USAA). Doc, a highly successful CEO, is also a blue water world record spearfishermen.

Officiating the event was the Association for the International Development of Apnea (AIDA), the world governing body for the sport of freediving. AIDA Level A Judges Bill Stromberg (Sweden) and Nicolas Laporte (Switzerland) were the officials in attendance ratifying the attempts and ensuring the strictest of safety protocols were followed.

Along with ICU Medical Inc, Divetech and Cobalt Coast on Grand Cayman provided diving and accommodations while Danny Kupkowski of Off The Wall Divers provided a daily training boat. Underwater video services were provided by Amphibico Inc of Montreal, Canada. Professional wetsuits furnished by Oceaner Sporting Goods and Yamamoto Corporation. ■

*Daily journals with photos and streaming videos are available at **www.performancefreediving.com**. More information regarding next year's free diving records plase contact **divetech@candw.ky** or visit **www.divetech.com**.*

Can the Cayman Blue Iguana be saved?

Only 25 of them left on Grand Cayman

The blue iguana is found only on Grand Cayman, and DNA evidence suggests it has been around for the past three million years. However, greedy humans and their pets have now so seriously threatened their survival that they are on the brink of extinction. The iguanas do not instinctively recognise dogs and cats, for example, as lethal predators and their first chance to learn is often the last.

In an attempt to save these iguana, a captive breeding programme has been set up in cooperation with the Cayman Islands Department of the Environment. Blue iguanas are hatched and reared for two years, so avoiding the severe mortality that would usually decimate a year's hatch. The blue iguanas are then released back into the wild and radio-tracked as they mature and start breeding. The programme seems to be working, and it seems that it is possible to bring the iguanas back to the numbers required to sustain a viable population. If enough habitat can be protected and maintained free of unnatural predators, including humans, then there is reason to hope the blue iguana will survive.

The blue iguanas are so named because their skin slowly turns from grey to blue throughout the day as the sun shines. ■

Blue Iguana Stamps will be issued by the Cayman Islands National Trust's Iguana Recovery Programme on 18 November. Images taken by Fred Burton show the most endangered iguana in the world, the Grand Cayman Bue Igauna (*Cyclura lewisi*) in its natural habitat. Donations can be made now and stamps can be ordered soon at **www.blueiguana.ky**

Wrecks

The Cayman Islands are home to some spectacular wrecks like this one shot by UK underwater photographer, Julian Calverley. It's the 110 m (330 ft) Russian Frigate #356, which was sunk in 1996 to create an artificial reef and renamed the *MV Capt. Keith Tibbets*. The bow of the ship rests in 110 feet, with its radar tower protruding to within 5 m (15 ft) of the surface.

We will see more of Caverley's work in future issues of X-RAY MAG. But if you want to get a sneak preview of some of his photography now, visit his website at: **www.juliancalverley.com**

The Russian Frigate lies on its side on the ocean floor off of Cayman Brac

InnerSpace

Text by Peter Symes
Photos courtesy of DiveTech

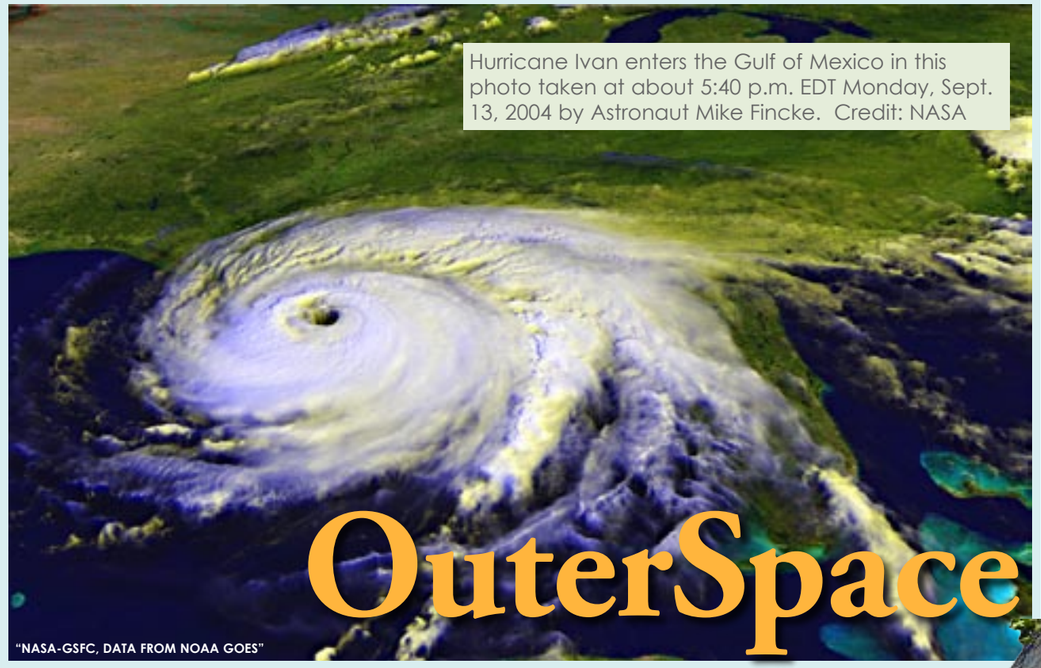
DiveTech and Cobalt Coast Resort is hosted the annual event, *Inner Space*, a closed circuit rebreather diving program for certified CCR divers who want to get certified at the recreational, normoxic or advanced trimix level.

The week-long event offers divers exploration of the deep walls of Cayman, seminars with leaders in the field, new equipment testing and daily live video and photography to take home.

This year's speaker line-up included several top leaders in the field. Tom Mount of IANTD presented comparisons of all CCR's on the market, an intimate look at CCR accidents and how to avoid them as well as cave diving and deeper diving on CCR. Mike Fowler of Silent Diving Systems presented the new Vision Electronics while diving the *Inspiration* and newly released *Evolution* models of CCRs. Lamar Hires of DiveRite introduced features and benefits of the new *O_2ptima* CCR which has just been released. While Leon Scamahorn of InnerSpace Systems Corp. introduced the new *Mini-meg* and demonstrated the use and benefits of the *Megladon* CCR.

Kevin Gurr of Delta P. Technology and Closed Circuit Research introduced the *Orobourus* CCR and the Rebreather Evolution. Ron Micjan of TMIShop.com introduced a CCR conversion kit for *Dolphin* SCR divers. Gordon and Kim Smith of Jetsam Technologies, Ltd., presented the new *Sport KISS* CCR which is a light-weight recreational rebreather developed over the last 2 ½ years. Tomar Gross and Dr Randy Klein of Bubble Seekers LLC presented the new *Nemesis,* which was introduced to recreational divers for the first time at Inner Space.

Doug McKenna of Micropore introduced the Extend Air CO_2 absorbent system. It utilizes easy to use disposable cartridges for various CCRs. Rany Polany of H_2O Audio demonstrated the new underwater MP-3 players as well as download acces from a computer for loading favorite music onto the unit. ■



Hurricane Ivan enters the Gulf of Mexico in this photo taken at about 5:40 p.m. EDT Monday, Sept. 13, 2004 by Astronaut Mike Fincke. Credit: NASA

"NASA-GSFC, DATA FROM NOAA GOES"

OuterSpace

Back to business after Hurricane Ivan

Last Autumn the Cayman Islands were battered pretty badly by Hurricane Ivan, but now the facilities are being rebuilt. Nancy Easterbrook of Divetech writes:

- 40% of accommodations are back on-line and totally refurbished—more coming on-line every month
- 90% of all restaurants open again
- 100% of car rental agencies are open with rental inventory
- Attractions are open or are going to open. Reopenings happen daily
- The reefs are undamaged.

They are even better than ever after Mother Nature did her not so gentle cleaning process. There is truly vibrant marine life—corals and all are intact, even in the shallows. We have whips, seafans, soft corals and the like. Reports from divers coming since we officially re-opened Nov. 20th have all been wonderful. Cayman is practically brand new for everything that is open, and cleanup has been done everywhere. As of the end of May, there were still some facilities under construction, roofs being repaired, but then again, when is there ever not any construction going on?

"It's welcome back - we're open for business and want divers"

The vegetation is coming back, the bougainvillea is blooming, but we are missing larger tress, etc. There are some empty lots with foliage down in them that will be tackled in the not too distant future Signage, welcome signs, markers, etc., are all being replaced.

Cayman has very strongly recognized the value of tourism and customer services levels are at an all time high. ■

Coral Spawning in the Caymans

A large Star coral releasing bundles of eggs and sperm

Text and photos
by Alex Mustard, PhD

Mass coral spawning is one of the most spectacular sights in the ocean – a moment when the whole reef explodes into effervescent life. It is also one of the most illusive; the majority of corals only spawn once a year, at night, and the whole show is done and dusted in less than 15 minutes. Waiting for it can feel like torture, but time it right and it can be one of the best experiences of your life.

It was a night dive just like the many others I have enjoyed on the reefs of Grand Cayman's East End. That was the problem. This wasn't supposed to be just another night dive. I glanced down at my dive computer. I had been in the water for 15 minutes. But in truth, this dive

Coral Spawning

ABOVE: A sequence of images showing Star coral spawning
LEFT: A diver watches a female gorgonian releasing white eggs

had started long before my giant stride off the boat, when I made a leap of faith that led to me buying plane tickets and flying across an ocean to be right here, right now. A bright blue octopus out hunting caught my eye, I ignored it and I stared again at the lump of coral in front of me. "Come on! Come ON!" Nothing. 21 minutes.

23 minutes. I was expecting to see the first signs of spawning ten minutes ago and as each minute passed it became more likely that tonight was not the night. Coral spawning predictions are best guesses based on experience, and despite a US University expedition nobody had ever seen mass spawning in Grand Cayman before. In the hustle of the last hour of loading the boat, kitting up and jumping in, I had forgotten how much the odds were stacked against us, but now those thoughts returned and my stomach felt hollow. I had staked time, effort and money on being here. Maybe we were to late? Maybe the corals had spawned earlier in the evening? Maybe they had spawned yesterday? Maybe they had spawned a month earlier, along with corals from Florida to Puerto Rico? Maybe they just don't spawn in Cayman? I looked at my computer again. Still 23 minutes!

Our target species for this night were Elkhorn and Staghorn corals; species that were once widespread in the Caribbean, but were decimated during the 1980s by white band disease. In many areas both species are now extinct, but on the East End of Grand Cayman you have the chance to dive back in time and see them in their glory. 26 minutes. I was now feeling guilty for dragging my buddy into the water. Steve Broadbelt is the co-owner of Ocean Frontiers dive centre and like me has a keen interest in marine life, something that is clearly reflected in how his dive centre operates. Steve had been trying to see coral spawning for many years, and I had been bullish about our chances to persuade him to try again. We were optimistic when we left the dock, Steve noting of the conditions "Only rarely does it get so glassy calm out here, it's as if Mother Nature knows that tonight's the night."

I was less confident. Steve was on the other side of the reef spur, which was silhouetted by his light. The moon was yet to rise and we had chosen weak torches so as not to put the corals off. The water was inky black and blood hot. It was claustrophobic and uncomfortable, like wearing a suit that is too thick at a summer wedding. I wasn't relaxed and I tried to concentrate on the coral.

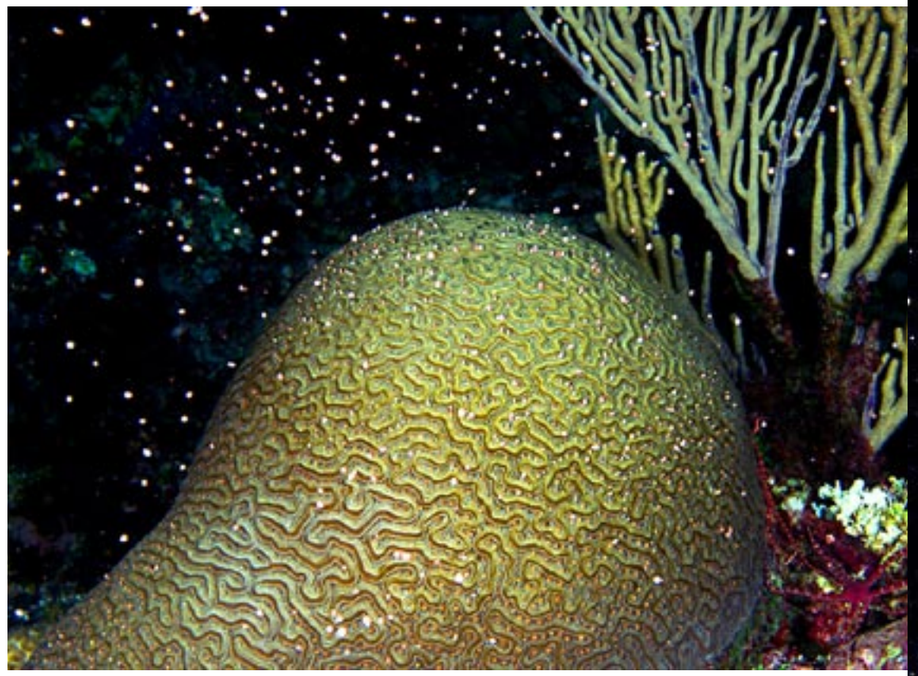
Suddenly the Staghorn coral looked different. Perhaps I had been staring at it for so long that my eyes were inventing new patterns. I screwed up my eyes, blinked, and stared again. As I inched closer I could see the shape of the polyps was subtly, but definitely changing, as beige bundles a few millimetres across were beginning to dome up

from within the polyps. I raced to over to Steve, flapping frantically to get his attention and dragged him back to the coral. I could now see the change from several metres away - even the colour of the colony was different. Staghorn, like most corals, is a hermaphrodite, being both male a female at the same time and these bundles were made up of eggs laced together with sperm. I checked the next colony and the next, now everywhere I looked Staghorn coral was preparing to spawn.

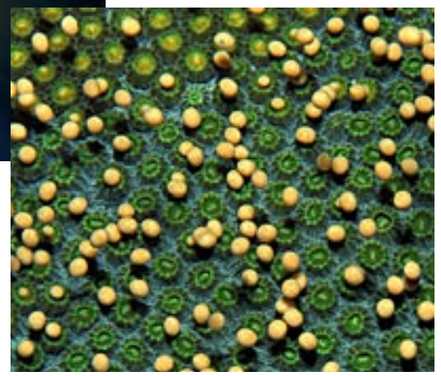
Steve and I exchanged perhaps the most cheerful OK signs ever made and a few less traditional underwater gestures that indicated spawning was definitely on! About 15 minutes later the bundles started to burst free. The buoyant fat filled eggs slowly pulling themselves away from the spiky branches of the Staghorn. Within a couple of minutes there was a steady stream of bundles rising from colonies across the reef. It was like diving in a glass of Champagne, the bundles looking just like tiny bubbles. They made an intoxicating sight.

I'm sure that you know what happens if you smile while you are diving? As the corners of your mouth go up, your cheeks rise, your mask no longer fits and water gushes in and rushes straight up your nose. Well, just at this moment I really did not care. Although I was now coughing water out of my regulator, nothing could dampen my spirits. Steve and I finned around with the joy and disbelief of children running in snow for the first time. All around us coral bundles were heading to the surface, where they would break open so eggs could be fertilized by the sperm from other colonies and start the next generation of Staghorn coral. And with a bit of luck help drag this species back from the brink.

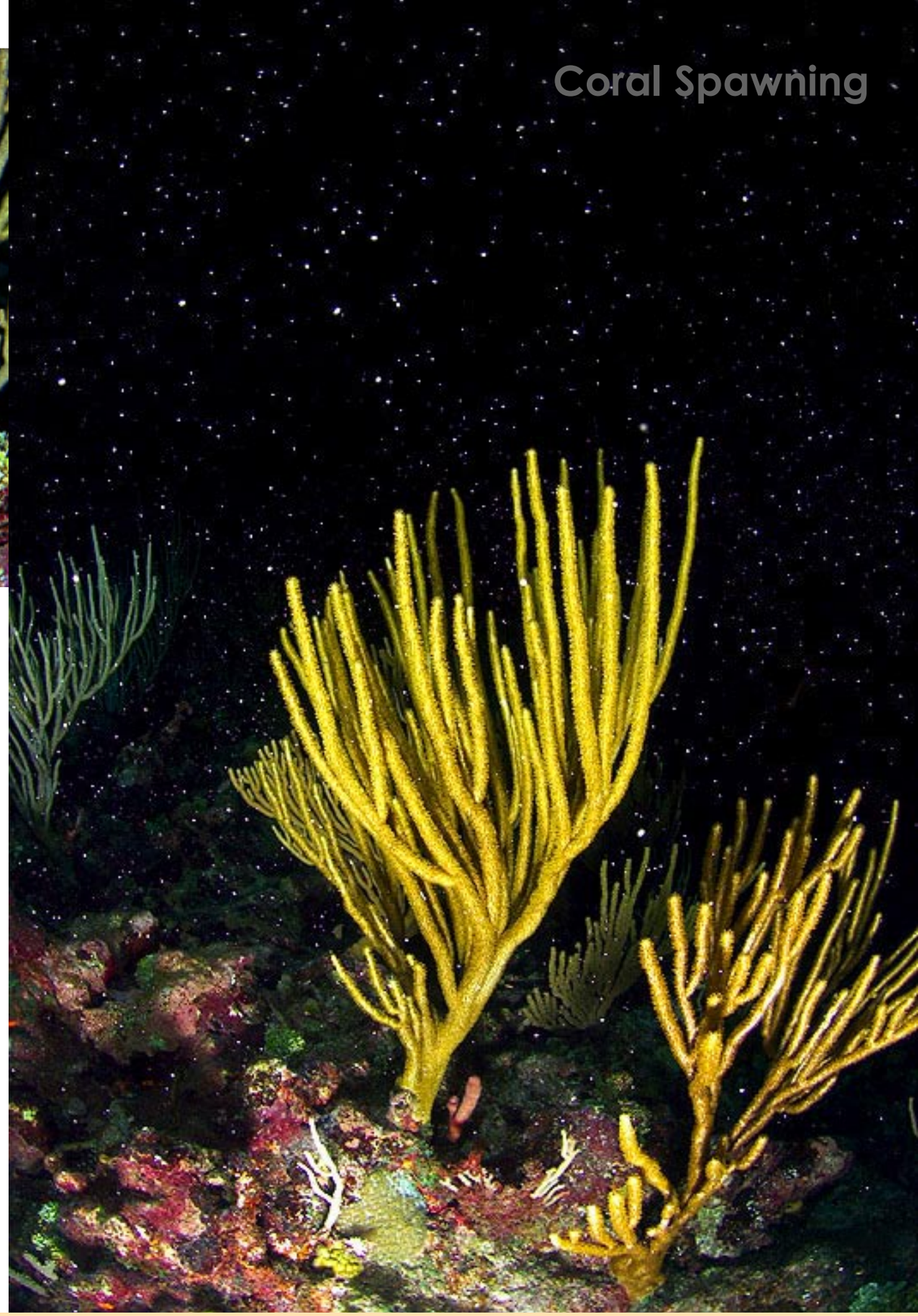
The end of the dive came all to quickly, as I glanced down and saw the needle on my air gauge buried in the red. Excitement has meant that I have gulped through my air, but as I finned slowly back to the boat I knew that I would never look at coral reefs the same way again.



Bundles of eggs and sperm float up from a spawning Brain coral



ABOVE: A female Giant Star coral releases a cloud of eggs
RIGHT: Bundles of eggs and sperm momentarily float above the surface of this Star coral before drifting away



The water column is filled with the small white eggs of gorgonians

Coral Spawning

LEFT: Steve Broadbelt watches bundles rise from a spawning colony of Elkhorn coral

RIGHT: The frenetic spawning activity across a section of the reef

Since that first encounter I have made six more successful coral spawning dives in Grand Cayman and have never had a no show. While that first experience with the Staghorn will always remain special some of the other species are far more spectacular. So far in Cayman we have seen at least 10 coral species spawning.

Coral spawning makes particularly addictive viewing because most of the different coral species have quite distinct spawning behaviours. Star coral is Cayman's most stellar performer because not only is it the most abundant with some colonies as large as barn doors, but also whole colonies tend to spawning in one go, releasing all their bundles in waves that spread across the surface of the colony like a blush. The intensity of spawning can be shocking, and this blizzard of eggs and sperm can cause the visibility to tumble from about 25m to about 5m in about 2 minutes. On one dive I even lost the dive boat! Just after the Star coral, the Brain coral usually goes, which usually attracts hordes of deep red brittlestars that clamber up on top of the colony and try to catch the bundles as they are released.

Giant Star coral is quite different. Unlike regular Star coral the colonies of the Giant variety are either male or female. Furthermore they do not release bundles, but instead the male colonies squirt out streams of sperm, while the females explode with a dense cloud of eggs. Gorgonians have separate sexes too and are very plentiful at the East End of Grand Cayman. Although not that much is know about their reproduction we have found out that it coincides with the hard corals and is a much longer event. Female gorgonians release their small white eggs in a steady stream over several hours filling the water column with a million white specks that wash back and forth with the waves. Before they float free the white eggs often get tangled up in the polyps, its an amusing sight as the gorgonian looks like it is suffering from a nasty case of dandruff!

So many underwater experiences are there ready and waiting for us whenever we choose to dive. Coral spawning is so different – for once we must dive to nature's rhythm to catch the show. Mass coral spawning is still a recent discovery, the world had watched Spielberg's E.T. before even scientists knew how corals reproduced. And to this day each spawning dive is filled with anticipation and uncertainty. But for me the angst is very much part of the experience. We live in a "now-culture" world where food is fast and we can find just about anything we want in a few clicks of a mouse. Coral spawning is a refreshing reminder that we cannot always have what we want exactly when we want it. I, for one, would not have it any other way. ■

These amazing photos were taken by Dr Alex Mustard who will be featured in our next issue's portfolio section due out in August 2005. To order prints of the photographer's images, visit: ***www.amustard.com***

For more information about the coral spawning excursion by Ocean Frontiers, visit: ***www.oceanfrontiers.com***

Cayman Rays

The sleek lines of the stingray enhances its graceful and ghostly movements over the sandy floor of the Grand Cayman Island shallows

Text and photos by John Collins

Stingray City, the ace in Grand Cayman's hand, is arguably the world's most popular dive site, and the graceful wild animals that live there attract hundreds of divers every day.

This site, and the nearby sand bar, both on the north shore of Grand Cayman, are home to more than 200 southern stingrays. These bottom feeders were first attracted by the local fisherman, cleaning their catches in sheltered waters before heading ashore to market.

Cayman waters are home to five species of rays, the southern stingray being the most famous. Fully grown specimens measure 1 to 1.5 m across, and they can sting using the strong barbs in their tails. The barbs face backwards yet can sting in any direction.

The rays appear totally unafraid of humans, and will envelope and almost harass divers as soon as they enter the water. They seem to have learned that as divers tend to carry food, if they distract them they will get a free meal more easily.

This is why it is best not to wear a snorkel, because the cunning stingray knows that if it knocks it, the divers mask will flood and the food will be discarded by the diver while the mask is being cleared! Stingrays one, divers nil.

Similarly, the rays have learned that divers without suits make easy targets. The rays do not have teeth, but a series of rasping plates that they use to crush the shellfish on which they nor-

A diver shares a playful moment with a friendly local at Stingray City

At 45 cm, the shy yellow stingray is the smallest of the Cayman rays

Cayman Rays

mally feed. With their powerful sucking action they can give exposed skin a nasty *hicky* that can bleed and be sore. This is all part of the game of interacting with these resourceful animals. The diver on the receiving end of such a kiss quickly surrenders the food - stingrays 2, divers nil !

An array of rays

Southern stingrays are the most commonly seen rays in the wild throughout the Caymans. They're generally spotted swimming gracefully over the coral or foraging for food in the sand. Here, they are almost always seen with a barjack. He waits for the ray to dig up the sand for food and darts in, getting an easy meal before the ray gets everything.

Of the other rays in Cayman waters, the Manta ray is more likely to be seen off Bloody Bay Wall in Little Cayman. A few years ago, a friendly female was a regular nightly visitor to a dive site called the meadows. Here, Molly, as she has became known, would perform barrel rolls as she fed on the plankton and krill attracted to the divers' torches.

The spotted eagle ray is also regularly seen on Bloody Bay Wall. This large elusive ray has the same graceful flight as the manta and may initially be mistaken for one. Eagle rays have snouts, not unlike a pigs, which they use to dig and forage in the sand for their diet of crustaceans and mollusks. However, they tend to be wary of divers and will swim away showing the spotted pattern on their back.

The electric or torpedo ray is much smaller and a rare sight for divers. This ray has a rounded body and electric organs that it uses to stun its prey. These can generate up to 220 volts, more than many a Red Sea liveaboard!

Finally, the yellow stingray is the baby of the Cayman rays. At a maximum of only 45 cm, this circular Ray will often be seen resting under coral outcrops when it is not feeding. It has a venomous spines at the end of its strong tail, and so, probably packs the punch of a heavyweight despite its small size.

While the rays of Stingray City get plenty of free meals from divers and snorkelers, there are potential dangers in the interaction. The stingray is dangerous only if trodden on or caught when it can thrash out and sting, causing serious lacerations. The danger for the stingray may be more serious as divers wearing gloves can remove the protective mucus from the fish's skin, allowing infections to develop, which can be fatal. Close encounters with these large, inquisitive and fearless animals is an interaction replete with excitement and fun for divers and snorkelers, and a great opportunity to learn about their world. ■

LEFT: A diver pets one of the large female stingrays at Stingray City off Grand Cayman Island

RIGHT: Southern stingray with a buddy barjack, an opportunist who waits nearby to snatch food the ray digs up

fact file

Cayman Islands

Map of the Cayman Islands

History During the 18th and 19th centuries, the Cayman Islands were colonized by the British from Jamaica. Since 1863, the islands have been administered by Jamaica. When Jamaica became independent in 1962, the islands remained a British dependency. They lie at an important location between Central America and Cuba. Government: British crown colony as overseas territory of the UK

Geography An island group in the Caribbean Sea, almost one-half of the distance from Cuba to Honduras; Area: 262 sq km; Coastline: 160 km; Terrain: low-lying limestone base surrounded by coral reefs; Elevation: lowest point: Caribbean Sea 0 m, highest point: The Bluff 43 m; Natural resources: fish, climate and beaches that entice tourism; Natural hazards: hurricanes (July to November)

Capital George Town

Climate Tropical marine; warm, rainy summers (May to October) and cool, relatively dry winters (November to April)

Population 44,270 (July 2005 est.); Ethinic groups: mixed 40%, white 20%, black 20%, expatriates of various ethnic groups 20%; Religions: United Church (Presbyterian and Congregational), Anglican, Baptist, Church of God, other Protestant, Roman Catholic

Economy The islands are a thriving offshore financial center since there is no direct taxation. As of 1998, more than 40,000 companies were registered in the Cayman Islands including nearly 600 banks and trust companies; banking assets exceed $500 billion. In 1997, a stock exchange was opened. Tourism is also a primary source of income, making up about 70% of GDP and 75% of foreign currency earnings. The tourist industry targets the luxury market and mainly serves visitors from North America. In 1997, total tourist arrivals were over 1.2 million, with 600,000 from the US. About 90% of the islands' food and consumer goods are imported. The Caymanians enjoy one of the highest standards of living in the world and one of the highest outputs per capital. Agriculture: vegetables, fruit; livestock, turtle farming; Industries: tourism, banking, insurance and finance, construction, construction materials, furniture

Currency Caymanian dollar (KYD); Exchange rate: 1 KYD = 1.21250 USD / 0.946672 EUR

Language English

Web sites

Cayman Islands Tourism
www.caymanislands.ky
Sister Islands Tourism Association
www.sisterislands.com
Cayman Brac
www.caymanbrac.com
Cayman Web World
cayman.com.ky
Dive Cayman
www.divecayman.ky
Atlantis Adventures Grand Cayman
www.atlantisadventures.com

Dive Operators

DiveTech
www.divetech.com
Ocean Frontiers
www.oceanfrontiers.com
Little Cayman Diver
www.littlecaymandiver.com
Cayman Aggressor Liveaboarc
www.aggressor.com ■

Edited by
Andrey Bizuykin
& Peter Symes

THE FACTS AND VIEWPOINTS IN THIS SECTION ARE NOT NECESSARILY THE VIEWS OF X-RAY MAG. EQUIPMENT PRESENTED IN THIS SECTION HAS NOT BEEN TESTED BY X-RAY MAG STAFF, NOR ARE THE ITEMS WARRANTED, INFORMATION PROVIDED IS CONDENSED FROM MANUFACTURERS DESCRIPTIONS. TEXTS ARE USUALLY EDITED FOR LENGTH, CLARITY AND STYLE LINKS ACTIVE AT THE TIME OF PUBLICATIONS

POINT & CLICK
ON BOLD LINKS

New & Interesting

Equipment

Any colour you like

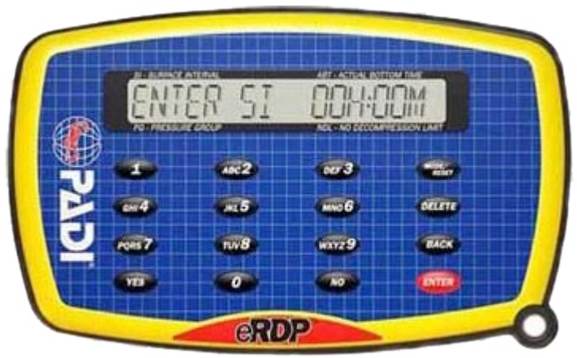
Zeagle cut and sew BCDs in their own Florida factory, so now can custom make your BCD to your order. This picture shows how colourful and customized the Ranger, their most popular BC, can be made to look. Each of the fabric panels can be ordered in a custom colour, enabling an almost endless number of pattern combinations. Have it in your company colours, or make the instructors stand out.
www.zeagle.com

Extreme Pen

InkaTM is a precision-crafted all-weather, compact pen engineered to perform in extreme environments. It writes underwater, at any angle, temperature and altitude. It has a sleek, lightweight, stainless steel cylindrical design and pressurized ink cartridge. The pen can be used by the outdoor enthusiast – from pilot to scuba diver, mountain climber to fisherman. Inka's innovative design enables it to change from a quick-use pen to full-size writing tool. Inka's key-ring can easily and securely attach to gear or clothing. Inka has a lifetime warranty and is made in the US. Refills are available. **www.inkastore.com**

Compact Oxygen Boosters

Hydraulics International's Rebreather Booster for Dive Shops and Dive Boat Owners ensures full 2400-3450 psi (166-238 Bar) rebreather bottle fills even if the oxygen supply drops below 500-psi (34 Bar). It weighs only 9.5-lbs. The unit is compact, manually operated by means of its integral hand pump assembly, air driven by means of a low-pressure conventional air compressor and uses less than 4-cfm @ 90-psi of air. It is HP gas driven by means of a Regulated high-Pressure air storage supply (SCBA bottles). USD 1599
www.hiinet.com



E-Dive Table

The PADI eRDP is an electronic version of the good ol' RDP dive table that will calculate your dive profiles just as the old plastic did, but with lots of new features and benefits including auto shut off, three modes, dive planning, minimum surface interval planning, maximum depth planning, five consecutive dive plans, warnings and reminders, metric and Imperial options, plastic ring for slate, splash proof, convenient pocket size for carrying in a dive bag or pocket. It is user friendly, easy to navigate with no need for paper/pencil. £14.89 plus VAT. **www.padi.com**

Regulator with side exhaust

This side exhaust regulator model puts the entry and exhaust points on the same side, leaving one side free of bubbles and obstruction. The first stage automatically compensates for depth changes (without lube or grease) without letting water or debris enter, thus reducing the chance of freezing or fouling. It is available as yoke or DIN by 5-port or hammerhead swivel. With an optional conversion kit, this regulator can be converted from side to bottom exhaust, or vice-versa. The hose can be connected on either side with the bottom exhaust configuration. Available in brass, monel, and titanium.
www.dynamodiving.com

Environmental and Microbubble Cognizant (EMC) Computer

The new Cochran EMC model has improved Touch Contact Programming method. A Lithium battery is used for improved reliability and longer battery life (but one can still use Alkaline). The new EMC-20H is capable of three automatic gas switches. Its depth has been extended to 130 meters.

www.divecochran.com

Fast Attachments

This Gear Keeper Low Force Retractor provides a convenient and secure attachment system for divers. It is ideal for small items that need to be tethered underwater. This retractor can't pull tools out of your hands. Divers can be streamlined with gear right where they need it. The recommended use of the unit is for securing knives where a high retraction force could be dangerous. The unit's Snap Clip attaches to a D-ring. It is built to last and designed to survive extended salt water and chlorine exposure. Sand and debris are flushed from the unit when operated in water. Made in the USA, it is backed by a full manufacturer's warranty. Snap Clip Model RT2- 0040, USD 19.99.

www.gearkeeper.com

Multi-Battery tester

This small 3 oz battery tester tests AA, AAA, C, D, NIMH, NiCd, alkaline, 3v photo lithium, or 9v batteries under load. Using a 2-second pulse load test, it computes the remaining power capacity. Now, you'll know whether charging in a foreign country has charged your batteries to full capacity or how much power is left in your alkaline batteries. Runs on 4 AAA batteries. USD 29.50 plus shipping. **www.ulcs.com**

Seatrend shorty from SeacSub

This 3mm shorty is especially suitable for diving in warm waters and in swimming pools. Arm and leg toroidal ring seals, diagonal back zipper and anatomic cut ensure perfect wearability. The outer lining is made of nylon and fine mesh and the inner lining is made of nylon. Available in sizes from XS to XL, it is a practical and easy to wear suit.

www.seacsub.com

Flexi Fun Star

The latest Green Force divetorch and is composed of the 'Flexi Fun' batterypack and the 'Star' lighthead. Due to the universal Green Force connection and the 'easy-to-replace' AA batteries, the Flexi Fun Star is not only great for starters, but is also a handy travelling companion. The 'Star' lighthead contains a 3 Watt LED which has an output equivalent to 25 Watt. In combination with the 'Flexi Fun', this lighthead garanties a burntime of 16 hours.

www.green-force.com

Knife news

Riffe Silencer Knife has a self locking sheath, 1/2" serrated Teflon coated blade design, remarkable cable cutting capabilities and easy one-hand removal. A tool is built in at the end of the black and grey soft-grip handle for removing shafts wedged in rocks. It can also be used as a banger to attract the attention of other divers or fish. Rubber leg straps are included.

www.speargun.com

Text and photos
by **Edwin Marcow**

Electroreceptivity of Sharks

ILLUSTRATION COURTESY OF FIONA'S SHARK MANIA
WWW.OCEANSTAR.COM

Gansbaai, South Africa, Great White shark capital of the world

Bang…. we did not see it coming…Blinded by the sun, a large four-and-a-half meter Great White shark crashed into the side of the submerged cage moored alongside our boat. Topside, it was cool but sunny with blue skies, although our noses dripped continually from the sea air. We dare not talk, scratch, wipe our noses, or do anything other than concentrate on the seal decoy, which, along with the un-hooked bait, took an almighty pounding every few minutes.

Concentrating on the un-hooked bait, why did the shark investigate an empty cage? It has long been an accepted opinion that, when a Great White shark, or any shark for that matter, attacks, bites, or merely interacts with metal objects in the water, it is simply a question of sensory overload. The shark detects the bait by smell and by sight, and also by detecting electric fields. In a hunting mode it would most probably utilise these senses in the order given. Just prior to mouthing the object of interest, for example bait in the water, the shark will roll its eyes backwards and the nictitating membrane will cover the eyes.

It is at this stage that the shark hunts totally by its electroreceptivity. Some people believe that the shark can, in fact, only hunt with just a single sense activated. With this highly sensitive sensory organ employed the cage, or any other metal object, will produce far higher levels of sensory input than a seal carcass or shark liver, which is a particular delicacy to these sharks. Tricked and confused, the shark bites and mouths any metal object. To the uninitiated, predominately the non-diving community, comments range from "this man eater is even trying to sink the boat to get to us" to "stupid dumb animal."

Nibbling to know

In the case of the Great White shark some disagree with this hypothesis. For example, Andre Hartman, an acclaimed shark behaviourist, believes that this shark bites and mouths metal objects because the shark is investigating the object, be it the boat, cage, props, etc., floating on the water. A good example of this is when the bait is floating on the surface of the water, with its all prevading odour. Any person sitting on the boat will cast a shadow or reflection down onto the water. This shadow or reflection will lie parallel to the surface of the water, even though the person is sitting vertically. The shark will see this shape and colour, and will attempt to mouth this 'floating' reflection. In a recent documentary production, a large Great White shark approached the boat, between the props, ignoring the cage, boat and any metal object raised out of the water, and mouthed the cameraman's video-lens. The shark was investigating its own reflection, and ignoring objects producing significant electric fields. This biting and mouthing of props, cage and even the bow, has been seen many times. This behaviour appears to be quite complex but there may be a surprisingly simple answer.

The shark views the boat in the water as it would a large dead whale carcass. The mouthing and biting of the props and cage is not due to external electric fields but is like when a shark starts biting the fins or any extremities of a large whale carcass, floating motionless in the surface of the water. The boat is viewed in the same manner. The shark is asking itself where it can start eating this object. This is borne out by the fact that Great White sharks will often bite and mouth the bow of a boat even though there are no electric fields present there.

However, I believe the truth lies somewhere between these two hypotheses. For it is absolutely certain that sharks do have this

shark tales

extraordinary sensitivity to electromagnetic fields. This sensitivity is made possible by the ampullae of Lorenzini, named after the 17th Century Italian anatomist, Stefano Lorenzini who made his discovery in 1678. These ampullae are located around the head of the shark and its snout, and there can be as many as 2052 in the Bull Shark. Shaped like small round flasks connected to the sharks lateral line, they are joined to the surface of the skin by a tube filled with a conductive jelly of mucopolysaccharides which surrounds a bundle of modified hair cells. These hair cells are receptive to local changes in electrical polarity which then trigger the release of neurotransmitters. These then inform the brain of the electric fields present in the water outside the shark.

Recent research at the Scripps Institute of Oceanography has shown that the elasmobranches, to which the sharks belong, can detect extremely small voltages. It has been shown, in fact, that sharks respond to electric fields as low as a 10-8 volt cm^{-1}. This is equivalent to the electric field produced by a torch battery connected to electrodes spaced 16000 kilometers apart in the ocean. Thus some shark species are able to detect electrical activity down to $5x10^{-9}$ volt at a distance of up to about 30 cm. To put this into perspective, the movement of a the gill-cover of a plaice will generate an electrical signal 5 million times greater than the minimum threshold of detection for an elasmobranch. The electrical charge, however, tends to dissipate readily in sea water which means that the ampullae of Lorenzini are only accurate to a distance of 20-30 cm from an object.

Electrical fields

It is a fact that all marine organisms, however small, generate an electric field. This includes fish hiding in the sea floor, and sharks of all species use this to their advantage. A good example is given in a recent study of hammerhead pups at the Hawaii Institute of Marine Biology. An electric field source placed in the seabed would be attacked immediately after being switched on, and then, when it was switched off the hammerhead pups would swim idly by.

Perhaps this great ability to detect electric fields can provide the answer to some of our own problems. A fascinating example is a little known problem faced by oil companies. In the exploration of new oil fields many kilometers of cables are placed with an array of sensors and sonar devices that map the geology of the ocean floor. The problem is that sharks attack these cables and sensors, causing damage running into millions of dollars. Can, therefore, an electrical field be found that is repellent to sharks?

The navigation abilities of sharks

Can sharks detect the earth's own magnetic field and thereby use it to navigate the oceans? Can they use this underwater super highway, which is full of information that we are unable to decipher? One idea is that the ampullae of Lorenzini may act as a very accurate electromagnetic compass. The dusky smoothound shark, for example, regularly migrates southward for the winter months, from the waters of Cape Cod, Massachusetts. They must be endowed with an excellent sense of direction, for how else could they arrive every year at the same location? It is thought that sharks can detect the local geomagnetic signature of the sea-bed, thus enabling it to navigate tremendous distances. The smooth dog-fish, for one, can detect a change in direction of electric field intensity of 5×10^{-9} volt cm^{-1}.

The Shark Pod

By sampling the information coming from a wide source of objects from within the water, the shark creates a picture of the electric world within its immediate vicinity. This extraordinary ability can be used to protect both shark populations and people. In the early 1990s the Shark Pod was invented by the Natal Sharks Board to protect divers in the ocean. A battery and two sensors worn on the body emit powerful electromagnetic radiation that deter sharks but not other marine life.

In 1999 SeaChange Technology was formed and, under exclusive licence from the Natal Shark Board, built and marketed the Shark Shield. Many versions have been produced, extending from military and recreational diving applications to versions for snorkellers and surfers. It is hoped that, one day, versions of the Shark Shield will replace shark-nets in the protection of beaches.

There has been a lot of in-water practical experience gained using the Shark Pod. Although the sharks receive a shock from the overwhelming level of electromagnetic energy Grey Reef sharks, for example, can appear to become accustomed to these encounters, and after each initial shock appear to circle back to re-investigate. What has been noted though, is that if individual sharks, not specific species, are exposed to an electrical field from the Shark Pod in the middle of a feeding frenzy, they will ignore this in their heightened state of excitement. Once their feeding has ceased they will then become aware of the large electromagnetic field and exit swiftly. This behaviour was witnessed in a handful of cases where the shark was at a heightened level of excitement.

Protection

One day I hope the Moses sole, as discovered and pioneered by Dr Eugenie Clarke, may, in conjunction with the Shark Shield and its predecessor the Shark Pod, prove a more all-round answer to the prevention of accidental attacks on bathers and swimmers. This will in turn help to give the shark a more friendly image, and thus help protect shark numbers for generations to come.

The benefits of the technology of the Shark Shield and its predecessor have given us the best chance that we may have to co-exist peacefully, side by side, in the realm of the shark. Elasmobranches possess this extraordinary ability which is shared by only a few other species. These electroreceptive abilities assist sharks in the detection of prey, in their spatial awareness of their surroundings, and in the navigation of their ocean realm. ■

ILLUSRATION: THE FRESHWATER AND MARINE IMAGE BANK

Text and Photos
by Peter Symes

Future Fabrics

Putting the glamour back into diving

Jim Standing
Fourth Element Co-Director

"Where did James Bond go?" Looking for passion and style.

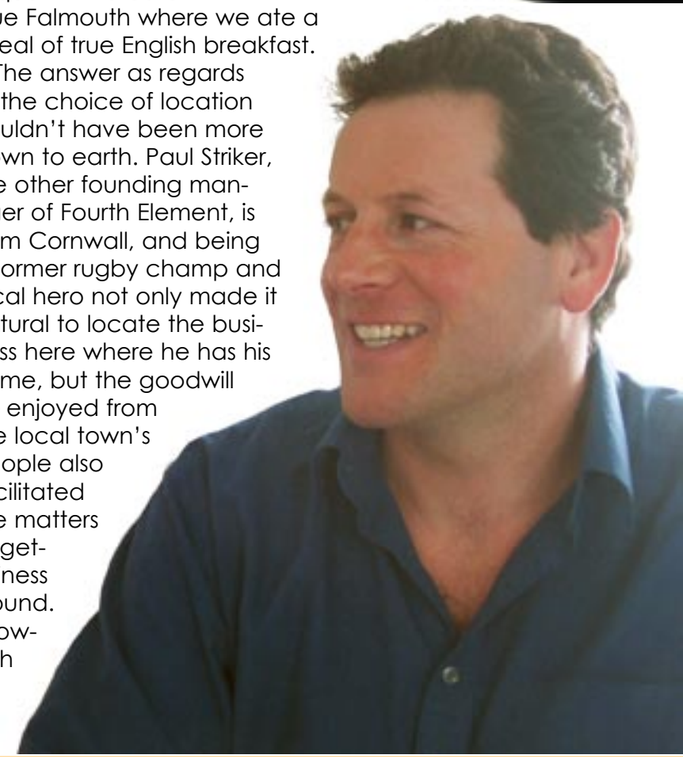
As I boarded the aircraft heading out to Cornwall to see Fourth Element it really hit me that I didn't quite know what to expect. And rightly so. What I found was not a plant full of sputtering machinery with pulsating pistons, but a bunch of ideas and visions on how to rebrand diving for the 21st century.

Fourth Element is headquartered not far from to England's southernmost tip. Jim Standing, who is one of the two founding directors of Fourth Element, came to pick me up at the not so nearby Newquay airport as I arrived with the early bird flight from London. Having to fly as the only practical option to get here only served as a testament to the fact that Cornwall is a considerable distance from London. So far south, that there are, in fact, some palms here. "Why on earth place an emerging enterprise all the way out here?" I queried Jim, as he drove us through the spring-green landscape where the ancient stone-fences brought images of King Arthur and Sir Lancelot to mind rather than those of modern enterprises. In fact, the remains of one of the fabled castles from these myths, Tintagel, is one of the local sights to be seen in these parts.

"Did the county or maybe the EU offer any special incentives to lure businesses out into this fringe area of the kingdom?" I wanted to know. I was still craving my morning coffee, so I welcomed Jim's offer to answer me at length over a cup of java at a quaint little café in picturesque Falmouth where we ate a healthy meal of true English breakfast.

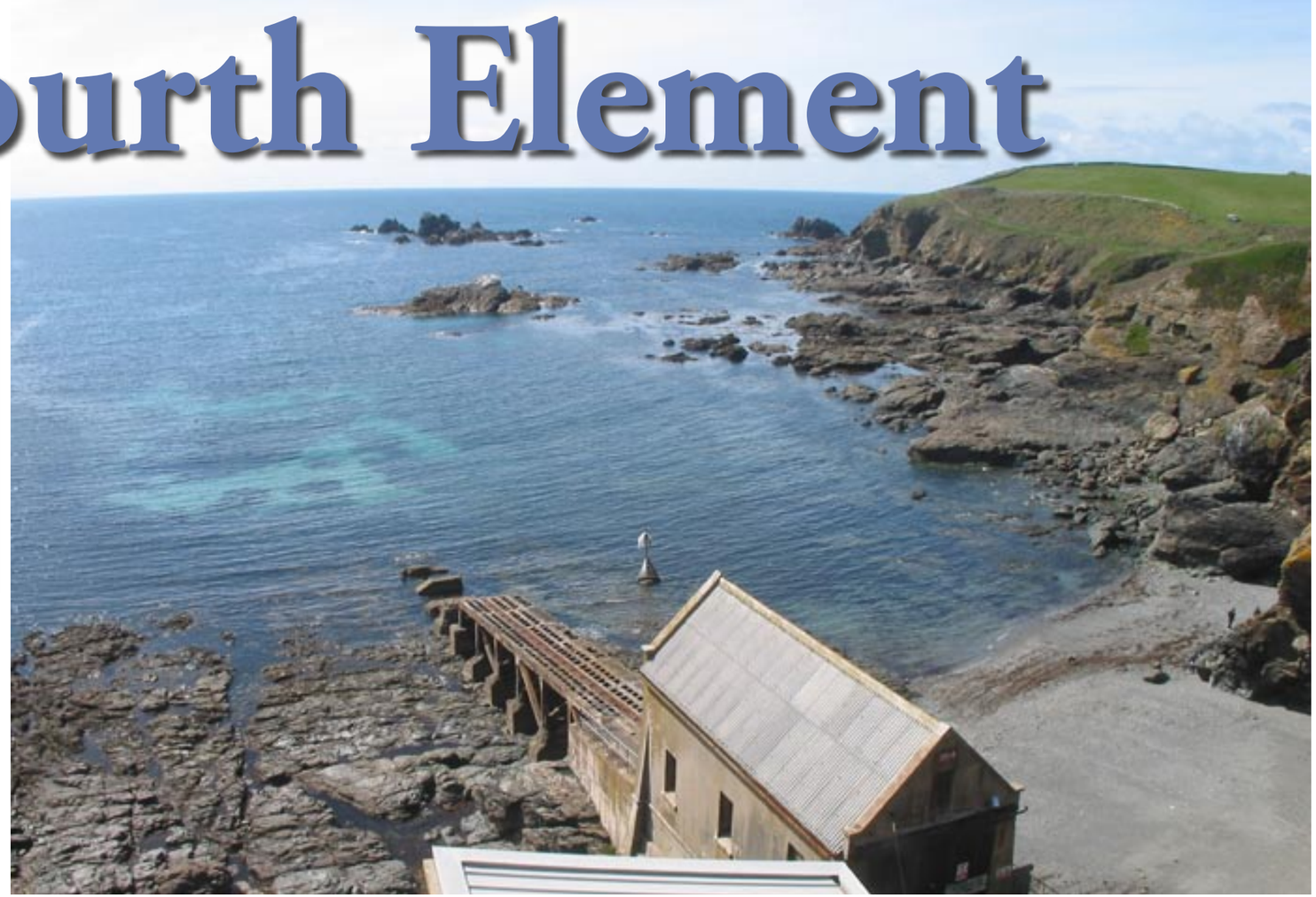
When the layman thinks about diving, the thing that comes to mind is James Bond and Ursula Andress - and the Adventure. Diving is meant to be something elegant, a lifestyle

The answer as regards to the choice of location couldn't have been more down to earth. Paul Striker, the other founding manager of Fourth Element, is from Cornwall, and being a former rugby champ and local hero not only made it natural to locate the business here where he has his home, but the goodwill he enjoyed from the local town's people also facilitated the matters of getting a business off the ground. Besides, nowadays, with



Paul Striker
Fourth Element Co-Director

Fourth Element



FAR LEFT: Jim Standing

CENTER: The picturesque location of Fourth Element's Head Quarters in Cornwall, England

BELOW: Fourth Element's Xerotherm Artic suit is part of a high performance system for divers in the most extreme environmental conditions. It combines two layers of advanced fabric to manage the microclimate around the wearer's body. The low bulk construction makes it ideal for using under neoprene drysuits. Even when wet, the suit retains its performance.

the world-wide use of electronic communication and the availability of efficient global shipping to a world market, it really doesn't matter in which end of a country you are located.

That being said, I soon enough found myself going down a narrow pot-holed county road to find that Fourth Element's headquarters is located in idyllic surroundings, with its offices directly overlooking the rolling landscape disturbed only by the ongoing construction of their new warehouse.

Stepping inside was like being beamed out of one world and into another. Here, the distance from rural countryside to a modern and buzzing office landscape with ringing phones and printers was only one short step. Right, where is my pen and notepad? Let's uncover the truth behind Fourth Element.

X-RAY: Where did the idea come from? Who had the original idea?

Paul: The entire process has always been a joint discussion, but it started back in the Sanafir hotel (a hotel in Sharm el Sheikh, Egypt ed). We didn't know one another that well at that time, but when we looked around, we both saw all these divers wearing expensive equipment, and some of them were going on these really exclusive liveaboards, but at the same time they are just wearing really cheap t-shirts and such. It was such a mismatch. We then came to ask ourselves, what would you buy clothing wise?

Jim: …why has the technology for thermal protection not changed for so many years? And why are we still wearing these woolly-bears as thermal protection inside our drysuits? When the layman thinks about diving, the thing that comes to mind is James Bond and Ursula Andress - and the Adventure. Diving is meant to be something elegant, a lifestyle

Paul: What PADI did was making diving an everyday thing to do. They made it low risk. Consequently, it took the edge out of it, and I don't think that it did the perception of diving so much good.

Jim: The growth of diving, and now I am thinking primarily through BSAC and the way it was taught through the clubs in this country, also led to a low-budget approach to diving. Everyone wanted it cheap. The end result was the glamour was removed. Look at windsurfing and a lot of other sports. They have a completely different image. We wanted to put the excitement back into it. Surfing and other sports are displaying the passion.

Paul: … and we are trying to inject that passion into our clothing. Make the clothing and diving something to get excited about again.

X-RAY: Are you "crusaders" or manufacturers then? (laughter)

Paul: What could we do to bring the excitement back into diving? We didn't have delusions about what impact we could have, but we certainly wanted to try it.

X-RAY: Are you using the fact that you are manufacturers to convey a vision and idea, or is it the other way around? And why clothing rather than something else?

Jim: There is a number of factors…
Paul (kicks in): … there was a need!
Jim: As regards to how divers were dressed, we had this feeling of, "I wouldn't be seen dead in that". There was a lot of other odd and outdated stuff around,

Paul Striker discusses the future of fabrics in the dive industry while on coffee break at nearby Lizards Point, the southernmost point in England.

and we got into this conversation that existing dive clothing was really unsubtle, "Divers do it Deeper" t-shirts and such.

Paul: We felt that there was a need for another brand, more stylish something you could wear in the evening too… and better thermal clothing.

X-RAY: So, it was a reaction against ugly t-shirts?

Paul: It was a reaction against having as contrast to an expensive Suunto watch, you have this cheap t-shirt, cheap in more than one sense.

Jim: … exactly. Someone came up to us at a show and said: "You guys are to scuba diving what Gucci is to clothing" and that felt really good.

X-RAY: Do you see branding and changing the image of diving as the new main challenge for the scuba diving industry?

Jim: PADI and National Geographic did a good example of re-inventing diving as something adventurous and giving the edge back into it again. It is, in a way, brilliant. It is edgy so far that the litigious circumstances American society suffers from permits.

Paul: Diving also set itself apart in the sense that it doesn't have – as surfing – a fitness requirement.

X-RAY: Does that pose a marketing challenge?

Jim: Absolutely… (pointing to a group picture of 12 top technical diving instructors – all being bald pot-bellied blokes). Does this lure more people into diving? I think not. These guys, as sweet and nice and professional as they may be, do not sell any tickets and get more people into diving. These are the harsh realities we must address. We must have something sexier, even if it means risk-

manufacturer


FOURTHELEMENT

FOURTHELEMENT

ing to revert to some old stereotypes.

X-RAY: But don't we risk that the whole brand / branding issue take over the focus from the product it sells?

Paul: The product needs to be good. Branding is no good if your product is bad.

Jim: We are building up the brand, but we are backing it with technical innovations. We hope that the brand will then tell something about the diver.

Paul: … but the brand needs to be good. The brand is just a part of the overall parcel.


At Fourth Element's headquarters one can enjoy a wonderful view over the Cornish landscape

X-RAY: So, in your opinion, is scuba diving a means to an end or an end in itself?

Jim: A means. We want to get more into marine conservation – like the Rolex OneWorld Scholarship, and next year, we are planning to get into shark conservation.

Paul: The greater picture is important. The ecological awareness is something that we would like more people to get involved with, and we believe that most divers are very ecologically aware. So, the more divers we have, the more knowledge and awareness we can create to promote a greater understanding and appreciation of the oceans.

X-RAY: Do you have any concrete plans as regards to new projects or setting up funds or sponsorships?

Paul: First of all, we want to get into shark conservation, but also get involved in projects like the Rolex OneWorld sponsorships. In the future, we want to do more expedition types of work. We are also involved in a boat project that would do conservation work.

Jim: We are happy to be associated with the Rolex / One World Scholarship because it has exposed young people who would otherwise just be white collars workers to the marine environment. Take Joe Stephens (the first European Scholar, ed) he is now with the BBC Natural History unit. Richard Somerset is running a dive school over in Bristol. Jade Berman is a sponge expert. Phoebe Rudomino-Dusiacke was the production coordinator of the underwater unit at Pinewood film studios but now she works for the British Antarctic Survey.

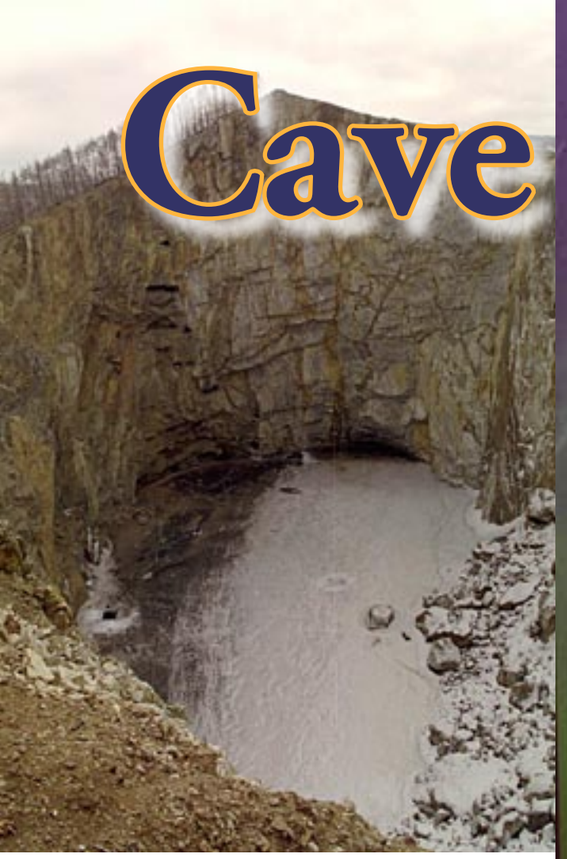
X-RAY: How did these new fabrics come about?

Paul: There were not dedicated empirical tests, but a lot of literature research, looking into specifications and then trying fabrics out in practice to see what worked. After experimenting, we also started looking into a commercial niche. The thermal protection seen in scuba diving was old. Thinsulate, for example, has been around for ages, but the new fabric technology has already gone far beyond that. So, we looked into many interesting fabrics with much better properties as regards to thermal performance weight for weight. Our fabrics are also machine-washable. ■

For more information, visit: ***www.fourthelement.com***

Cave Diving in Siberia

Text and photos by Andrey Bizyukin



ABOVE: View of the huge Tuim's collapse from above. The wall is 120 m high, and the lake is covered with thick ice. From this height, people on the bottom look like ants

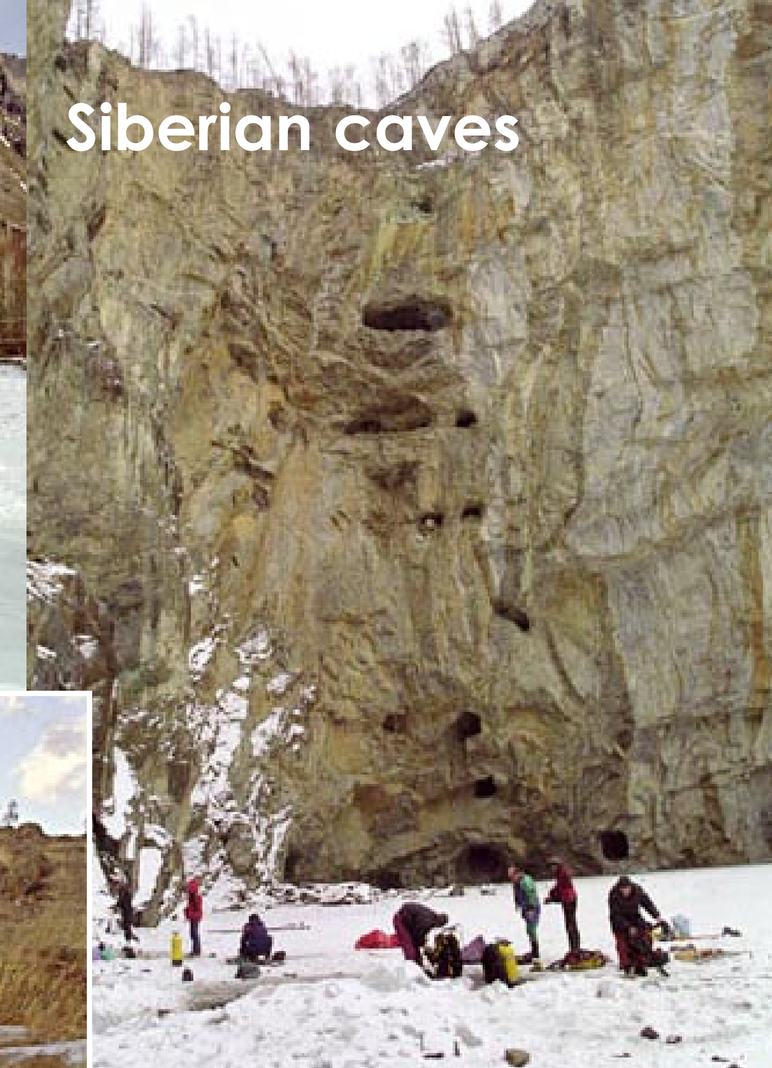
It is only four hours by plane from Moscow to Abakan, capital of Khakassia. The above-freezing temperatures, sunshine and the absence of snowdrifts contradict the traditional idea regarding the severe climate of Central Siberia. Together with the Novokuznetsk cave diver's team, we drove up through the foothills of Kuznetsk Alatau and the picturesque valley of the Small Sya river to the mining town of Tuim.

Mountain-top subsidence close to Tuim
Huge crater formed

A diver lowers a homemade soft underwater habitat for comfort during decompression in the cold water under the ice

The surrounding forest-covered, beautiful mountain ranges are inspiring, and there are caves with painted rock pictures and many untouched historical monuments everywhere. The first settlements of Homo sapiens appeared here about 34 000 years ago. Ours divers' base is in the old village called Small Sya. This is a favorite place for modern shamans and is a well-known Stone Age settlement. Stone axes, bones of mammoths killed by our ancestors, and the most ancient musical instrument in the world, a flute, has been found here. Here are salt lakes, possessing wonderful medicinal properties from the very oldest times, around which people collected, seeking for a vision of God. The water of the lakes is so strongly saturated with salts that it is easily possible to read a newspaper while floating on the surface. There was already a prospering nation here five thousand years ago from which has survived one of the most ancient observatories in the

Siberian caves



ABOVE: Local mountains with cave entrance. Caves here are where ancient peoples lived during the Stone Age

TOP CENTER: View of the local river, Malaya Sia. There are many old places to be found with evidence of Stone Age people

world, Shira with its dolmens resembling Stonehenge. Everywhere there are barrows and fresh excavations of them.

Our objective, though, was a huge subsidence in the top of a mountain close to Tuim town. This is a place described as Tuim camp by A. Solzhenitsyn in his book *The GULAG Archipelago*. It was a correctional camp for enemies of the Soviet government which worked the copper-ore mines here. It was very hard labouring here, and after only two years many had died. In the Stalin years all the slopes of the copper mountain were literally covered by prisoners from the Soviet concentration camps. At any one time there were up to 2300 exiles working here.

Prisoners dug many shafts into the limestone in order to get to the deposits of copper- and molybdenite-ores inside the mountain. The surviving local residents recently told that they sometimes penetrated into natural caves or, when removing the ore, created huge man-made underground caverns. Later, being afraid of a possible collapse, part of the top of the mountain was brought down by a large force-directed explosion. This created a majestic subsidence, a hole with vertical rocky walls up to 140 meters high. Some years after that a beautiful turquoise lake formed at the bottom of this hole which has since became a popular place for cave divers to explore.

Divers place a soft underwater chamber under the ice

INSET: One of the Shamans' stones. On the rope around the stone, you can see pieces of textile material. These are wishes and prayers to local Gods

TOP RIGHT: Divers on the ice of the lake at the bottom of the collapse. They are going to prepare some equipment before diving. In the middle of the wall, you can see entrances to old copper mines

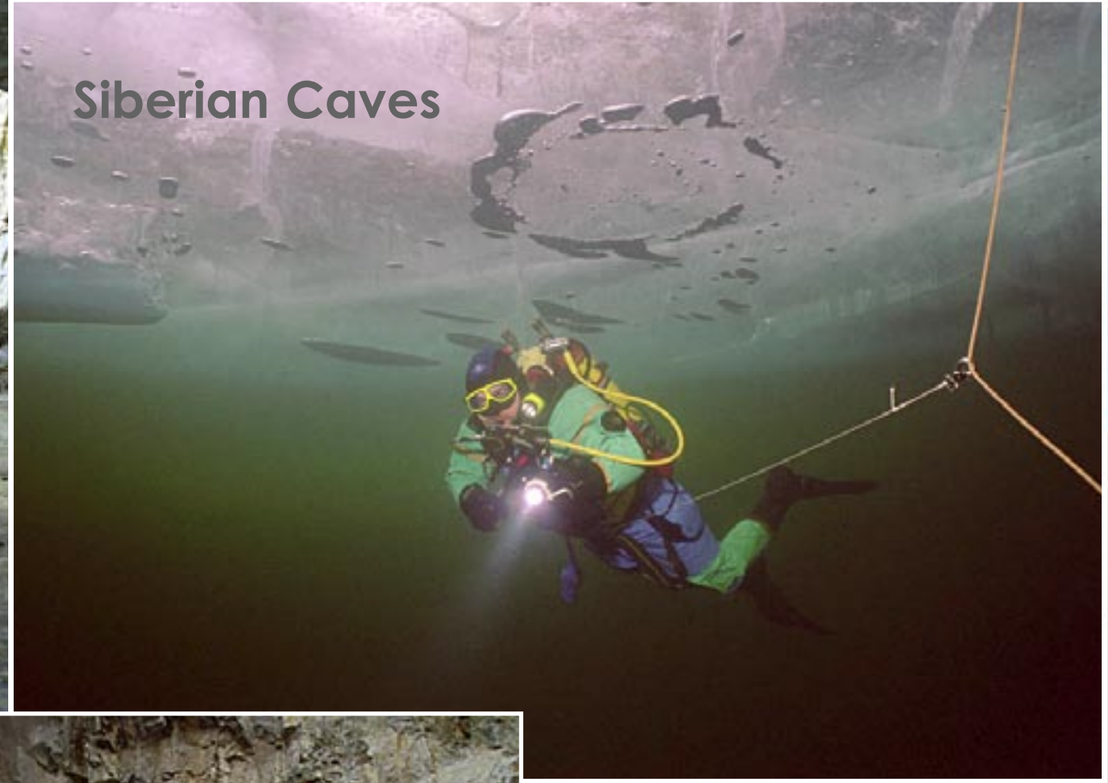
BOTTOM RIGHT: Excavation of a settlement of ancient people from an unknown age

Divers share a short meal and a coffee brake on the ice tables. This is a view from one of many mine entrances that can be found in the area

Oleg

The leader of the diving project for the exploration of the Tuim subsidence was Oleg Grigorjev who is a very experienced dive instructor and cave diver from the city of Novokuznetsk. "I entered my first cave when still a schoolboy ", said Oleg. "I was attracted by the darkness and the vertical pits. I have always been keen on exploring caverns and apparently endless labyrinths, and I was fascinated by the mysterious magic of the subterranean world. I started as an ordinary caver and a member of a cave divers' support team. We just carried cylinders through caves to sumps. But my dream and wish

Siberian Caves



Diver under ice with guide line. Don't lose a way to get back home

to dive into sumps was so strong that I began my scuba diving studies. In 1983, at the age of 17, I plunged into my first sump in a cave, Pandora's Box. Many years later, after becoming a dive instructor, I had to travel and dive in many various places, in warm and cold seas, rivers and lakes, to communicate with the large number of divers around in the world."

It is not the first visit of Oleg and his team to the Tuim subsidence, they have already dived here many times. In the beginning they used ropes and speleological techniques to get down from the top of the rocks to the lake, and to carry down underwater equipment. It was a very dangerous and unsafe way because of frequent falls of rock. Later they found a more simple way, an old 250 meter horizontal mine which connected the subsidence to the open mountainside.

Entering the cave

Having armed ourselves with miners' lanterns, we now dragged our cylinders through a seemingly endless underground tunnel. It is very

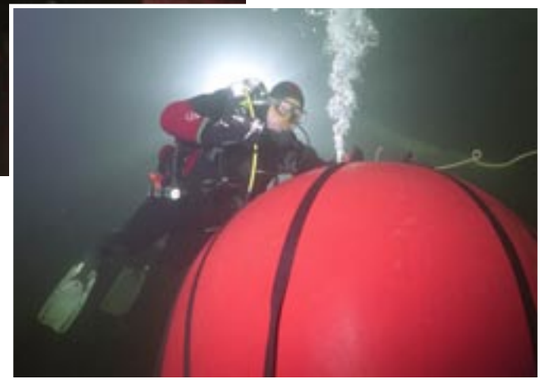
Twin sets are going into a mine entrance. This is the way each day to the air compressor

Siberian Caves

LEFT: Free flow for filling a chamber with air

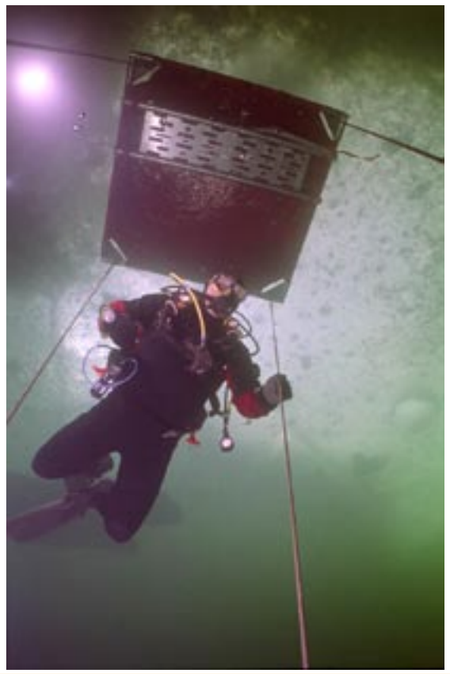
INSET: Checking a valve at the top of the chamber. It should be ready to release air for any rescue incident

BELOW: Time to go for decompression inside the chamber



cold here, with temperatures below freezing point, and the floor of the mine is covered with ice. It is necessary to be very careful that one does not strike one's head on a low stone arch or on the many spikes of rock sticking out everywhere, and also not to fall on the slippery ice. Happily, having avoided all dangers in the mine, we finally come to a strong sheet of transparent ice covering the lake at the bottom of the subsidence. Rocky walls reaching to the heavens hang above our heads, and the broken blocks on the ice are the traces of recent rockfalls. Recalling a Latin saying, memento more, there isn't much relaxation.

Our expedition is a part of the long-term research project. Step by step, trip after trip, cave-divers will eventually explore all the underwater areas. There are many underwater mine shafts, some of which have very narrow entrances. In others there are old rails, trolleys, cables and wooden logs. The bottom of the lake, some 40 meters in depth, has been filled up with huge blocks of rock. It is thought that there is an entrance into a big underwater cave somewhere within the depth of the lake.



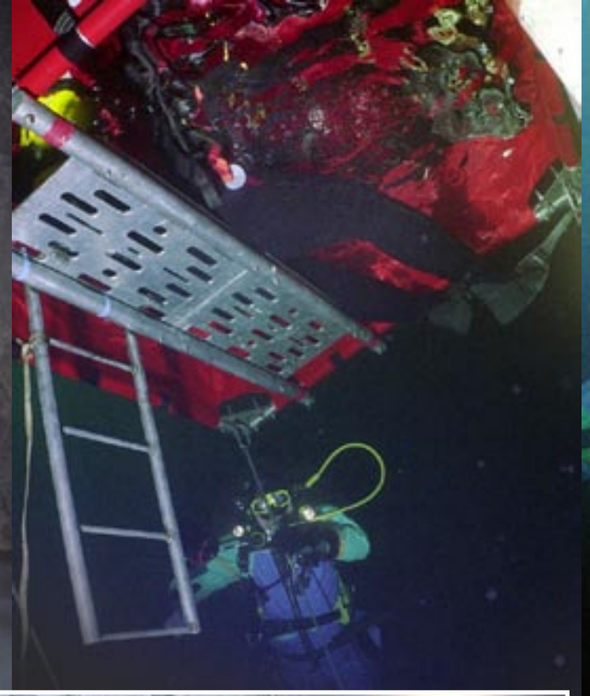
The sun is rarely a visitor to the bottom of the subsidence, so that the water temperature here seldom rises above 2 - 3°C, and visibility varies from season to season. The best visibility is up to 10-15 meters, under the ice, and therefore just as we arrived here at the end of March.

Goals

Within the framework of present expedition our team had three main objectives:

- A support team will make two big ice-holes in the ninety centimeter-thick ice. One of them will be very close to the egress from the dry mine, where the

adventure



ABOVE: In the main tunnel, people carrying tanks across the slippery ice floor should be very careful

INSET: Diver under clear ice

TOP CENTER & RIGHT: Divers from the support team assist in the decompression procedure. Little tanks attached to the chamber are filled with pure oxygen

depth of the lake is only 18 meters, and the other above a deep part, which we think is just above a probable entrance to the underwater cave. It will be necessary to lay 150 meters of guide line on the bottom between both ice-holes at depths from 18 up to 40 meters.

- Divers are to fix a diving bell. Last year an attempt to do so failed, as the six ton steel cable could not hold it and broke. The cave explorers have now made all the necessary constructional changes, and were perfectly prepared.

- After a successful completion of these objectives, Oleg Grigorjev will make a deep-water dive to reach the greatest possible depth and to explore a possible new underwater cave.

"Diving is, first of all, a pleasure and an aspiration to spiritual and physiological perfection. Here we have all the requirements for this in the subsidence; huge underwater volumes, depth, a gloom and the ice's clear water. Even the most powerful torch does not always reach to the opposite wall or the ceiling of the huge underground tunnel. The history of the subsidence and the events connected with it can bring gloomy thoughts to mind of the diver. Most of all, I am afraid of the terrible cold of the water and of the non-stable functioning of the regulator, or its freezing, when it will then be necessary to close the valve of cylinders and to wait, while the first stage thaws. And so over and over again, before the next problem. I like diving in the subsidence very much, though it is sometimes necessary to overcome my own reluctance. A very high degree of endurance, together with being very fit, is necessary for diving at the subsidence at Tuim." says Oleg. "Siberians nevertheless differ from Europeans. Maybe they worry less, but due to the Siberian temperament they do things faster and more rationally. They just have no other ways for survival. To become a good cave diver, at the very least it is necessary to be very clever, prudent, and be rich. These are the key conditions for a top-rank cave diver. And you can add to this the narrow and muddy sumps of Siberian caves, with their cold and stagnant water, which so easily grows turbid, so that it is generally necessary to search for a way home through the zero visibility using only touch. This means that Siberian underwater cave explorers must also have qualities such as exceptional patience and purposefulness."

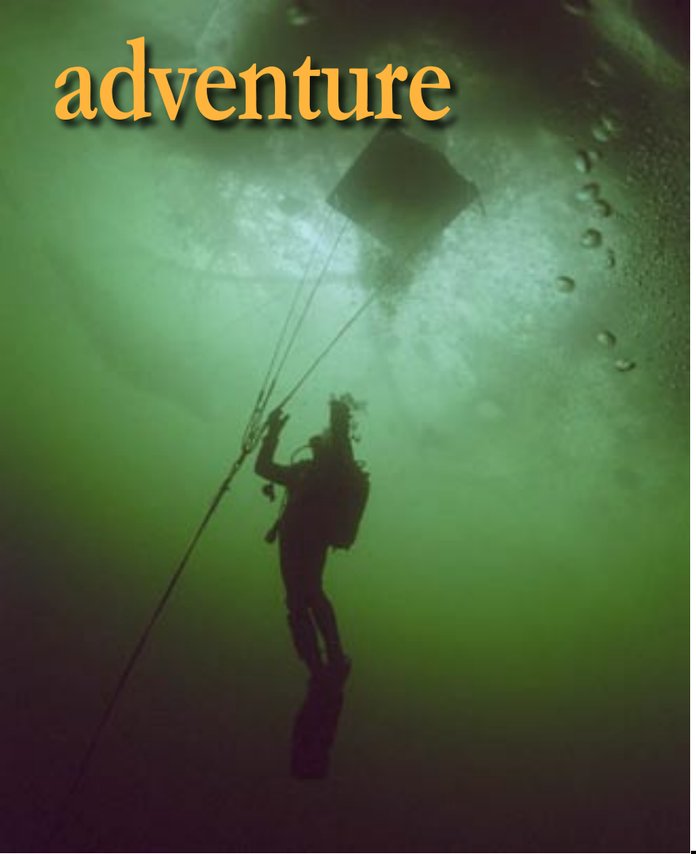
Hypothermia

It is dangerous to dive for long in ice-cold water, in this case more than one and a half hours. Hypothermia can cause cramping and muscle pains in the hands and legs, hallucination, and loss of consciousness and control underwater. Therefore, the plan for this dive was to eliminate all such risks as far as possible.

Prior to such deep dives, speleologists usually carry out training dives, for a couple of days, down to depths of 55-60 meters with air, checking and adjusting equipment, refreshing skills and getting themselves in the right frame of mind. For the deep diving a bottom mix has been prepared with MOD for 90 meters, consisting of 16 % oxygen, 34% helium, and 50% nitrogen; travel mixes 28 and 50 EAN; and separate cylinders with pure oxygen for the final decompression from five meters. The danger of the regulator freezing is so high that a time turn around point is moved from the traditional 1/3 of the volume of gas to 1/5 of it. The bigger the reserve of gas left for the return back to the surface, the more safe will be such an extreme dive.

The dive

The dive begins in the ice-hole. Oleg is under the ice and begins falling very



Siberian Caves

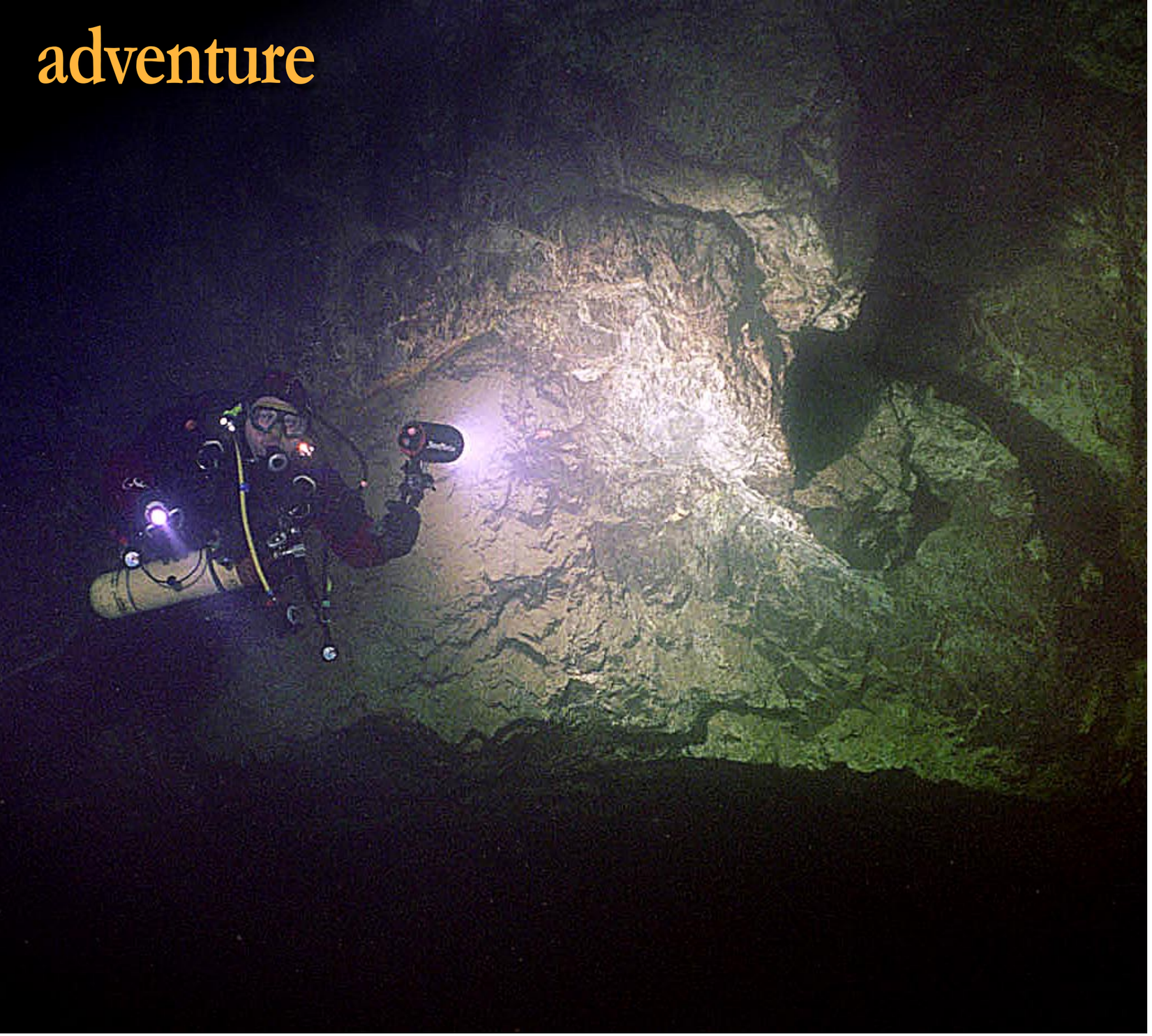
A diver ascends to the underwater chamber under the ice

as the light of the torch can reach there is darkness all around, with only the right wall being visible from time to time. There is the feeling that the water here is black in colour. Oleg goes down between blocks bigger than a man. It sometimes seems that his guide line goes down straight into black emptiness. The blockage is behind his back, and ahead, where the torch reaches, is the all-consuming gloom and uncertainty. The descent continues for 13 minutes, at which point the floor starts to appear at 70 meters depth with a little slope, and finally at 80 meters he arrives at the horizontal bottom which is covered with large rubble. Neither ceiling nor walls are visible. It is possible to move any direction and Oleg has chosen a way and started to unwind the thin white guideline. Fears about possible problems with equipment began to return with their ominous whispers, and he thinks about the long decompression time in the ice cold water. But all the same, it is necessary to move forward, so he fast, following a rope, and has already reached the visibility limits of the subsidence wall. A huge arch, about 20 in height and about 30 meters wide appears at a depth of 22 meters. This is the majestic entrance to an underwater cave and the deepest underwater part of the subsidence. Very big flat block lies on the steeply inclined slope of 45-50 degrees at the bottom of the arch. A guide line from previous dives is fixed to its lower end. At this moment, looking back, it is still possible to see the greenish gloomy daylight which can hardly make its way down through great thickness of water. There are friends, fresh air, the sun and warmth, so far back, above a thick layer of ice and water.

Having jumped out from the slope, the cave explorer starts a seemingly endless fall down into the black attracting abyss. The fall is so fast that from time to time Oleg loses the guide line, but grabs it again at a depth of fifty meters. He tries to maintain a correct direction and orients himself on rocks of the blockage during this descent.

The size of the tunnels are very impressive. As far

A diver explores the depths of the abyss in a huge underwater cave



A diver approaches a huge arch of stone, which is the entrance into the underwater cave

Siberian Caves

pulls himself together, for he has a specific geographical exploration to carry out. And the most difficult part is not to cross that invisible line beyond which it is not necessary to go, not make that superfluous precipitate step which could lead to one's death.

Only three minutes at that depth to spend on exploration and further searching. It is done! Oleg fixes the guideline, knotting it round a stone. It is time to return, back to warmth, light, hope and smiles – a long way back through the depths of the cave water and ice. At a depth of 40 meters, it will be necessary to re-clip on the guideline which shows the way to the decompression bell, and then to cross the 150 meters under the ice up to a shallower part of the lake. Here, under the second ice-hole, is the warm underwater chamber and the previously stored oxygen cylinders. There, in relative comfort, it will be possible to stay for the whole decompression time.

Story time

During the long way back to the surface Oleg tried to cheer himself up by recalling amusing stories about things that have happened to his friends under water. In the gloom of the cave, while at one of the stops, he remembers the frightened Maldivian diver who hid from a shark in an underwater grotto. Only there, in the full darkness, did this scuba diver feel himself in safety, so nobody could entice him back.

Resisting the underwater cold and the great weariness that comes after a long deep dive, Oleg recalls one Russian cave diver, Ivan, who

Oleg on the deco-stop with oxygen during one of the check dives

Siberian Caves

fell asleep in the 45 meter-deep sump. Weariness and nitrogen narcosis had so affected him that his brain was almost disabled, but he continued along the guideline by subconsciously kicking his fins. Ivan only woke in a cold sweat when his helmet struck the wall with great force. He was really lucky that he was fastened by a clip to the guide line. "How are you? What happened? Tell us?", friends asked him later. "I remember nothing", Ivan replied. "I remember only the great impact of my head on the wall. Bang! Splash! And I returned to full consciousness. Where am I? In the sump? Forward! Go!"

Close to the underwater decompression chamber Oleg thought about his idols Olivier Isler and Jocben Hasenmayer, the world famous cave-divers, the heroes that have broken many records and survived, but only because they trusted themselves, planned dives correctly, and had the excellent support of the dive team. "Our power is in our team and its help is vital for me. I could not make these dives without the help and support of Alexey Bazarov, Gleb Sitnikov and Vladimir Komarisov", said Oleg later.

"Many people think that we are abnormal. Why do we dive in such cold place? But for us this cold water diving to great depths is excellent training and fine recreation. It is just interesting for us to explore all of the subsidence at Tuim, and to dive even more deeply here. Besides, here is the ideal place to test equipment under very extreme conditions. My dream is to find the finest, most trouble-free, underwater equipment, although last time I had already begun to doubt that such equipment really exists", said Alexey Bazarov.

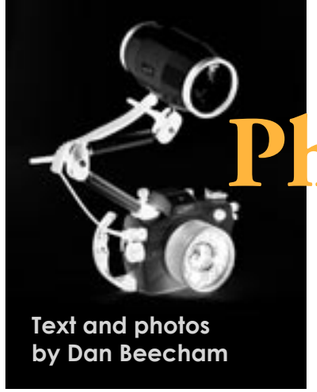
"The subsidence at Tuim gives one a feeling of Man's smallness in Nature's greater order of things. We are moved by a hope to touch uncertainty, and a passion to be the first to explore a previously unknown subterranean aquatic space. Here, under water, is the voice of the Abyss, giving us this unforgettable sensation of peacefulness. The history of an ancient underwater cave can be only a story, but all of us trust in the dream and we amuse ourselves by hoping to find it", explains Gleb Sitnikov.

Afterthoughts

After the end of our diving trip, Oleg Grigorjev expressed the opinion that even if there is a technological break through in the near future and the working pressures for cylinders increases up to 1000 atmospheres, or even if rebreathers which actually work in cold water make their appearance, the subsidence at Tuim will still remain an unique range for testing all these innovations.

It is not surprising that much of what is suitable for Red sea techno-divers does not function here. Gradually, step by step, ignoring whatever the advertisers might claim, cave divers will test and choose the most reliable and trouble-free equipment for all types of diving. Oleg is confident that the exploration of the subsidence will inspire other divers to do similar underwater researching in other places of Russia.

"I am a patriot of my country and believe that the future diving expertise of Russia will grow in Siberia", with these words Oleg Grigorjev finished his story of the subsidence at Tuim. ■



Photography

Text and photos
by Dan Beecham

Digital Underwater Photography: Part One

Digital camera and i-Pod. i-Pods may be used as data-medium to store images. i-Pods come in various models with up to 40Gb of storage

In the past few years underwater photography has been transformed by new technologies and new ideas. It's not only the equipment and techniques that have changed. The way we store and view our photographs has also been revolutionized. This has made underwater photography more popular than ever.

Cameras are everywhere nowadays — on our computers on our phones. In fact, most people have a digital camera of some sort with them at all times. The same is now true for many divers. Entry-level cameras are now so cheap, compact and effective, that they can be carried on every dive — slipped into a BCD pocket for a quick snapshot if the opportunity presents itself. Most divers now enjoy early success with their photography. Whereas, in the past, entry level film cameras took a lot of time and attention to get pleasing results.

Things have also changed in professional level equipment. There are housings available for the top of the line Canon and Nikon digital SLR's, and nearly all professional underwater photographers have now made the switch to digital, this is allowing them to produce new and exciting images which have never been achieved before.

ABOVE: Film vs image card

In this issue, we're going to look at the advantages and disadvantages of digital, and in the future we're going to tackle many different aspects in detail, including specific types of cameras, techniques, lighting, digital enhancement/manipulation, storage of images, and maintenance of cameras. We'll also be looking at diving equipment, locations and resorts that are set up to cater for the needs of the underwater photographer.

Many of the advantages and disadvantages of digital underwater photography are the same as those on land, but it's worth looking at how they affect us as divers.

LCD

The LCD on a digital camera allows you to review images and navigate the camera menus. On a compact camera, this is also used for composing the picture. On a digital SLR (Single Lens Reflex), the screen cannot be used for composition. The camera viewfinder must do instead.

When used as a viewfinder, the LCD screen provides a large, bright, clear viewfinder. This is a very important feature in an underwater camera. When using the LCD, you can hold the camera at arms length, and still clearly see the screen. This feature can be handy when trying to shoot shy critters, which may not like you and your bubbles getting too close.

Previously, on entry level cameras, the viewfinders were very poor. You also had to battle parallax (the difference between the image seen in the viewfinder and the image which is actually recorded by the camera). With an LCD you see exactly what the camera is going to record, and you can see the image after it's been taken. This means you learn on the dive, and this is what has allowed people to get underwater pictures they are happy with much sooner than they would with a film camera.

Sizes: Digital camera and house compared to a UK passport

Another great thing about compact cameras is that you can start off using a camera and housing on its own, and when you want to push your photography forward and explore new areas, you can add on accessories. These include ancillary wide angle and close up lenses, external flash units and colour corrective filters. This allows you to spread your costs over time, and get to grips with using one piece of equipment before moving onto using something else.

Number of Exposures

In the days of film, if you wanted to take more than 36 pictures on a dive, you had to carry two cameras. Only having 36 exposures often stopped you taking risks or trying new techniques or ideas — every shot had to count. Nowadays, by using a large media card, you can take hundreds, or (if you really try) thousands of pictures on a dive. You can just shoot, shoot, shoot — and if you fill up your memory card, you can start deleting the shots you don't want and shoot some more.

Costs

The start up costs with most entry level systems is extremely low, a compact camera and housing may set you back £500 (USD 916) or less. This on its own will offer you tremendous flexibility. At the other end of the scale, the costs can be astronomical. Some manufacturers now produce housings for top-of-the-line DSLR's such as the Canon EOS D1s Mk II, or Nikon D2X. These cameras are the tools of professionals, costing many thousands of pounds. Housing systems often cost as much or even more than the camera.

Compared to film however, the running costs are much lower.

Let's say you're planning a trip to the Red Sea, shooting film. You're going to be doing three dives a day for five days. This means you could get through fifteen rolls at a total cost of as much as £70 (USD 128) for a high quality film. Processing at a reliable lab can cost as much as £5 (USD 9) a roll, that's another £70 (USD 128) or more. If you're using slide film, you now need to pay out for scanning of images if you want to view them on your computer, and the cost of prints if you want pictures to keep in an album or on display in your home.

Now consider that with digital you

could be taking many more pictures per dive, and you would be seeing straight away what you were getting. You could then save the pictures you're pleased with, and even print them out on a home printer. Your only cost for the whole process would be that of paper and ink for your printer.

Adjustable ISO

Traditional film is available in many different sensitivities, or ISO's. Higher ISO's produce a lower quality image, where the grain of the film is often visible at very high levels. A picture taken using a film with a lower ISO yields much higher quality, but you need more light to expose the picture properly. This means you could start the dive using a film such as 100 ISO, but when you get under water you may find out that it's too dark, and that you should have used 400 ISO instead.

On a digital camera, you can change the camera sensitivity on the dive to suit the light levels at the time.

Size and Weight

Entry level compact cameras are so small and light that they can be carried at all times. This is beneficial not only whilst diving, but also when travelling. Many underwater photographers have difficulties transporting their heavy and bulky equipment to a destination. This can still be an issue when using an SLR. The size and weight generally remains the same using a compact, however you can slip a whole system into your rucksac and carry it with you on the plane.

Disadvantages

They're few and far between, but digital photography does have a few disadvantages.

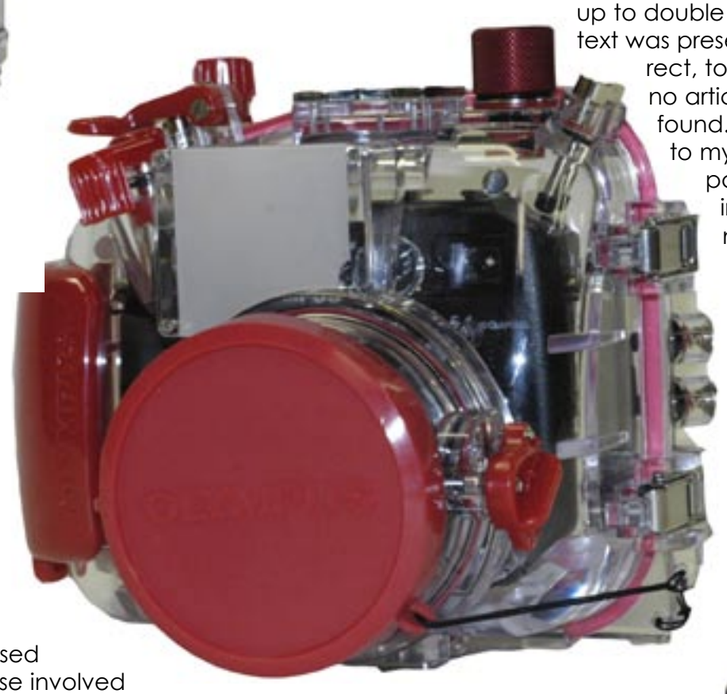
Sometimes digital cameras do not handle strong areas of contrast very well. As an example in an image of a diver with the sun in the background, the sun will not be as crisp and defined as it would have been when using film.

Another problem, which is present only in compact cameras, is *shutter lag*. This is a small delay between pressing the shutter release button, and the camera actually taking the picture. This happens because the camera's on board computer takes time to adjust its settings, achieve focus and record the new image.

When you first use a camera with shutter lag, it can be very distracting, especially if you're used to the instant shutter release on an SLR. If the camera is very slow, it can stop you getting the picture you wanted, especially if you are photographing fast moving subjects such as dolphins or sharks. However, for the majority of subjects, shutter lag is not an issue — take wrecks as an example. There are ways to reduce shutter lag, but if you choose to use a compact camera, expect shutter lag.

When using a Digital SLR, the only delay you have is that of the camera's autofocus locking onto the subject, and so is generally unoticeable.

The obvious down side to this is the greatly increased expense involved with getting an SLR under the water.



When using many digital cameras, or when using RAW settings on your camera, the images that come off the card and are transferred onto your computer need to be adjusted to get the best possible result. This requires knowledge of software such as Adobe Photoshop, and can often be time consuming. If you do not put the time in on the computer to get the best of your images, you may find your pictures look flat, or the colours may not be as vibrant as you would like.

Reliability

One final point which needs to be made about the disadvantages of digital cameras is something that we are all too familiar with: computers can be unreliable. When I was getting ready to send off the final draft of this article to the editor, I transferred the file on a portable hard drive to broadband over from my work computer. When I tried to open it up to double check the text was present and correct, to my horror, no article could be found. I went back to my laptop, with panic creeping in — the original file was no where to be found.

After some frantic searching, I managed to dig up the article buried deep in my hard drive. I don't know why the file went missing, and I don't know why it didn't transfer properly. I do know, however, that sometimes computers are simply out to ruin my day. I'm blessed with the dolcid tone of my Mac restarting a few times every day. Just remember this, if you've got a picture that's important to you, BACK IT UP!

When you consider all the features that digital offers you over film, the few disadvantages seem insignificant. The trick is to use digital cameras where they are most effective, rather than attempting to replicate pictures where film would outperform.

Digital is here to stay, and day-to-day we're discovering just how much these cameras are capable of. These are exciting times to be an underwater photographer. In the next issue, we'll look at specific types and models of cameras, from Entry Level compacts up to Professional level DSLR's. We'll also look at the housing systems available for these cameras, and find out which one is right for you. ■

*Dan Beecham of **Ocean Optics** in the UK won the Our World Underwater Young Photographer prize at the 31st Annual World Festival of Underwater Pictures in Antibes, France, 2004*

LEFT TO RIGHT: Olympus 5060 camera with underwater housing and lens, Olympus 5060 camera with underwater housing, Olympus 5060 camera body

NARVIK – Norwegian Eldorado for wreck-divers

Wrecks of Narvik

Dieter von Roeder

Text by Erling Skjold
(history and diving)
and Frank Bang (diving)
Underwater photography
by Frank Bang
Ship photography
by Erling Skjolds,
NSA collection
Translation by
Michael Symes

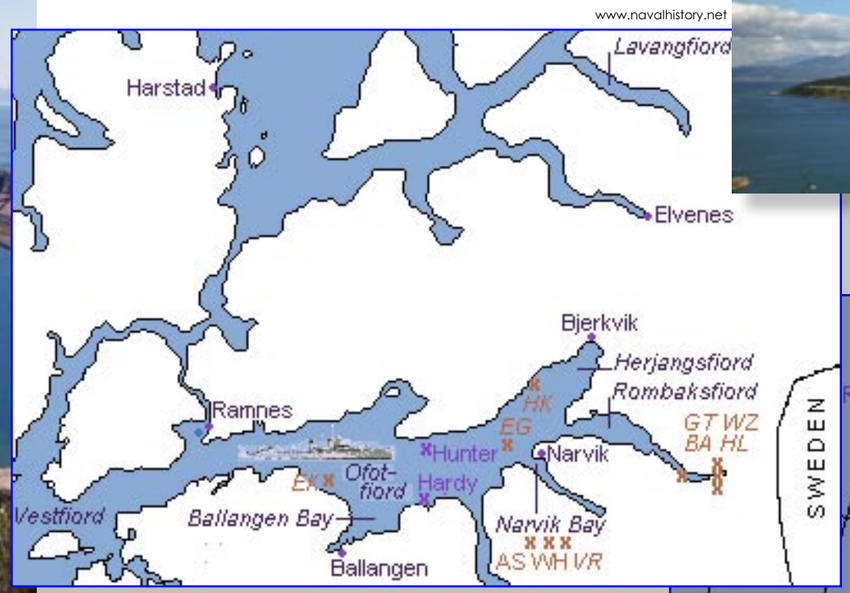
The port of Narvik in north Norway was established around the export of iron-ore from Sweden. This was due to the very good harbour and its ice-free conditions. At the outbreak of World War II, Narvik was a strategically important harbour, and during the first few days of the war a very intense battle was fought out here between German, Norwegian and British naval forces. During this fighting several ships were sunk, both warships and civil merchant ships. Narvik harbour was transformed into a great ship cemetery, with wrecks sticking up out of the water everywhere. Several of the ships were later salvaged, but many wrecks still remained. With its high density of wrecks, Narvik is an eldorado for wreck divers.

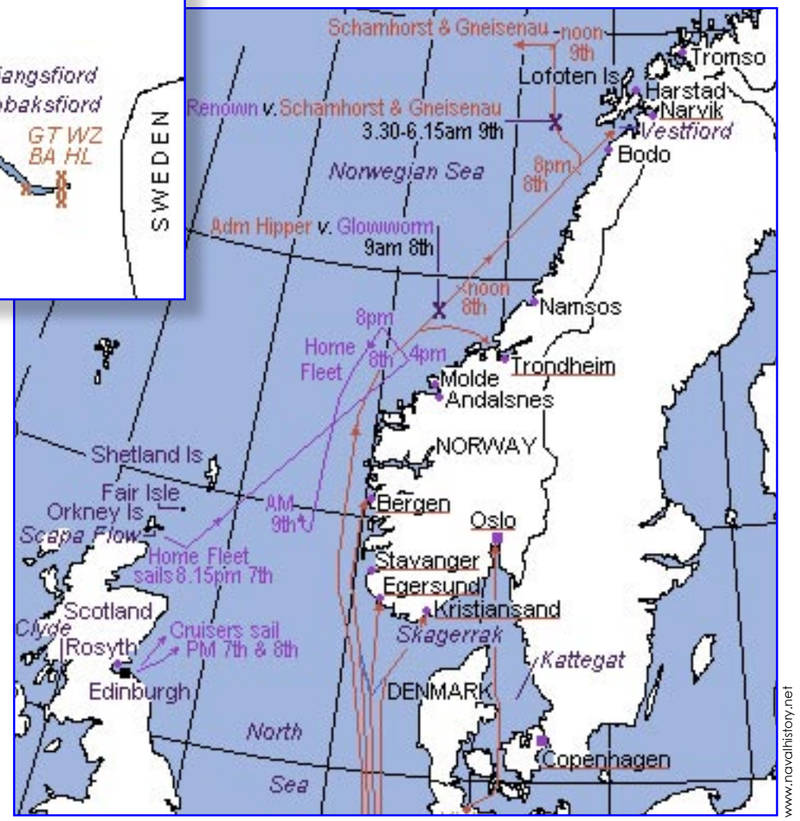
A diver explores the wreck of the German destroyer *Hermann Künne* in Trollvika

Narvik Wrecks

Narvik harbour

Narvik harbour





Maps outline battles in Narvik and around Norway during World War II

The importance of Narvik as a strategic harbour increased immediately at the outbreak of World War II. Germany needed large amounts of iron ore for their armaments industry, and had a big advantage, in that the ships carrying the ore could use neutral Norway and Sweden to get safely through, without the British navy being able to attack. The export from Narvik went ahead therefore, with ore ships from many countries. Due to the war between Finland and the Soviet Union, Norway had moved her largest warships to North Norway, and in April 1940 both the antiquated armoured warships were guarding Norway's neutrality in Narvik, in order to ensure that the traffic with the ore carrying ships was not disrupted by the warring nations.

Attack on April 9th

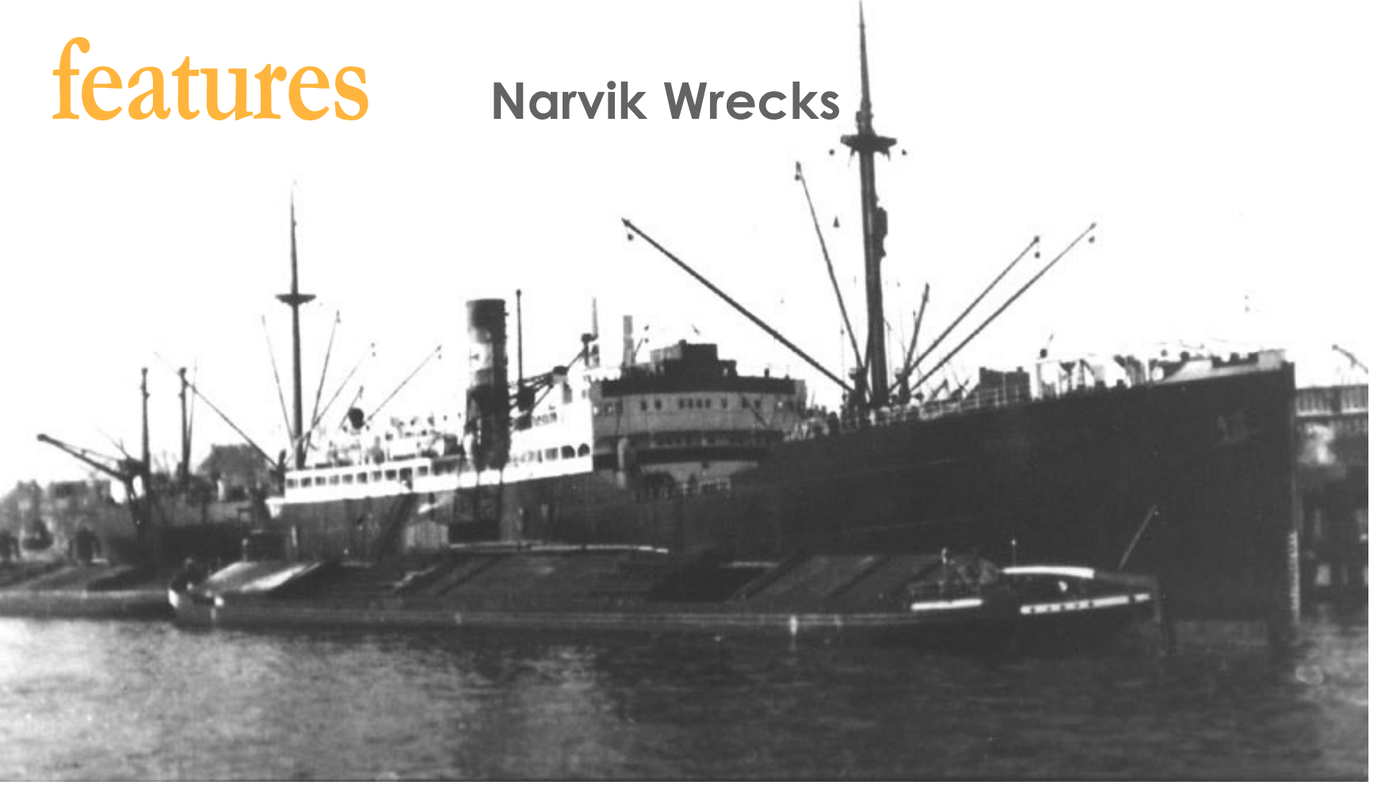
The German attack was a great surprise for Norway, and the forces in Narvik were quite unprepared for the attack. In the morning mist, the armoured warship *Eidsvold*, which was anchored outside Framnesodden, discovered that foreign naval vessels were on their way in to Narvik's harbour. Even with its forty years, the armament of the *Eidsvold* was a big threat to the much smaller German destroyer, *Wilhelm Heidkamp*, which stopped a few ship's lengths away. It must have seemed very strange for the commander of the *Eidsvold* to be requested to surrender to a German destroyer a long way in a Norwegian fjord. As the *Eidsvold* prepared to open fire the *Wilhelm Heidkamp* fired torpedoes, which sank the *Eidsvold* in just a few seconds. The German ships could thereafter sail into the harbour basin, partly hidden in a strong blizzard. On board the armour-plated *Norge*, it was clear that something was terribly wrong, and slipped its moorings. When the foreign warships were discovered in the harbour, the *Norge* immediately opened fire against them. Again, it went terribly wrong for the pride of the Norwegian navy. *Norge* was struck by a torpedo fired from the German destroyer *Anton Schmitt*, and capsized and sank in just two minutes. Out in the harbour basin, all was total chaos. The merchant ships launched lifeboats into the water, and thereby rescued a number of survivors from the *Eidsvold* and *Norge*. The captain of the German ore-boat *Bockenheim* thought that it was British forces that were attacking, as three torpedoes hit the ship. He therefore ordered the ship to be beached and blown up.

In the space of just a short time Narvik harbour was under German control. All the merchant ships that were not German were immediately put under German control, and the guns on the British cargo boats were demounted to be used as land-based artillery.

The British hit back

Even though the attack was surprising for Norway, the Royal Navy were already out in the Atlantic in a hunt for the German warships that were sail-

Narvik Wrecks



Neuenfels

ing north. Thus, the retreat of the 10 German destroyers in Narvik could be cut off. As the weather conditions were good for a surprise attack, the British second destroyer group was ordered into Ofotfjord in order to attack the German forces there, and to create the greatest possible damage to both the warships and the merchant ships there.

The attack was a total surprise, as the German destroyers at the mouth of the fjord had not observed the British attackers. The British could therefore fire their torpedoes straight into the harbour basin without meeting any serious resistance. The results were overwhelming. Two German destroyers and several cargo boats were sunk after being hit by torpedoes. In addition, many ships were damaged, and the German naval leadership in Narvik was nearly totally wiped out when the *Wilhelm Heidkamp* was hit by a torpedo. The retreat of the British ships was, however, not quite so easy, as the German destroyers guarding the fjord threw themselves into the fray. The British destroyers *HMS Hardy* and *HMS Hunter* were thus sunk in Ofotfjord. The remaining British forces also discovered the German supply ship *Rauenfels*, which was beached and blown up. Essential supplies of ammunition, weapons and provisions were thereby lost for the Germans.

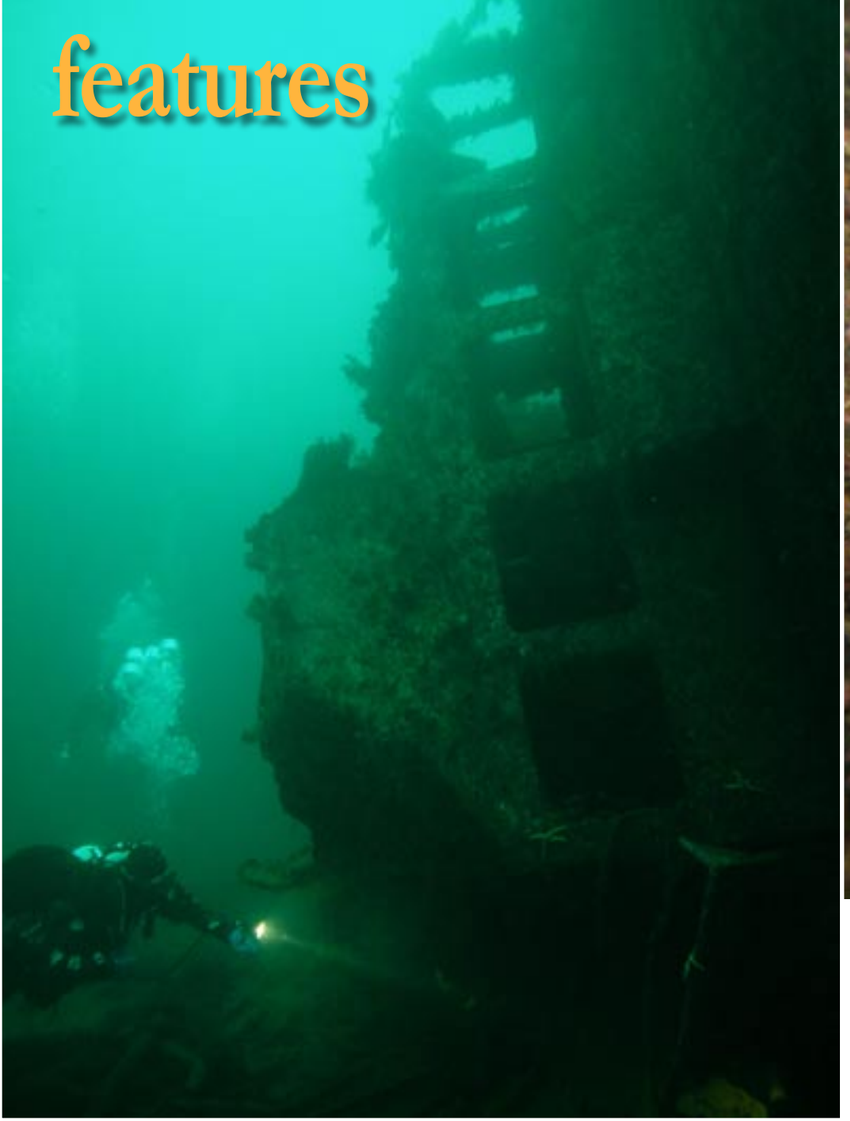
After this there were some quieter days. Planes from British aircraft carriers attacked the harbour, but caused only limited damage.

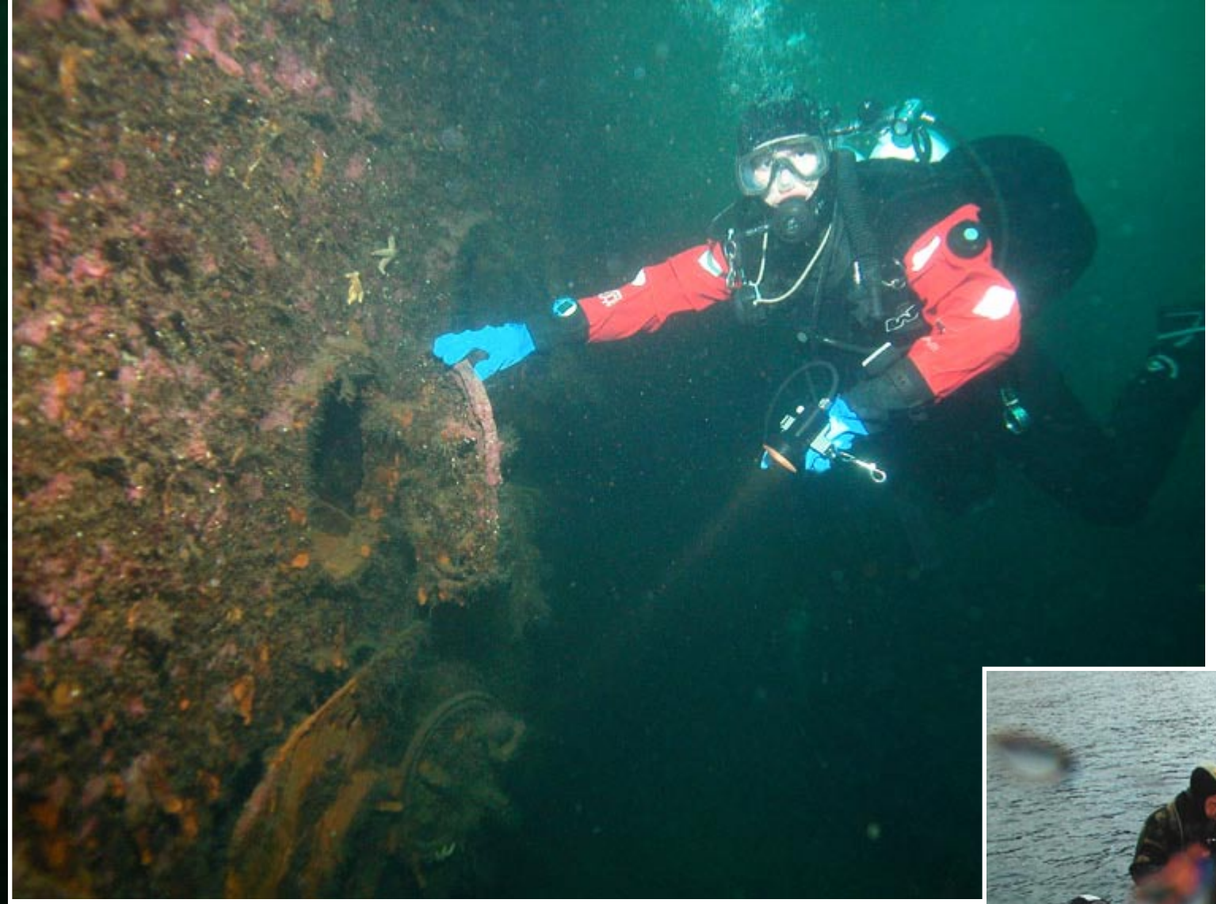
On April 13th, the great battle of Narvik harbour took place. Under command of the British battleship *HMS Warspite*, a large British force sailed into Ofotfjord to annihilate the German destroyers. German submarines attempted to attack but the torpedoes didn't work! Thus, all the remaining German destroyers could be destroyed. This time the British losses were small. Only the destroyer *HMS Eskimo* had its bows destroyed by a German torpedo. Most of the German destroyers were beached, emptied of ammunition and blown up. The merchant ships were not spared.

When the British forces pulled out, all the merchant ships were either sunk or destroyed. Narvik harbour was transformed into an enormous ships' cemetery with wrecks sticking up out of the water everywhere.

View of the great damages in Narvik Harbour after it was attacked on April 9, 1940, World War II

Narvik Wrecks





◄ A diver explores the bridge of the wreck of the German destroyer *Anton Schmitt*

▲ Close up of a porthole on the destroyer *Anton Schmitt*

► Captain Terje Seiness with divers on the way to the wrecks of the German destroyers

Other shipwrecks

Narvik was a quiet place for the rest of the war. The most dramatic event that otherwise occurred was when the German ore-boat *Odin* sailed into the German anti-mine boom at the entrance to the harbour, and immediately sank. Apart from this, it was only minor ships sinking due to collisions, overloading, etc.

There are several wrecks of aircraft to be found in the area around Narvik, both in the sea, in fresh water, and in the mountains. During the fighting in 1940, German bombers also sank several allied ships in this area. The most well known of these is the Norwegian fast-route ship *Dronning Maud* in Gratangen.

Clearing up

The big work of salvaging the sunken ships in Narvik was started already in the Spring of 1940. Norwegian and German salvage boats worked at top speed, and in just a short time most of the wrecks which were blocking the quays were lifted and sent overseas for repair. In addition, the wrecks out in the harbour basin were blown up so that the ore-boats could pass over them. After the war, the salvaging work continued on the remaining ships. From 1949 until 1956 most of the cargo boats were lifted and broken up for scrap. Only the most damaged and heavily loaded were allowed to remain, and today they make a fine and exciting diving site for wreck divers. In 1964, three German destroyers were lifted from the harbour basin and moved out to Framnesodden, where they are out of the way of shipping traffic. Thus the totally destroyed armoured vessel *Eidsvold* lies in the company of its slayers.

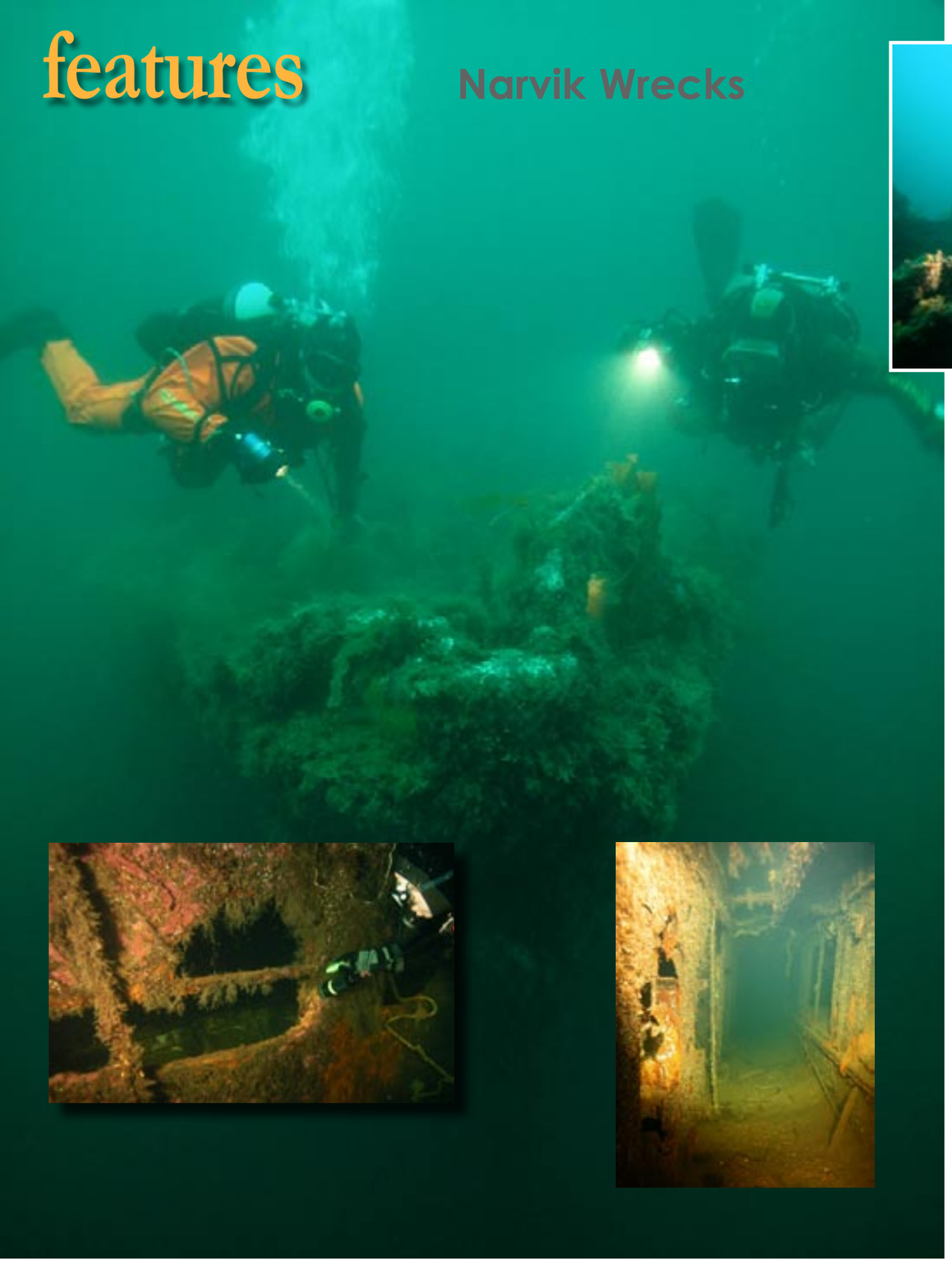
Diving to the wrecks

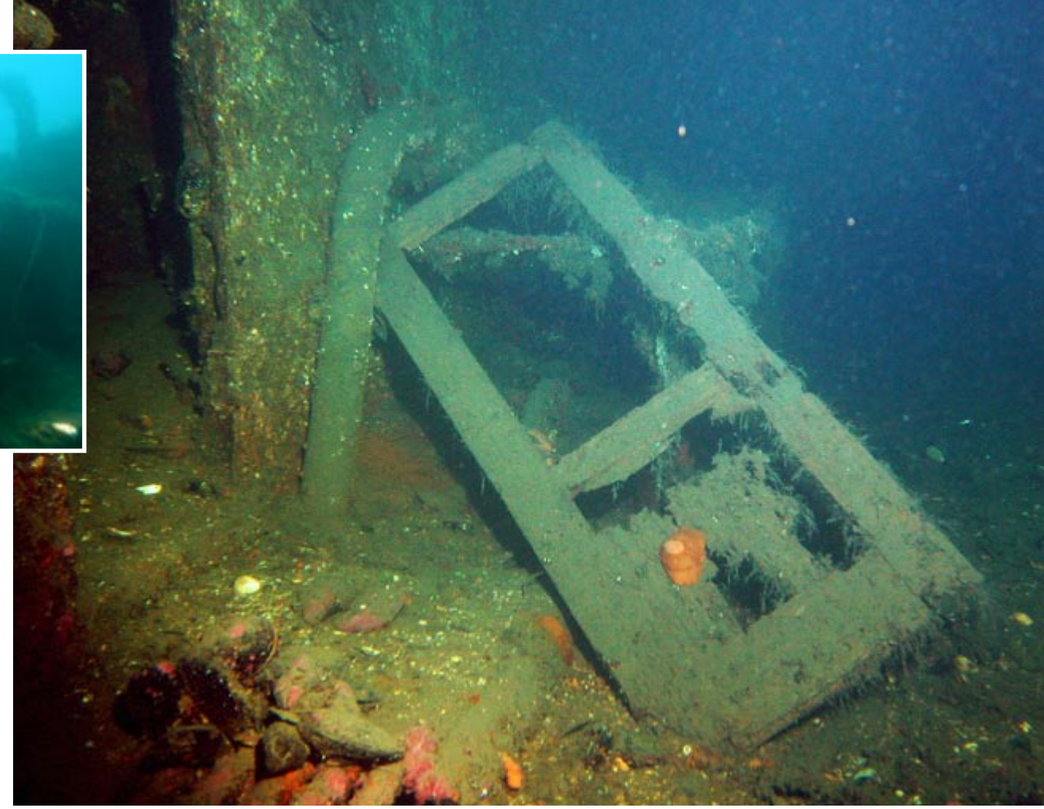
All diving in Narvik is controlled by the Harbour Authorities. Anyone wishing to dive must register with the Narvik Harbour board, and sign a declaration regarding diving to the wrecks. These rules and regulations, and self-declaration can be found on the internet at **www.narvik.kommune.no/havnetj/dykking.html**

When one has registered, a dive permit can be obtained for NOK 50.00 per week. The dive permit is valid for the wrecks: *Martha Hendrik Fisser, Strássa, Romanby, Neuenfels, Anton Schmitt, Wilhelm Heidkamp, and Diether von Roeder.*

It is totally forbidden to dive down to some of the other wrecks that lie in the Narvik area. This is because they have either not been cleared of ammunition, or that they are preserved as a historic site. Among others, it is forbid-

Narvik Wrecks





◄ Divers explore the wreck of the German destroyer *Wilhelm Heidkamp*. INSET LEFT: Gunnery holes. INSET RIGHT: Corridor of the wreck
▲ A diver gets up close and personal with artifacts still visible on the wreck of the German destroyer *Wilhelm Heidkamp*
►A door blown from the wreck of the British cargo boat *Romanby*

den to dive down to *Eidsvold, Norge, Odin, Erich Giese* and all the German destroyers in Rombaks fjord.

Three German destroyers in one dive!

Imagine diving down to three German destroyers from World War II in one single dive! It is possible in Narvik. The destroyers *Anton Schmitt, Diether von Roeder* and *Wilhelm Heidkamp* lying outside Framnesodden, were opened for diving a few years ago. The destroyers make a fine and well preserved diving site, with a dive depth of 12 - 24 meters. The wrecks lie close together, so that if you are a practiced diver with lots of air, you can visit all these three wrecks in the same dive without the need for decompression.

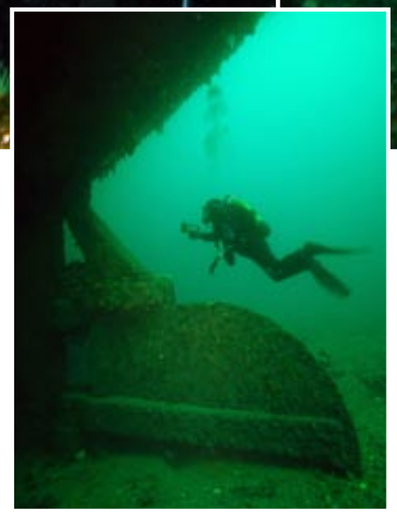
Normally, there is a small plastic buoy attached to the *Wilhelm Heidkamp* to which the dive boat can be moored. Following the down-line, one arrives at the roof of the control room of the *Wilhelm Heidkamp*, which is the middle one of the three destroyers. The vessel lies on its keel, with its stern blown off. It is recommended that one swims straight out from the starboard of the *Wilhelm Heidkamp*, to arrive at the *Anton Schmitt*, some 7 meters away.

Anton Schmitt lies leaning on its starboard side. Up at the highest part (the port side) it is about 15 meters deep, and it is 24 meters at the deepest. Most of the ship's stern has been blown away, but the wreck is otherwise fairly intact. Among other things, there is the wheelhouse with its many details. A good route, is to swim forwards to the bows and continue down towards the keel, thereafter swinging slightly towards the starboard where one will meet the bows of the *Wilhelm Heidkamp*. The bows of the destroyer stand up from the sea bottom, and it is a fine sight, to be remembered. This vessel could do 35 knots at its fastest. On the port-side af the wheelhouse below the first deck, there is a hole straight into the crew's laundry. Otherwise, there is a lot of detail that should be studied.

To get over to the *Diether von Roeder* you should swim straight out from the the port side of the *Wilhelm Heidkamp*, that is, in the opposite direction from the *Anton Schmitt*. It is about a 30 meter swim. Of the *Diether von Roeder*, just about only the mid-section remains. The stern and the bows were blown away, and much of the remaining ship shows the ravages of time. But there are still a number of details that are worth taking back with you. Outside Framnesodden, it is also not as muddy as it is in the harbour basin.

Wrecks of merchantships in the harbour

The wreck of the British cargo boat



◄ Diver reveals the reserve propeller blades of the German cargo ship *Neuenfels*

▲ Colorful corals decorate the walls of the ship wreck *Neuenfels*

► Jarles checks out the propeller blade of the *Neuenfels*

◄ INSET: Jarles with the rudder of the *Neuenfels*

Narvik Wrecks

Romanby lies in the harbour basin. The boat was being loaded on 9th April and sank after being hit by a torpedo on 10th april. Of the wrecks in the harbour, the *Romanby* is probably the best to dive down to. The wreck is fairly complete, and it is easy to swim through the corridors and down into the engine room, which lies completely open. It is recommended, though, that inexperienced divers should not swim down into the engine room.

Behind the rear cargo compartment, you can see, among other things, a folded stock anchor. Swimming further back towards the stern, and letting oneself glide out from the railing, you will see the fine rudder of the wreck together with the propeller axle that is sticking out. Being 130 meters in length, the *Romanby* is a big wreck to explore. Beautiful growths of sea anemones and sea carnations can be seen many places on the wreck. The depth along the deck is about 12 meters, and the maximum depth to the bottom outside the wreck is 28 meters. *Romanby* lies on its keel on a flat bottom. There are normally buoys on the wreck.

Neuenfels

Further in, lies the German cargo ship *Neuenfels*. This is the biggest wreck remaining in the harbour, and it is an imposing sight, with its 143 meters length and 18 meters breadth. Here, too, there is a maximum depth of 28 meters to the flat sea bed outside the wreck. Along the deck the depth is about 12 meters, which gives a long bottom-time and thereby good time to explore.

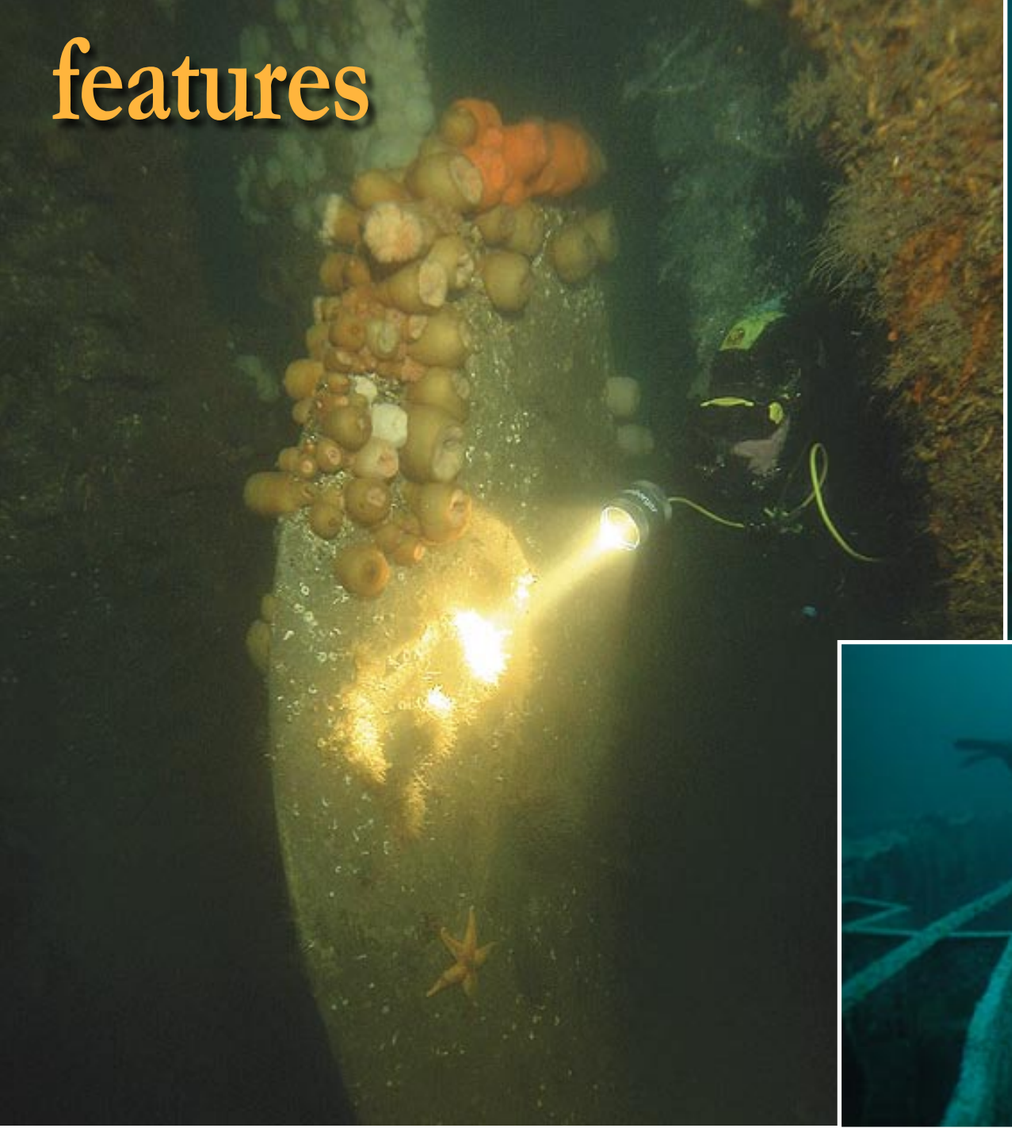
After being sunk, the *Neuenfels* lay with its masts and some superstructure above the surface, although they later had to be blown up in order not to be a danger for the shipping traffic. The remains of the blown up superstructure lies on the bottom beside the wreck.

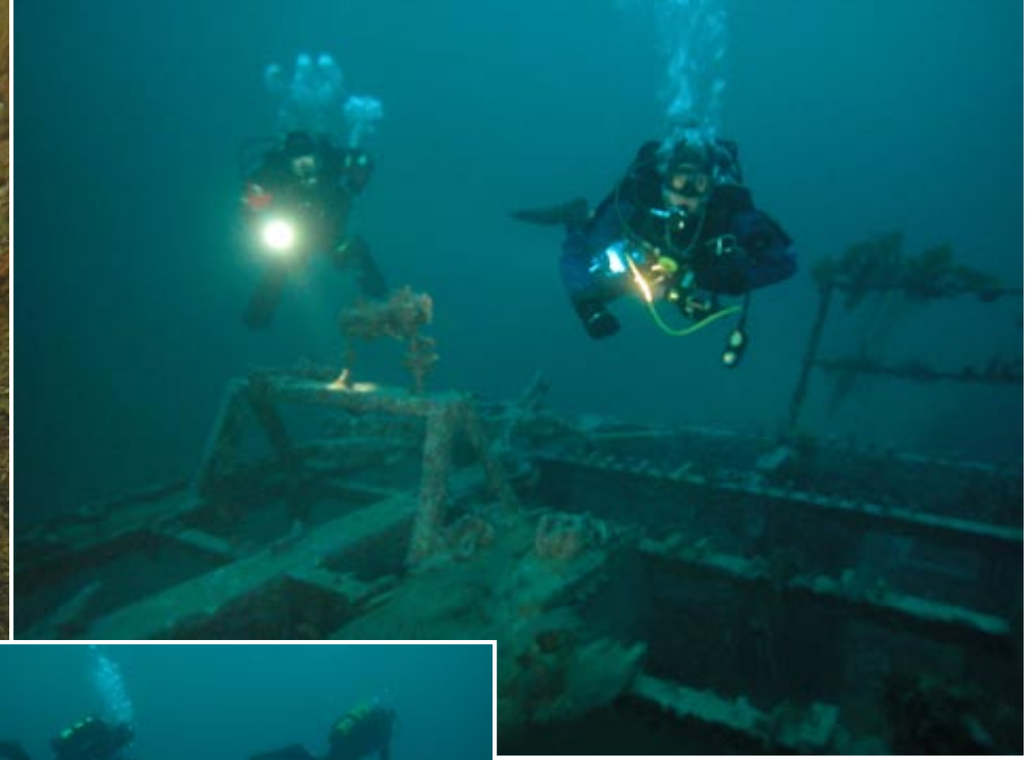
If you swim through the first cargo compartment from the stern you can see one of the reserve propeller blades. Down at the bottom, under the stern, both propellers can be seen sticking up from the seabed, and also the rudder which is half sunk into the mud. Looking out from here, one can really get an idea of the imposing size of the wreck. The hole in the hull after the torpedo hit 10th April is also an imposing sight. Normally, there are buoys on this wreck too.

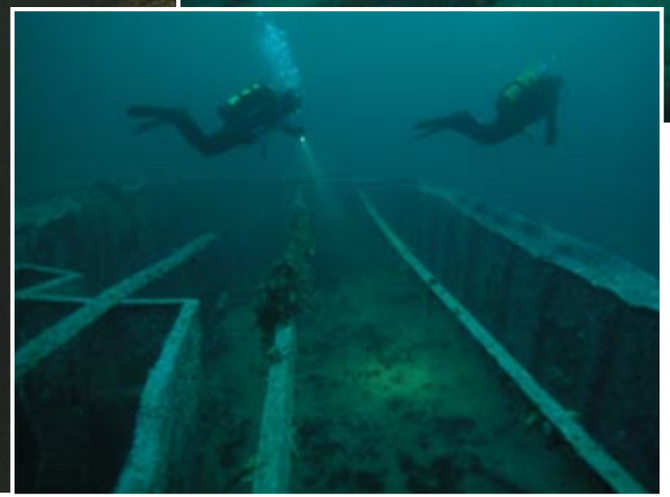
About 4-5 years ago the whole deck was covered with 30-50 cm of mud. All the mud has now gone after Narvik Urban Council extended the industrial area, which caused a greater flow between high-water and low-water. This should be taken into consideration when planning dives to the wrecks in the harbour. The surface current can often be extremely strong.

Strássa and *Martha Hendrik Fisser*

Further out in the harbour basin lie the wrecks of the Swedish cargo boat *Strássa* and the German cargo boat *Martha Hendrik Fisser*. There is only about 30 meters between the two wrecks, so it is quite possible to visit them both in a single dive as long as one just wants a general overview. If you just want to dive







CLOCKWISE FROM TOP:
▲ A diver checks out the rudder of the German cargo boat *Martha Hendrik Fisser*
► Divers explore the wreck of the Swedish cargo boat *Stråssa*
▼ *Stråssa* in its glory days
◄ The *Stråssa* is a wreck with lots of details to discover

down to the *Martha Hendrik Fisser*, one usually does so via a descent/ascent from the *Stråssa*. One can then follow a rope that is stretched between the two wrecks. Both vessels have been affected by work with explosives, but the hulls and parts of the superstructures remain.

Stråssa was kept partly afloat after the attack, but was finally blown up by the Germans in May. Today, the *Stråssa* is a fine wreck with lots of detail. The wreck lies upright on its keel on the flat seabed. The depth is about 28 meters to the bottom outside the wreck and 15 meters along the deck. Parts of the wheelhouse are still relatively intact, and one can look down into an open engine room with the ship's big motor in place. There is also a workshop here with, among other things, a lathe and other machines. Unfortunately, due to the stagnant water, the visibility is generally not very good here. The wreck is well decorated with colonies of dead man's fingers, and there is a rich animal life.

The rope between *Stråssa* and *Martha Hendrik Fisser* stretches between the sterns of both ships. On *Stråssa* this rope is fastened beneath the railing at the front edge of the stern on the portside. On *Martha Hendrik Fisser*'s stern the rope is fastened to the starboard side.

Over on *Martha*...

Martha Hendrik Fisser was the victim of a British torpedo 10th April. This wreck, too, lies upright on its keel on the 28 m deep, flat bottom. The depth along the deck of this wreck is 10-12 meters. If you get to this wreck using the rope from the *Stråssa*, you will arrive at the stern of the *Martha Hendrik Fisser*, where, among the first things you will see, is a curved staircase down to the rooms that were in the stern. In front of the stern lies the rear cargo compartment, where one can see a 4-bladed reserve propeller.

One can easily swim down into the after

Narvik Wrecks

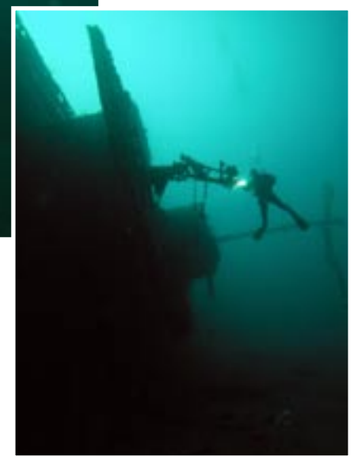
cargo compartment, towards the remains of the superstructure of the mid-ship section, where the engine room, among other things, is to be found. The engine room of this wreck is not open from above, but it is relatively easy to swim through. Look out for possible divers behind you, as it can easily become cloudy. Penetration here should not be carried out by inexperienced divers. The wreck is otherwise easy for everyone to get around on. Remember to turn back in good time if you started your dive from the *Stråssa*, and must get back to the down-line on this wreck. If the visibility is not so good you should give yourself good time for the return.

With depths down to some 28 meters (at the seabed), the most sensible is to use at least two dives to expore these two wrecks, as there are so many different things to see. If you keep to the deck, an overview of both wrecks can be obtained in a single dive.

Common to all wrecks in the harbour basin, is that the parts that have been blown away lie on the bottom just beside the wrecks. With a little planning, one can therefore also visit masts and superstructures, but visibility can be bad.

Hermann Künne in Trollvika

With regard to the German destroyer *Hermann Künne*, which lies in Trollvika in Herjangs fjord, the wreck can be reached both by car and by boat. Either way, it takes about 30-40 minutes to travel the 30 km from the centre of Narvik. If you intend to go by car, it is important first to contact some of the local divers from Narvik Sports Divers Club or Bjerkvik Divers Club. In order to be able to get down to the water where the *Hermann Künne* lies, you have to pass the boom which closes off the the final stretch of the old national road to Harstad. The wreck of the *Herman Künne* starts at the low-water line and goes down to 40 meters depth. It is a fine subject for photography, and a wreck which is suitable



Divers explore the wreck of the German destroyer *Hermann Künne*, which lies in Trollvika in Herjangs fjord

for divers at all levels of experience. Many details from the ship are to be found everywhere. The propeller has disappeared but the gigantic rudder is still there, sticking majestically out to the side. Many fish live in and around the wreck. Those who just want a relaxing time can study the many different things that they had on board. It is still forbidden to remove anything that lies in and around the wreck.

Plane wrecks too...

Not only is Narvik *favoured* with the wrecks of many ships, but there are also plane wrecks. In Rombaks fjord some kilometers north-east of Narvik, lies a German *Dornier 26* seaplane, also from the wartime. Relatively intact (one can actually see that it is a plane ...), it lies at a depth of 22 meters. The fuselage stands upright but the wings broke off when it sank and are now lying over the fuselage.

Another German plane from World War II is a *Junker 52*, which lies east in Hartvikvannet about 3 miles from Narvik. The plane is quite intact at a depth of 2 to 9 meters, and there is easy access to the plane in the summer. It is a good photographic subject.

Diving in Narvik?

As previously stated, a dive permit must be obtained from the Harbour Authorities (telephone 76- 95-03-75) in order to be able to dive in Narvik. Information, regulations og conditions for diving in Narvik, together with a self declaration for a dive permit can be found on the Narvik Harbour board's website: **www.narvik.kommune.no/havnetj/dykking.html**

• Narvik Dyk & Äventyr (Narvik Dive and Adventure) are currently the only tour operators who have a complete presentation with dive boats (live-aboard), overnighting and diving. The firm runs week tours from weeks 13 to 45. See website: **www.narvikdykaventyr.nu**

• Narvik Dykkerklubb (Narvik Diving Club) can assist with tips about diving and overnighting, and also boat trips. Contact Frank Bang on telephone 957-56-450. See also Bang's website: **http://home.online.no/~f-bang/**

• Tore Lie and Torje Løvgren provide boat trips with a 23 ft RIB. Contact telephone 911-94-960 (Torje)

• Kristoffersen Dykk (Kristoffersen Dive and leasing) fill air, give service and sell equipment. Contact telephone 907-211-05 ■

Technical data for the most relevant wrecks in Narvik:

***Wilhelm Heidkamp* – Z-21** Built: 1939
Shipyard: Deschimag, Bremen #923
Owner: German Navy
Weight: 2411 tons displacement
Dimensions: 125.1 x 11.8 meters
GPS: 68°26.086"N 017°22.643'E

***Anton Schmitt* – Z-22** Built: 1939
Shipyard: Deschimag, Bremen #924
Owner: German Navy
Weight: 2411 tons displacement
Dimensions:125.1 x 11.8 meters
GPS: 68°26.058"N 017°22.588'E

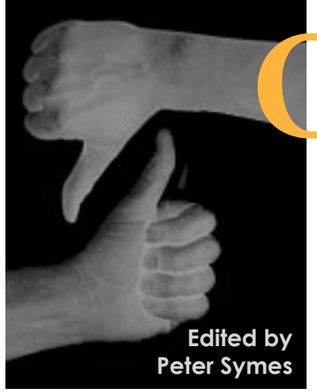
***Diether von Roeder* – Z-17** Built: 1938
Shipyard: Deschimag, Bremen #919
Owner: German Navy
Weight: 2411 tons displacement
Dimensjon:125.1 x 11.8 meters
GPS: 68°26.083"N 017°22.682'E

Romanby Built: 1927
Shipyard: W. Gray & Co,
West Hartlepool #987
Owner: Ropner Shipping Co,
West Hartlepool
Weight: 4887 tons
Dimensions:127.9 x 18.0 meters
GPS: 68°25.533"N 017°22.629'E

Neuenfels Built:1925
Shipyard: AG Weser, Bremen #397
Owner: DDG Hansa, Bremen
Weight: 8096 tons
Dimensions:143.2 x 18.6 meters
GPS: 68°25.230"N 017°23.601'E

Strässa Built: 1921
Shipyard: AB Götaverken,
Göteborg #356
Owner: Trafik AB-Grängesberg-Oxelösund, Stockholm
Weight: 5602 tons
Dimensions:120.1 x 16.3 meters
GPS: 68°25.142N 017°24.032'E

Martha Hendrikk Fisser Built: 1911
Shipyard: Ropner & Sons,
Stockton #456
Owner: Hendrik Fisser AG, Emden
Weight: 4879 tons
Dimensions:118.2 x 15.9 meters
GPS: 68°25.207"N 017°24.220'E



All perspectives expressed in this section are those of the individual author and do not necessarily reflect the views of X-RAY MAG or its associates

Edited by Peter Symes

Open Letter to Disney

Attention: Mr. Michael Eisner
Chief Executive Officer, Disney World

Dear Mr Eisner,

Since Sylvia Hui's editorial in The STANDARD on 18 May 2005 - "Disneyland weddings for the young and wealthy..The menus feature traditional Chinese banquet delicacies such as roast suckling pig, shark's fin soup and sliced abalone", you would have received hundreds of pleas at a global level to remove the gruesome item from the menu.

We are disappointed at the response or lack there of to the issue; it is apparent that shortsightedness or plain ignorance from your banquet and PR staff. By promoting and offering shark fins soup, DISNEYLAND is seen as supporting the culling of sharks, eventually causing their extinction in the world's oceans.

Imagine shark fins to be the hand and legs of Mickey Mouse; chop them off and throw the lame struggling body of Mickey on the side walk to die a slow painful death! That is how sharks are harvested from the world's oceans.

Please consider the following:

1. In the minute it takes you to read this letter almost 200 sharks will have their fins removed while still alive and thrown back into the sea to die. Shark experts estimate that 100 million sharks are slaughtered each year for their fins.
2. Shark fin is tasteless and has no nutritional value - they are cartilage, just like your fingernails and hair.
3. It is Cruel to consume shark fin. It is akin to chopping legs off a cow and throwing them back into the field and allowing them to bleed to death.
4. Because of the demand from Asia, fishermen from Galapagos are now pushing for wholesale revisions to the fishing statute by demanding a year-round fishing calendar, use of long-line fishing, a lifting of the prohibition on shark fishing. In this respect, the Asian culture is threatening to destroy one of the most unique and fragile eco-systems remaining on this planet.
5. Sharks reproduce very slowly and we are killing them faster than they can replace themselves. Sharks have slow growth rates and do not reach sexual maturity for years. It takes a whaleshark 25 years to reproduce. For Hammerheads and Tiger sharks it takes 15 years. Once sexually mature, sharks have long gestation periods with the embryo developing in the mother for up to two years.
6. Sharks are vanishing from our world's oceans very quickly. The demand for shark fin soup in Singapore, Malaysia, Hong Kong and China is primarily responsible for the peril of sharks globally — some 100 million animals are killed every year just for their fins.

Instead of supporting conservation, DISNEYLAND HONG KONG is now contributing to the extinction of sharks, promoting cruelty and wastefulness to children and young adults

To conserve sharks and the preserve the species, we must address the issue at the heart of the problem. We must reduce the demand for shark fins in Asia. Since 2001, Ocean N ENvironment and Asian Geographic have launched the 'Say No to Shark Fins" campaign on an annual basis targeting young couples and children.

Instead of supporting conservation, DISNEYLAND HONG KONG is now contributing to the extinction of sharks, promoting cruelty and wastefulness to children and young adults. Since many shark species are protected, DISNEY is therefore seen as encouraging the sale and consumption of endangered species. In this aspect, DISNEY is promoting to children and young people a message that cruelty and exploitation of animals is acceptable.

THIS IS UNACCEPTABLE

We respectfully suggest the following actions: Admit the shortsightedness of current policy, and instead, support the conservation of sharks by removing shark fins soup from wedding banquets and replace it with other more sustainable delicacies.

Since 2002, Ocean N Environment and Asian Geographic have produced a card/letter package " WHY WE ARE NOT SERVING SHARK FIN SOUP TONIGHT" for couples to distribute at their wedding dinner. Perhaps you may wish to consider this as an option. By doing this, DISNEYLAND and prospective wedding couples will be seen as intelligent, eco-savvy, and most importantly, contributing to the preservation of our ocean environment.

I trust that you will respond expediently. Imagine the next edition of Asian Geographic with Mickey Mouse struggling in agony without his arms and legs on the cover. Get the picture?

PHOTO COURTESY OF BIMINI BIOLOGICAL FIELD STATION

This guy is cutting the fin off a great hammerhead shark. Most shark finners dump the carcasses or live sharks back into the sea to die a horrible slow death of suffication. A surfboard-sized fin from a basking shark can get USD 5,000 on the market. Studies show that, since 1986, Hammerhead populations in the North Atlantic have decreased by 89%.

Submitted by:
Michael AW, Chairman
Ocean N Environment Australia
Publisher of Asian Geographic, Scuba Diver Australasia and Underwater Channel
www.asiangeographic.org
www.scubadiveraustralasia.com

SAVE OUR SHARKS CAMPAIGN 2003

Hydrothermal Vents

Ephemeral Underwater Oases of the Ocean Depths

Text by Michael Symes
Photos by Peter Batson (**www.exploretheabyss.com**)

PETER BATSON

Tevnia plume

Hydrothermal vents are places in the Earth's crust where very hot water arises from vents in the cold, deep-sea floor. This hot, mineral-laden water is a rich environment for the development of an exotic marine life, previously unknown before the discovery of hydrothermal vents. This marine life uses a quite different chemistry from other animal life, be it marine life in the upper sea levels, or terrestrial life. Thus, hydrothermal vents are not only very interesting geologically speaking, but even more so from the biological point of view.

Their discovery

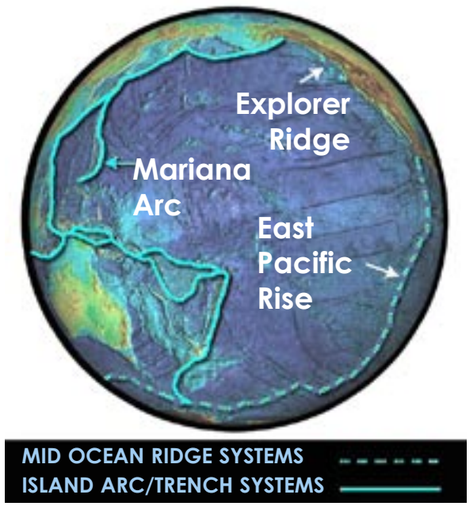
Prior to the 1970s, hydrothermal vents were an unknown phenomenon, but certain observations had led marine geologists to hypothesize that vents existed. Rocks had previously been recovered from the sea floor containing minerals known to form when volcanic rocks react with seawater. Such rocks are to be seen on Iceland and other volcanic islands today. And sediments with unusually high amounts of iron, manganese, and other metals are found near mid-ocean ridges. There are also large chunks of ocean crust, kilometers thick, known as *ophiolites*, that have been lifted up onto land by tectonic forces. These ophiolites show evidence of hot seawater circulation through fissures in the rocks in the distant past.

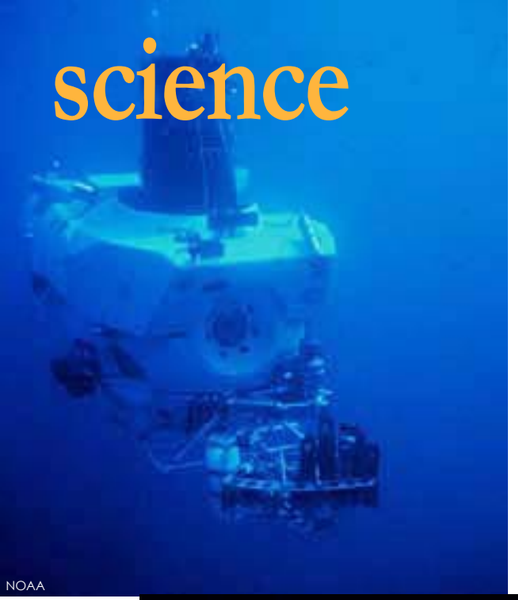
Furthermore, heat flow anomalies indicated that the crust near a mid-ocean ridge crest was cooler than expected. It was infered that the crust was cooled by circulation of seawater through cracks and fissures in the rock. There were also deep-tow temperature anomalies. An instrument package towed at about 2500 meters depth near the East Pacific Rise, a geologically active zone betwen the Pacific tectonic plate and the Nazca plate, measured an average temperature of ca 2°C, but detected warmer water temperature peaks of 0.1°C to 0.2°C.

This then led geologists, in 1977, to organize an expedition to an area of the East Pacific rise near the Galapagos islands, some 2500 meters below the surface. They took a deep tow instrument and Cousteau's research submersible *Cyana*. They first found slightly warm water with the deep tow, then dived on that spot in *Alvin*. As they hoped, they found 20°C warm water seeping from fissures. But more importantly, they found a strange alien landscape littered with what looked like chimneys expelling clouds of black smoke.

The greatest surprise, however, was that there were very numerous, large animals living around the vents.

Global View: Pacific Ring of Fire



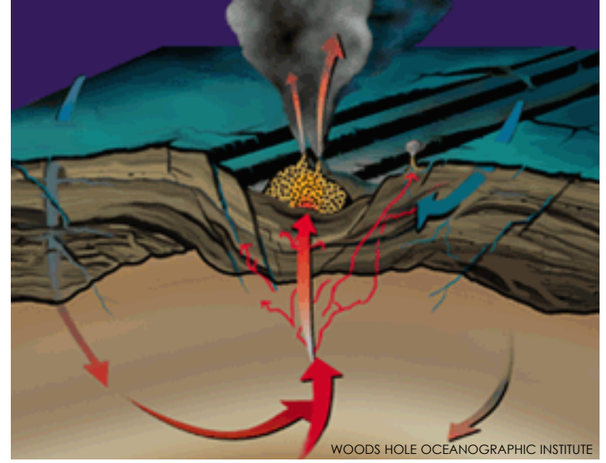


NOAA

Hydrovents

TOP LEFT: *Alvin* submersible
BOTTOM LEFT: Alvinellacaudata
FAR RIGHT: Black smoker
BELOW RIGHT: Map of Active Sites

Surrounding these chimneys was a unique type of ecosystem that had never been seen before. These animals turned out to be completely new species, often new Families or Orders, and even one new Phylum. Until then, it had always been assumed that all life on Earth obtained its energy from the sun. Using a process called photosynthesis sunlight is converted into energy by plants which, in turn, provide food for countless species of animals in a complex web of life. But here was a sight that challenged those assumptions. Here was proof for the first time that life could be sustained by the earth itself, totally cut off from the world of sunlight.



WOODS HOLE OCEANOGRAPHIC INSTITUTE

THE CHEMISTRY OF A "BLACK SMOKER" IS UNIQUE: AFTER SEA WATER SEEPS INTO THE CRUST, OXYGEN AND POTASSIUM AND THEN CALCIUM, SULFATE, AND MAGNESIUM ARE REMOVED FROM THE WATER. AS THE WATER HEATS UP, SODIUM, POTASSIUM AND CALCIUM DISSOLVE FROM THE CRUST. MAGMA SUPERHEATS THE WATER, DISSOLVING IRON, ZINC, COPPER, AND SULFUR. THEN THE WATER RISES BACK UP TO THE SURFACE, WHERE IT MIXES WITH COLD SEA-WATER, FORMING BLACK METAL-SULFIDE COMPOUNDS.

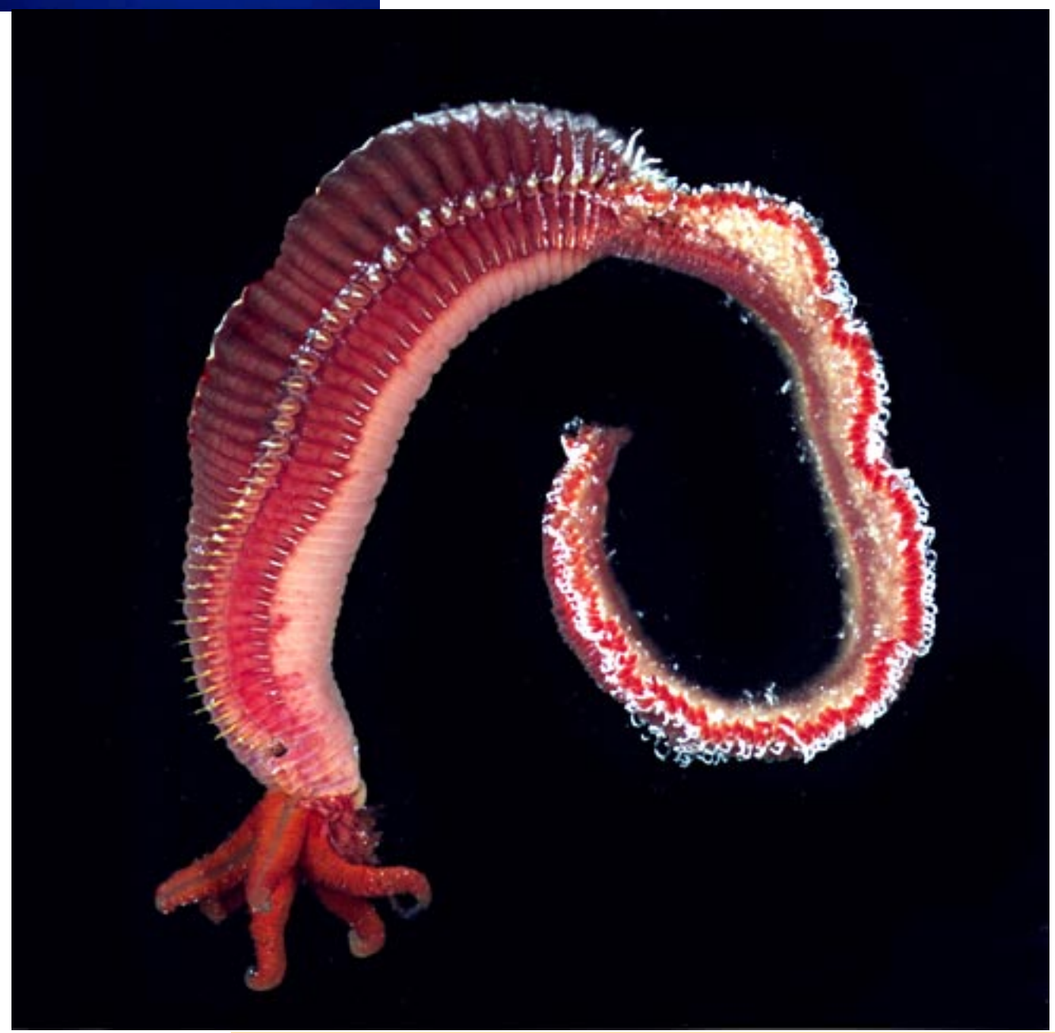
NOAA

Hydrothermal vents and their formation

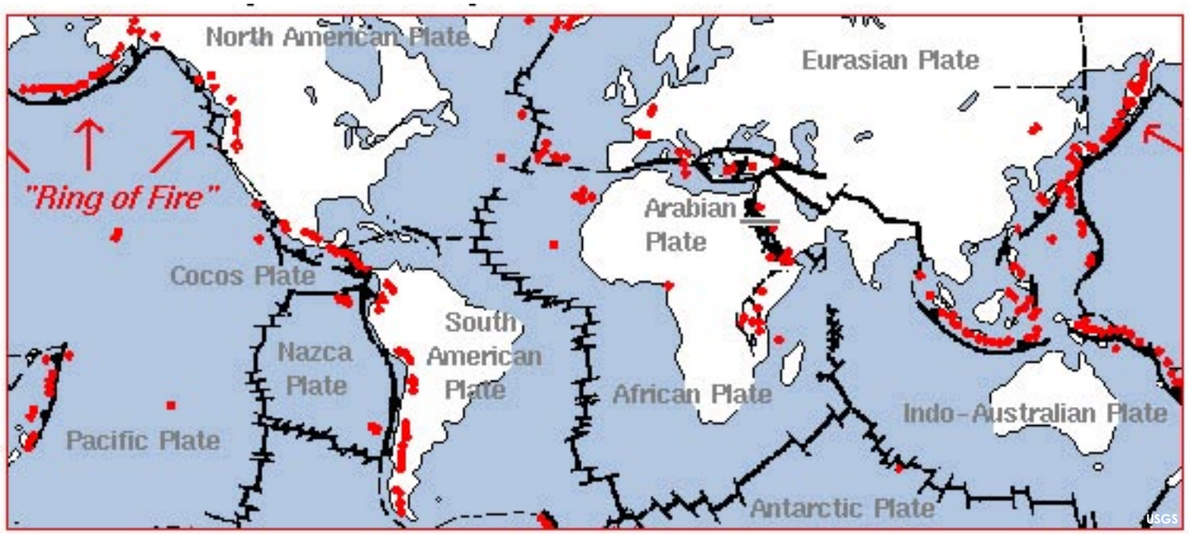
Hydrothermal vents occur in geologically active regions of the ocean floor where the planet's crustal tectonic plates are slowly spreading apart thus allowing magma to well up from below to form mountain ranges known as mid-ocean ridges. Vents are usually clustered in fields and normally found at a depth of more than a kilometer. Most have been discovered along the crest of the Mid-Oceanic Ridge, a 74000 kilometer-long chain of mountains that wraps around Earth like the seam on a tennis ball. A few vents have also been found at seamounts, underwater volcanoes that are not located at the intersection of the tectonic crustal plates.

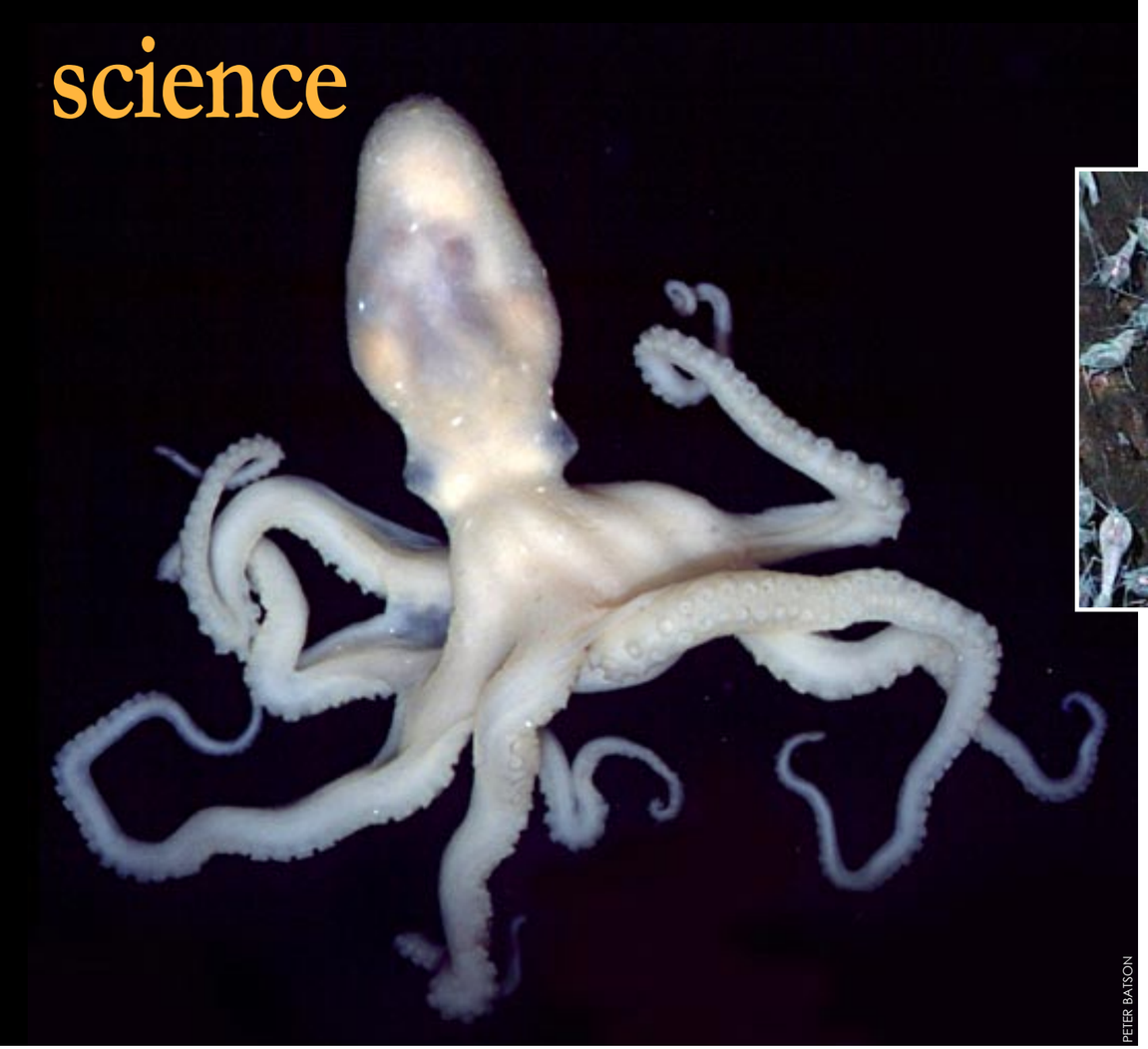
As cracks form in the ocean floor at these spreading centers, seawater seeps a kilometer or two down into the hot rock where it is heated by the intense heat of the magma. As the water is heated to boiling point, it expands and rises back to the surface, up through the cracks and fissures through which it dropped. On its way back up, the hot water dissolves minerals and other chemicals from the rock. When it reaches the ocean floor, the water is a rich, chemical soup. Some of the minerals precipitate out of the sea water and harden on the rim of the vent. Over time, the rim of the vent is built up into a tall, chimney-like structure. These chimneys are formed from dissolved metals that precipitate out when the super-hot vent water meets the surrounding cold deep ocean water. Individual vent openings typically range from less than a centimeter to more than two meters in diameter.

Vent chimneys can grow very rapidly, up to 9 meters in 18 months. During a December 1993 dive to the Phoenix vent field, *Alvin* accidentally toppled a 10



PETER BATSON




PETER BATSON

Hydrovents


NASA


PETER BATSON

Strange and unique species develop in the ecosystem of the hydrothermal vents such as the vulcan octopus (ABOVE), shrimp and vent crabs (INSET).

meter-tall smoker. When the sub returned for a brief visit three months later, the chimney had already grown back 6 meters.

The dark colour of the water spewing forth from these vents has earned them the name *black smokers*.

As the vent water bursts out into the ocean, its temperature may be as high as 400°C. This water does not boil, however, because it is under so much pressure; for when the pressure on a liquid is increased, its boiling point increases. However, the intense heat is limited to just a small area. Within less than a couple of centimeters of the vent opening, the water temperature drops to 2°C, the ambient temperature of deep seawater.

Chemicals in hydrothermal vents

There is a very mineral-rich environment surrounding these vents. The water rising from the vents is acidic, with a pH of about 3.5, and contains up to 0.03% H_2S. It contains significant amounts of calcium, potassium, and sodium, together with silicon, barium, rubidium, iron and manganese.

The *black smokers* are the hottest of the vents. They throw out mostly iron and sulfide, which combine to form the black iron monosulfide. It is this compound which gives the smoker its black colour. There are also so-called *white smokers* which release cooler water, and which contain amorphous silica mixed with zinc- and iron-sulphide, and calcium- and barium-sulphate. These compounds are white.

However, important and commercially interesting as the chemicals in the vents might be, it is the creatures surrounding the vents that are the most interesting.

Creatures at these oases

Scientists once thought that no living thing could survive the harsh combination of toxic chemicals, high temperatures, high pressures, and total darkness existing at these vents. Similar communities have since been found at several hundred hot spots around the world. Hydrothermal vents are like underwater oases, providing a habitat for many creatures that are not found anywhere else in the ocean. More than 300 new species have been identified since the first vent was discovered in 1977.

These creatures are like nothing else on Earth.

Thickets of giant tube worms, some more than two meters tall, can be seen around


PETER BATSON

TOP RIGHT: Stalked barnacles
RIGHT: Alvinella head

Hydrovents

ABOVE: Riftia on tevnia
RIGHT: Palm worms are one of the many species that live near hydrovents

the vents. The tail ends of the worms are firmly fixed to the ocean floor, while the red plumes at their heads look like a field of red poppy flowers. When *Alvin* had been at the same spot less than two years earlier none of these strange creatures had been observed. Measurements at the site have since shown that individual tube worms can increase in length at a rate of more than 80 cm per year, making them the fastest-growing marine invertebrates.

In addition to the giant tube worms, which have so far been found only in the Pacific, there are Jericho worms, bristley orange worms, small benthic worms living in the mud, and finger sized, red palm worms that stand upright, topped with fronds. A special class of small worms, called *Alvinellids* (named after the sub), live on the walls of mineral deposits that form around vents.

Mussels, shrimp, clams, and crabs are abundant at many vents, but these are not the same species we usually eat. The prawn-like shrimps that dominate vents in the mid-Atlantic, for example, have no eyes. Both clams and mussels reach enormous size near vents. They appear to live about 20 years and attain lengths of 20 to 30 cm. Like the tube worms they, too, have symbiotic bacteria that live within specially modified gills. Although the clams and mussels do have digestive tracts, it appears that the symbionts provide nearly all of their food.

It is still not fully known how shrimp and other vent creatures can cope with chemical-laden seawater that would kill ordinary shellfish.

While octopuses are at the upper end of the vent's food chain, bacteria are at the bottom. They are the first organisms to colonize newly formed vents, arriving as if in a blizzard and then settling to form white mats attached to the ocean floor. Bacteria have been found living beneath the ocean's floor, and it seems likely that they emerge from below when the conditions are right. Most of the creatures that congregate around vents live at temperatures just above freezing.

Thus chemicals are the key to vent life, not heat.

Incredible deep sea creatures had been known for quite some time, but these animals all depended on the regions above for their sustenance. They feed on small scraps of food and dead animals that fall from above. Here at the vents, though, something entirely different was taking place. These organisms were using another process to get their food directly from the vents themselves.

This process is known as *chemosynthesis*, with bacteria in the water actually feeding on what would otherwise be a lethal soup of noxious chemicals. Small animals feed on these bacteria, and these small animals again provide food for the larger animals. It is an entire ecosystem, totally separate from the world of light.

It should be noted, though, that not all vent animals have symbionts. Some are scavengers or carnivores that benefit from the rich food supply, for example, crabs and amphipods

SYMBIOSIS
Symbiosis is an association between two organisms that benefits them both. In the case of many of the vent animals, the animal has chemosynthetic bacteria as symbionts. The animal gets its food from the bacteria. The bacteria get an ideal location for growth, because the animal provides them with both oxygen and hydrogen sulphide.

Chemosynthesis

Chemosynthesis is analogous to photosynthesis but with a different energy source.

Photosynthesis, which is used by all terrestrial plants, and the great majority of the marine ones too, is exemplified by how phytoplankton produce their food. In this process, carbon dioxide and water react under the energy input of sunlight, with chlorophyll as a catalyst, to produce organic molecules such as sugars and starch, with oxygen as a biproduct.

$CO_2 + H_2O \rightarrow$ 'CH_2O' + O_2

THE TUBE WORM
A particularly remarkable type of vent animal is the tube worm. These can be 3 or more meters long. They live within a tough, white tube attached to the sea floor near a vent. A red "plume" protrudes from the top of the tube. This structure contains red haemoglobin, that absorbs oxygen, carbon dioxide, and hydrogen sulfide from the water surrounding the worm. The brown, spongy tissue filling the inside of a tube worm is packed with symbiotic bacteria - about 10 billion bacteria per gram of tissue. The bloodstream of the tube worm transports the absorbed chemicals to the bacteria, which are housed within a special organ called the trophosome. The bacteria then use these chemicals to grow and to produce organic substances that are absorbed by the worm for food. Having no digestive tract at all, the worm thus depends solely on the bacteria for its nutrition.

Tube worms reproduce by spawning: They release sperm and eggs, which combine in the water to create a new worm. Biologists don't know how the infant worm acquires its own bacteria. Perhaps the egg comes with a starter set.

At least 5 different species have been discovered.

ABOVE: Colony of tube worms

Hydrovents

PETER BATSON

Stalked barnacles

where 'CH_2O' is the basic building block of sugars, lipids, etc.

For the production of a specific compound, sugar, we can write the following process.

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

i.e. six molecules of carbon dioxide plus six molecules of water produce one molecule of sugar plus six molecules of oxygen. Here the sugar can be glucose, for example.

However, due to the absence of light-energy from the sun to power photosythesis other energy sources must be used to drive food synthesis. Now, the most prevalent chemical dissolved in vent water is hydrogen sulphide, H_2S, which is produced when seawater reacts with sulphate in the rocks below the ocean floor. And it is that which supplies the energy to drive the chemosynthesis, for hydrogen sulphide is a highly reduced molecule, and therefore a great deal of energy can be obtained when it is oxidised. This ability to oxidize and release the energy in H_2S is restricted to certain types of bacteria containing the oxidising enzyme.

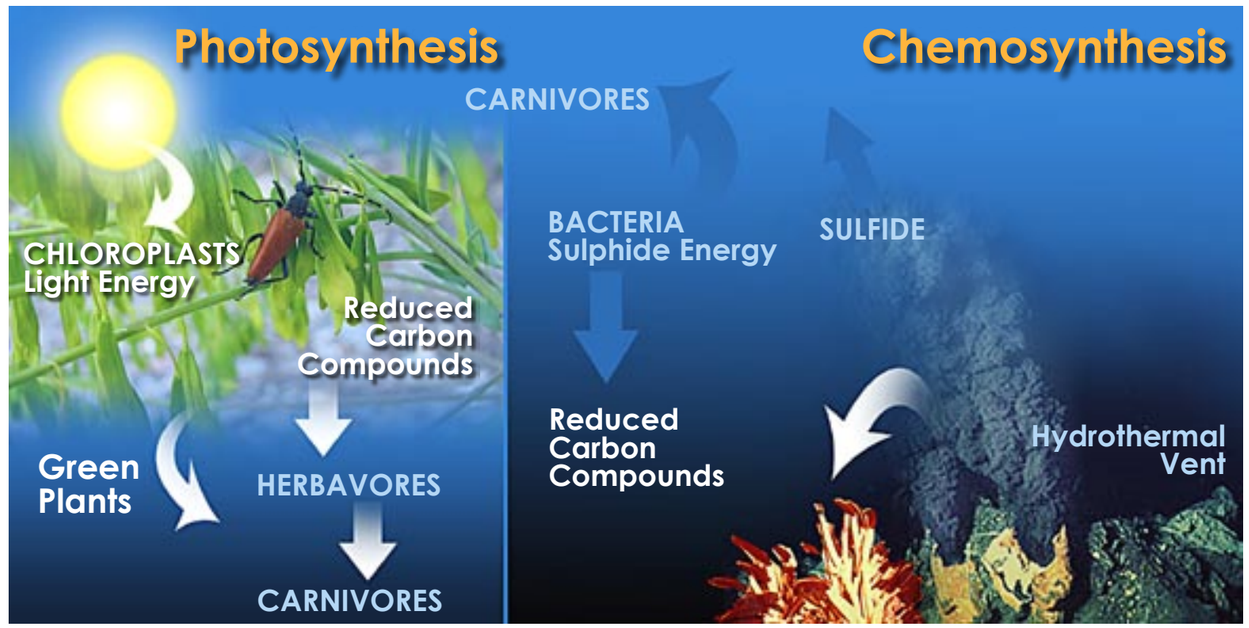
Chemosynthesis takes place in two stages, with the first stage being catalysed by bacteria such as *Thiomicrospira* and *Thiothrix*.

$$H_2S + 2O_2 \rightarrow SO_3^{--} + \text{chemical energy} + H_2O$$

The chemical energy produced here then facilitates the reaction between carbon dioxide and water to produce organic molcules.

$$CO_2 + H_2O \rightarrow \text{'}CH_2O\text{'} + O_2$$

As shown above, symbiotic chemosynthetic bacteria can use hydrogen sulfide as their energy source. However, methane-using symbiotic chemosynthetic bacteria also exist, especially at cold-seeps (see below). There are many varieties of chemosynthetic bacteria. Nearly all use a reduced chemical energy source, using oxygen to oxidize it to produce the energy they need.



Instead of photosynthesis, hydrothremal vent ecosystems get their energy from chemicals in a process called *chemosynthesis*. Both methods involve an energy source, carbon dioxide and water to produce sugars. Photosynthesis gives off oxygen gas as a byproduct, while chemosynthesis produces sulfur. Information source: NOAA

Hydrovents

Transience

Vent fields are tens of kilometers apart along ridge axes, and most vent fields are probably active only for about 20 years, although some can be active for 100-1000 years. The chimneys eventually become blocked as chemical precipitates plug up the cracks and fissures and flow ceases. The animals near such dead vents also die. However, new vent systems form fairly frequently, as forces of plate tectonics open new cracks and fissures.

Most of the animals that live near vents are sessile, and even animals like crabs can't move that far. So, how are new vents colonized? How do vent species survive when vents frequently die?

Hydrothermal vents may play a role in the regulation of ocean temperature which has a large affect on coral growth and health

Colonization of new vents

It is not known how tube worms and other organisms locate new vents for colonization. The vents are small, and they are separated, like islands. Most vent organisms have a free-swimming larval stage. But it is not known whether the larvae float aimlessly or purposely follow clues, such as chemical traces in the water, to find new homes. Many vent animals produce eggs with large yolk sacs. It seems that their eggs and larvae can survive for a long time, perhaps years. It is thought that the larvae drift with currents along the bottom, which may tend, at least slightly, to flow toward active vents. When the larvae find favorable conditions, they settle to the bottom and grow to adults. However, most die because they fail to find an active vent. When the flow of hot, sulphide-rich water slows to a trickle, death also comes quickly.

Cold Seeps

These are entirely different, geologically, from hydrothermal vents. They occur in situations where sediments are compressed, squeezing out the water between the mineral particles and causing it to seep out of the sea floor. Cold seeps are mentioned here because they have hydrothermal vent-like organisms that use a CH_4- or H_2S-based energy source.

Animals that don't live near vents

Some animals normally found in the deep ocean are not found, or are rare, near vents. These include sponges and anemones and echinoderms. Perhaps the conditions near the vents (hydrogen sulphide, high temperature, etc.) are harmful to them.

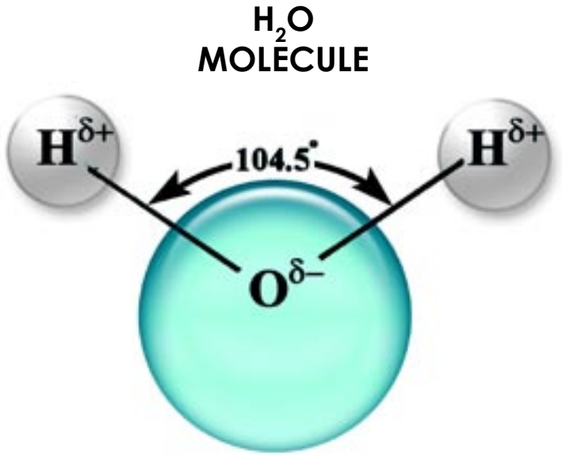
Sponges and soft corals do not grow near hydrothermal vents. It is thought that they cannot survive in this extreme environment

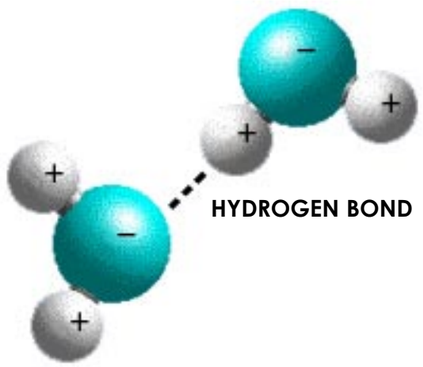
Hydrothermal vents are important sources of knowledge

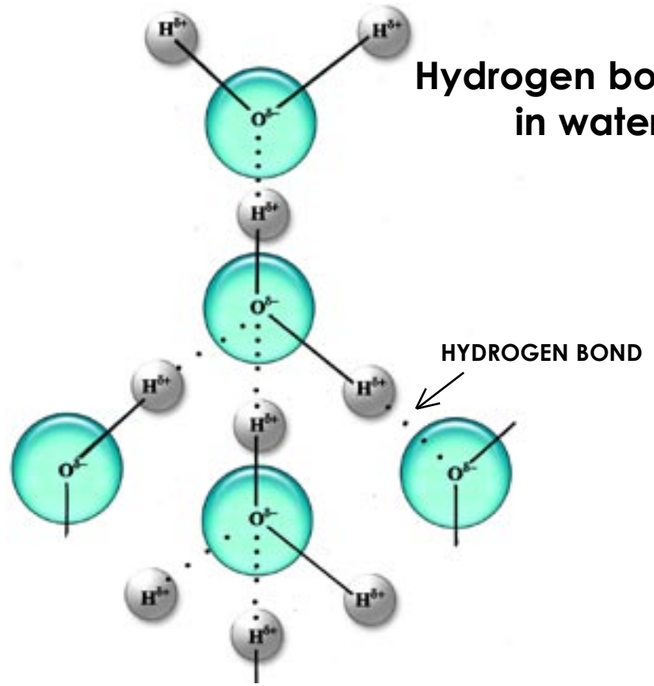
Interesting as it is in itself, the life surrounding hydrothermal vents is also an important source of knowledge. For example, vent bacteria can withstand higher temperatures than any other organism. That makes them attractive to researchers who are developing heat-stable enzymes for genetic engineering, and culturing bacteria designed to break down toxic waste. Also, these bacteria and tubeworms may show the way to the development of new drugs, industrial processes, and other products useful to us all.

Some biologists think that life, in the form of chemosynthetic bacteria, first evolved at vents. One reason is that such deep sea organisms would have been less affected by the harsh and highly variable conditions on the Earth's surface, where any photosynthetic organisms would have needed to live. Certain microorganisms have adapted to thrive on these vents and create rich underwater ecosystems that some scientists believe may represent some of the earliest life forms on Earth. Biologically, hydrothermal vents have a lot to tell us about the origins of life and the conditions in which life can be found, which is important to our continuing search for life elsewhere.

There are many other reasons why scientists want to learn more about hydrothermal vents. For example, these underwater geysers are believed to play an important role in the ocean's temperature, chemistry, and circulation patterns. Hydrothermal vents are central to the function of the Earth system and the life that is part of it; the vents at ocean ridges are an essential part of the chemical balance of seawater. ■







Text by Micheal Symes

Water Facts

THE HEAT CONTENT OF WATER

It has often been stated that life depends on the anomalous properties of water. More than 40 properties of water appear to be anomalous in some way or other, and among these is its large heat capacity.

The specific heat capacity of a substance is the amount of heat energy required to heat one gram of the substance one degree. The original unit of heat energy was the calorie, which was the amount of heat energy required to heat water one degree celcius. However, the relative unit of the calorie was later replaced by the absolute unit of the joule, where one calorie equals 4.18 joule. Water then has a specific heat capacity of 4.18 J g-1 K-1 , where K refers to the absolute temperature scale.

Water has the highest specific heat of all liquids except ammonia, and can thus retain and store large amounts of heat. This high heat capacity of water has as least two major impacts on our lives.

For the first, the large heat capacity of the oceans and seas allows them to act as heat reservoirs, so that sea temperatures vary only a third as much as land temperatures. This effect moderates and stabilises our climate, reducing extremes in temperature. That is also why coasts experience a milder climate than areas that lie more inland. The heat stored in water is also transported to other places around the globe through currents and will warm up colder water.

Secondly, and of more direct importance to humans, the high water content in organisms contributes to thermal regulation and prevents local temperature fluctuations. This allows us to more easily control our body temperature.

The high heat capacity of water is also the reason, for example, why hot water can cause such serious scalding. Hot water, when cooled from say 100°C to the temperature of skin, releases such a large amount of heat energy to the skin that it causes the damaging and very painful scald.

But why has this apparently simple substance such a high specific heat? The answer is *hydrogen bonding*, which also explains many of the other properties of water.

HYDROGEN BONDING

Water is a polar molecule, having a weak, partial negative charge d- at the oxygen atom and a partial positive charge d+ at the hydrogen atom. This is because the electron shell round a hydrogen atom is rather thin, and the positive charge on its nucleus shows through, thus giving the hydrogen atom a small but definite positive charge. On the other hand, the electron shell round an oxygen atom is rather thick, and so the oxygen atom has an extra bit of negative charge. These opposite charges attract, giving a relatively weak force called a hydrogen bond. Thus, when water molecules are close together, their positive and negative regions are attracted to the oppositely-charged regions of nearby molecules. This hydrogen bonding is shown by dotted lines in the diagram. Each water molecule has the potential to be hydrogen-bonded to four others. It is these hydrogens bonds that account for some of the essential and unique properties of water.

As water is heated, the addition of energy first causes the hydrogen bonds to bend and break. And, as water is a light molecule there are more molecules per gram than most simlar molecules to absorb this energy. Now, because the energy absorbed in these processes is not available to increase the kinetic energy of the water, and thereby raise its temperature, it takes a considerable input of heat to raise the temperature of water. Which is the same as saying that it has a high specific heat. ■

Leigh Cunningham

Photos courtesy Craig Nelson
www.aquaimaging.co.uk

Configuration & Hose Routing

Two hotly debated subjects

Leigh Cunningham is the technical manager and TDI Instructor Trainer for Ocean College, Sharm El Sheikh.

Probably best known for his records - Leigh once held the record for the deepest dive in the Red Sea - and attempts of reaching extreme depths, he also has a wide range of teaching credentials to his curriculum:

TDI instructor trainer, DSAT Tech Trimix instructor, PADI MSDT IANTD Technical diver instructor CMAS 3 star instructor.

Since the introduction of Scuba diving in the mid 1950s, one of the most hotly debated subjects in the world of technical diving is that regarding the best type of gear configuration. Over the years, many experienced divers, instructors, and training agencies, have all claimed that their method and style of kit configuration is the best.

In my opinion, the specifics regarding kit configuration can frequently vary because of the effects of different diving environments, be they fresh-water deep cave, open-ocean, or decompression diving. And there are also the personal experiences and preferences of the individual diver to consider. What might be a very logical, safe configuration in one environment, could lead to a multitude of difficulties in a very different environment. For example, I have had much discussion with many divers on the issue of whether or not to have the back-up inflator connected to the redundant wing. A redundant wing system is standard kit for divers using wet suits, and is also an option for those using dry suits. The distadvantage of having the back-up Low Pressure Inflator (LPI) connected would be the possibility of having a 'creeping' inflator.

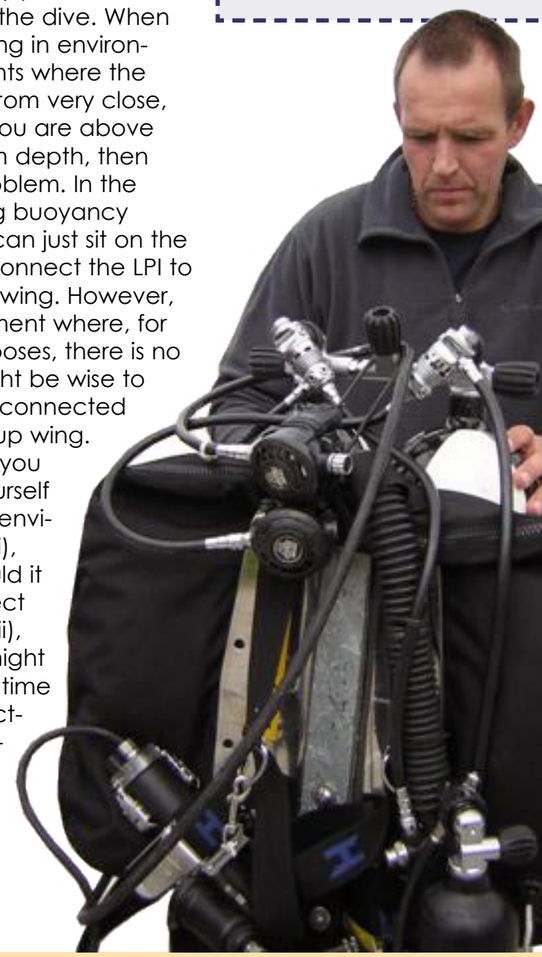
But what is a creeping inflator? For those using wet suits, the tech wing (BCD) would have a redundant bladder to give independent back-up buoyancy. Divers using dry suits may consider the dry suit as a form of back-up buoyancy or opt for the redundant wing. Normally, divers would not use the back-up bladder unless there was a problem with the primary bladder. During a rig check prior to a dive, the back-up system should be checked along with everything else. For if this isn't done there is the possibility that salt crystals could form around the inflator mechanism. This would then cause the back-up inflator to fill only very slowly, i.e. creep, causing buoyancy problems. The diver would then have to vent gas from two bladders during the ascent, which can be very tricky.

In my opinion, the specifics regarding kit configuration can frequently vary

Unless equipment is not maintained by cleaning and washing after every dive, it is highly unlikely salt crystals will form. I have, though, met numerous divers who do not have the back-up inflator connected to the LPI. In my opinion, because of the possibility of a creeping inflator in some environments, e.g. a bottomless wall, it would be very wise to have the back-up inflator connected to the LPI at all times..

As stated, having a creeping inflator could cause buoyancy problems during the dive. When diving in environments where the bottom very close, or you are above your maximum depth, then there is no problem. In the event of losing buoyancy abruptly you can just sit on the bottom and connect the LPI to your back-up wing. However, in an environment where, for practical purposes, there is no bottom, it might be wise to have your LPI connected to your back-up wing. The questions you should ask yourself in this type of environment are (i), how long would it take to connect the LPI? and (ii), what depth might I be at by the time I get it connected and establish neutral buoyancy?

When hoses are routed down and behind, they don't snag on objects, and it is more streamlined



Many factors dictate the degree of negative buoyancy at depth. These can be the depth itself, the thickness of the wet suit, and how close you are to a perfectly weighted system (steel tanks all round make an over weighted diver).

Be safe! Have a neat and tidy, streamlined diving system.

Also, a diver may be able to maintain his depth at the bottom by lightly finning. However, finning too hard and for too long could lead to excessive CO_2 production. The breathing rate would then increase, and the flushing and exhaling of CO_2 would become less efficient. This would then cause the breathing rate to increase even more, producing more CO_2 and thus predisposing the diver to a heavy narcotic hit, together with a greater possibility of O_2-toxicity problems. This is the well known vicious circle of too much CO_2, leading to too much N2, leading to too much O_2.

Very deep diving for technical divers will have a different set of considerations for buoyancy compared to the average recreational diver, who may experience depth changes of only just a couple of atmospheres. At 200m there is a great deal of difference, with a pressure change of over twenty atmospheres. At these depths, an over-weighted diver runs the risk of reaching the point of no return, where the ability to inflate is exceeded by an increasing descent speed, as suit-compression and excess lead, or the addition of steel tanks, steel plates and unnecessarily heavy equipment, becomes overwhelming.

Example of a single bladder wing - the Gravity Zero 55lb seen at **www.abyssuk.com**

Bungee or not?

Another hotly debated subject is whether to have a bungeed or an un-bungeed wing system. Again, much like the Low Pressure Inflator issue, there is no one right or wrong answer. There is only the consideration of what should be used in a variety of environments or diving circumstances. For example, in confined or closed environments, such as cave or wreck penetration, the bungeed wing could result in snagging or entanglement, whereas in open water or ocean diving this problem would not generally occur. The advantage of a bungeed wing is that, if a diver found himself in an undesirable position where it was difficult to dump gas by adjusting his body to an optimum position, then the bungee would assist in self-deflating the wing by squeezing the gas out from any position. However, that advantage could also turn into a disadvantage in the event of a wing malfunction, such as a split or ruptured bladder. In this scenario, a rapid loss of gas would occur from both the split and by the bungee squeezing away badly needed gas. In the un-bungeed system there is always the option of turning sideways to trap some of the remaining gas inside. This is not for the faint-hearted but is an option none-the-less. So, there is no right or wrong answer, only what is best for the given environment.

Hose routing

This, too, is a subject that has had many a group of technical divers debating in open session for hours on end. In the caving community, a pioneer of configuration protocol is William Hogarth Maine, or Bill Main as this highly respected caving pioneer is called. The term Hogarthian was adopted due to Bill's philosophy. Originally, this philosophy was based on safety issues in caving, where, if divers used exactly the same equipment and configuration down to even the smallest detail, i.e. if one diver was a replica image of the other, then, in an emergency, other team members would be compatible with the diver in trouble

Incorporated in this style of configuration is a very rigid hose routing, the specifics of which include what side you have your primary first stage and back-up regulators, a 2m primary hose that would be wrapped once around the neck, and the location of additional equipment for the dive. Again, due to differing diving environments, this configuration may not always be the most suitable. For example, in open-ocean do we really need a 2m long hose when one of 1.5m may be sufficient?

In summary, what is fundamentally important is that, no matter what the environment, no matter where the hoses are located and their length, no matter whether your back-up LPI is connected, divers MUST know what they have and where it is situated. This is the only way to

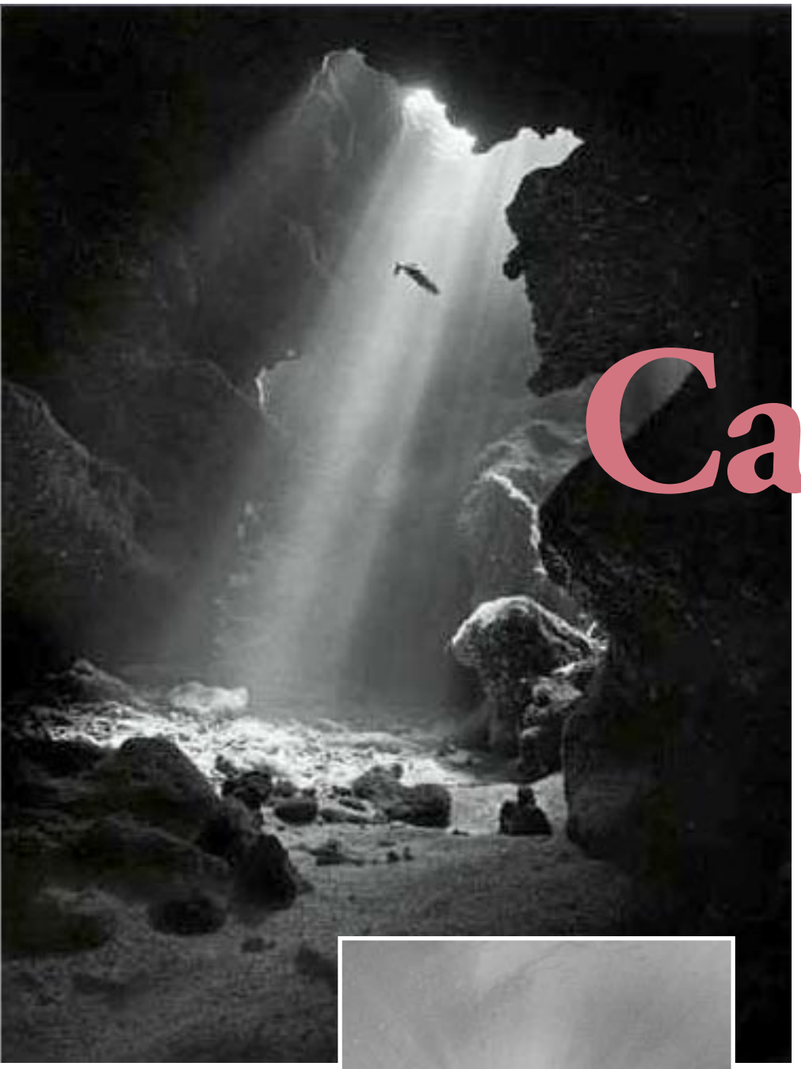
The secondstages are rigged on different first stages as is a source of bouyancy. This way, in case a first stage fails, i.e. it freeflows, it's valve can be closed and the diver will still have both breathing gas and buoyancy.

Erh..no! Fine and orderly hoserouting but this is not quite what we had in mind

resolve a problem in a worst-case scenario, whether it be in a cave, in open water or inside a wreck. It therefore makes great sense to have a tidy, streamlined and neat configuration that is well suited to the given environment and the diver.

This discussion is by no means restricted to the technical diver. Recreational divers also need to consider their hose routings, many of which may have been learned or become a habit, good or bad, over many years of just taking such things for granted. I have seen some recreational divers stow their alternate second stages in various unsuitable places like BCD pockets and restrictive retainers, or even attached to nothing, where they dangle like a dog's tail!.

Nearly all recreational agencies have a general agreement that the alternate air source is usually stowed in the imaginary triangle between the chin and down and across the rib cage. However, I believe that in an out-of-air emergency, the stressed diver on the bottom will always prefer to take the regulator from his buddy that he can clearly see and knows that it is working. The alternate air-source in the triangular region may have flashing fairy lights on it, but I can guarantee that in most cases the out-of-air diver will always go for the one in their buddy's mouth. If I had my way, I would adopt the same philosophy in the recreational community as in the technical community, by breathing off the second stage that would be donated to the out-of-gas diver, and having the back up regulator on a bungee around the neck, where it can be located with ease. ■



ABOVE: Grotto with one fish

RIGHT: Jellyfish

FAR RIGHT: Barracudas

Text by Gunild Pak Symes
Underwater Photography by Cathy Church
Portraits of Cathy Church by Peter Symes

Unique, unmatched, magical...

Cathy Church

Down the stairs to the friendly photo shop at Sunset House Hotel, a dive resort on Grand Cayman Island, one enters the world of the colourful and inimitable Cathy Church, a legend in underwater photography and an inspiring teacher to many a diver who found his or her way to her popular week-long super courses. At the tender age of 60, Church is still excited about her craft and looks forward to many more years of helping divers take better shots underwater.

Since 1972, Church has been teaching underwater photography in the Caymans and has conducted seminars in most of the major cities in the US. She is one of the pioneers in the field of underwater photography and has been a contributing editor for SKIN DIVER magazine for 15 years in the 70s and early 80s.

While married to another pioneer and renowned authority on underwater photography, Jim Church, Cathy co-author a stunning array of over 200 articles and three books on underwater photography with Jim including the Nikonos Handbook. Her underwater images have been published in many underwater and non-diving publications over the years as well as advertisements for Cayman Islands Department of Tourism, US Virgin Islands, Kodak, Nikon, various cruise lines and other businesses.

In 1987, Church was awarded the prestigious NOGI award for the arts from the Academy of Underwater Arts and Sciences, and in 2000, was inducted into the Women Divers' Hall of Fame and received the DEMA Reaching Out Award. She acted as president of the Academy of Underwater Arts and Sciences in 1999 and 2000.

Church has been pioneering new techniques in underwater photography from the beginning and passing along her knowledge to her students. In fact, she was the first underwater photographer to identify and write about the common mistake u/w photographers make when they aim a strobe at the apparent image and not beyond it at an angle to compensate for water distortion and to avoid backscatter and hot spots. A simple well-known concept these days, it was not common knowledge back then.

Church said that she enjoys exploring the medium of black and white, that perhaps it is her background in science that spurs her interest into the complexities of the craft behind the form – a process that includes the mixing of chemicals and working through a zone system. Still open to the changing technologies in the field, Church also explores the digital realm in underwater photography – a welcome alternative, especially since her darkroom was damaged by Hurricane Ivan in 2004. The photo centre has since been remodelled and is hopping with business and photo classes once again.

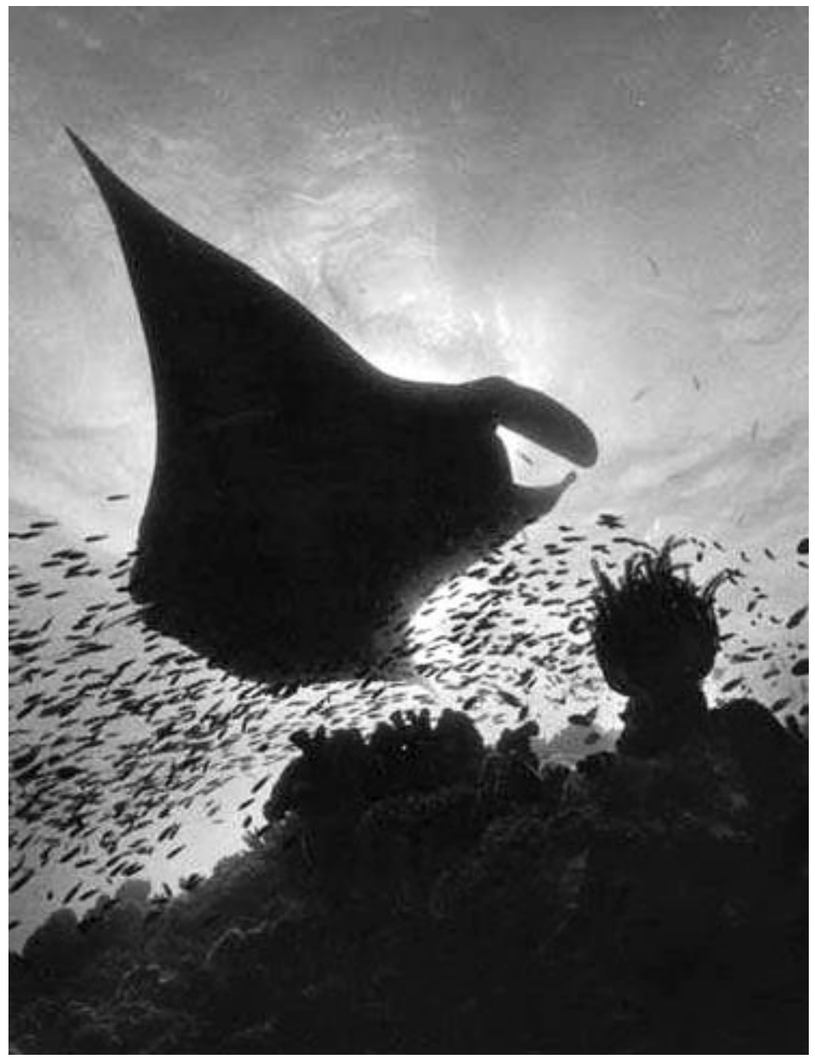
These days, she continues inspiring students with her regular courses in the Caymans and u/w photo tours to the Pacific tropics as well as developing her photo centre and gallery to serve customers better, which she manages with her husband, Herb Rafael, a published and accomplished underwater photographer in his own right.

In the early days, Church was a women in a field dominated by men. She is candid with her views and per-

Church

Solomon seafan

Fumisuki bow



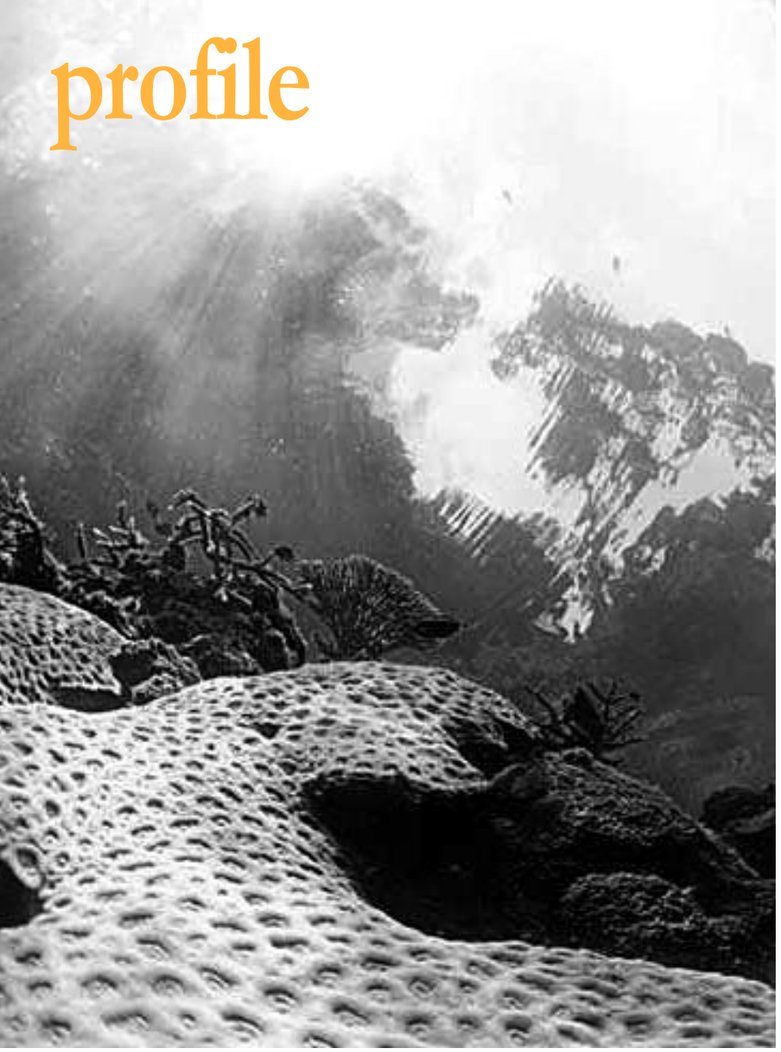
Manta cleaning station

spectives on the changes in diving and underwater photography in regards to the involvement and inclusion of women as well as the rising accomplishments of women in the field and sciences in general. She said that she has seen a positive growth and change over the years.

Church was first introduced to SCUBA diving at the University of Michigan biology station in Pelston. At the time she was earning a bachelors degree in biology. She had her first taste of underwater photography at Stanford University's Hopkins Marine Biology Station in Monterey, California, where she met Jim Church. He taught her how to take u/w shots with a Calypso camera and a twin lens reflex Rollei camera. Hopelessly hooked, she attended underwater photography courses at the Brooks Institute of Photography. In 1970, she received her graduate degree in Marine Zoology from the University of Hawaii but discontinued her studies toward a doctoral degree since women were not allowed, at the time, to overnight on the research vessel, nor at any research station.

After completing her degree in marine biology, Church wanted to work in research in an underwater job for fisheries, for instance, but doors to jobs in the field were closed to women then. Jobs with the California State Fish and Game Department, for example, were not available to women. So, Church became a substitute teacher after receiving a teaching certificate at San Jose State College. She taught middle school for several years in the 70s. But she still wanted to see the natural habitat of marine animals, and so diving and underwater photography were a natural development.

In 1971, the Churches were invited by friends to stay at their newly built dive resort (now the Spanish Bay Reef) and help guests with underwater photography. Procedures were simple then. Students shot a roll of black and white. Church processed the film, and then the students held their film over special light sensitive paper out in the sun until an image emerged. That was their studio proof. Nowadays, the regularly packed courses have 15 Nikonos systems available with several sets of lenses and strobes, housed systems and digital systems, three hour dives from large boats loaded with tanks, nitrox, and most importantly, snacks. What a difference 30 years of



Cathy Church

LEFT: Stairway to the star

Orange Canyon Angels

instruction makes!

Church loves to teach. She likes to help students visualize their pictures, find where the scene exists in nature and help them set up the shot. Church said that she helps them learn how to optimize what they have and find out what they can get out of a shot – how to get the most that they can. She is also sensitive to the unique needs of individuals, some of whom may have certain fears or issues to overcome in the water or in learning how to dive. Church continues to seek new directions and methods to aid those who are apprehensive, yet yearn to learn underwater photography.

Over the years, Church has observed differences in the genders as they approach underwater photography. In the early years, women usually did not come to her course out of their own interest, but through that of their spouse or partner. Often, one spouse was domineering over the other, so Church split them up and worked with them separately. Responses from wives to Church's sensitivity and disposition to listen to them were that of surprise and appreciation. Many women went on to further develop their underwater photography skills. Church said that, nowadays, women outnumber men in her classes, and she also often sees couples enjoying each other's progress over the run of the courses.

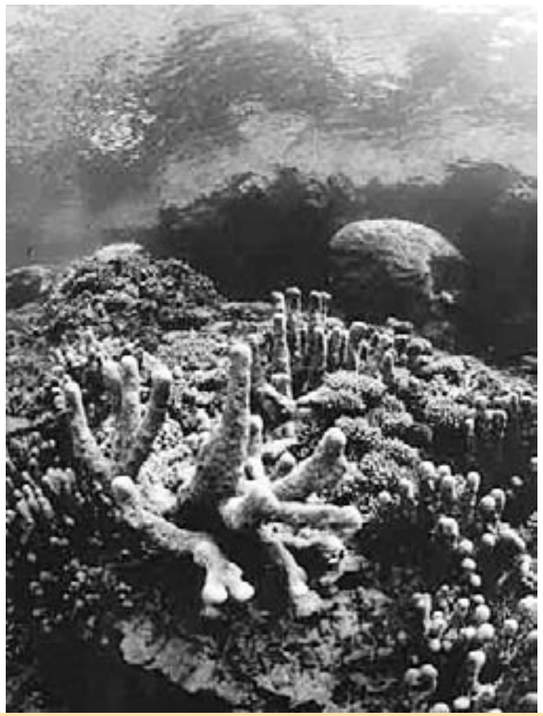
Church said that in the early years, she saw society being protective of women, unduly prohibiting them from exploring and excelling in mostly male dominated fields such as marine science and diving. But after the women's liberation movement of the 60s and 70s, she can see that women can be anything they want to be now. Church´s own career was often blocked by outdated views towards women. As a professional in the field, Church was turned down for jobs only to find that a man who was no better than an amateur was hired to fill the post. Another ugly side of the dive community emerged in the early years of her photo courses, when Church found out that male colleagues in the area were telling students not to go to her. But she agreed that professionalism, or lack thereof, cannot be blamed on gender.

Church said that underwater photography is a passion, and those that go into it must contend with a field that can be fickle and difficult to survive upon. Most, she said, must supplement their habit with something else – finding a job that is not too far from their passion. She said that some photographers work as tour operators, and she finds that there are a lot of couples working together in the field. They complement each other's skills and talents and provide an instant dive buddy and underwater model out on location.

She suggested that photographers gain a combination of skills, become resort photography professionals, work hard and develop their skills on land and on boats. Church said that it is helpful for photographers to get certified as a SCUBA dive master or instructor, and in the beginning, be willing to work in exchange for camera equipment and gear and diving experience whenever possible. Church said underwater photographers do what they do "because they can't not do it".

She said that there is no money in stock images, but dive writing and underwater photography can get you contacts and free advertising, though the assignments are far and few between as competition for publication is fierce. But Church warns photographers not to give their images away to clients for nothing. It hurts the business and themselves.

"Underwater photography is a challenge," said Church. "It is a wide open field. You first have to be good at it. It can't be hurried." With the wisdom of over thirty years in the field, Church concluded that underwater photographers must balance creativity with the business of selling images. ■



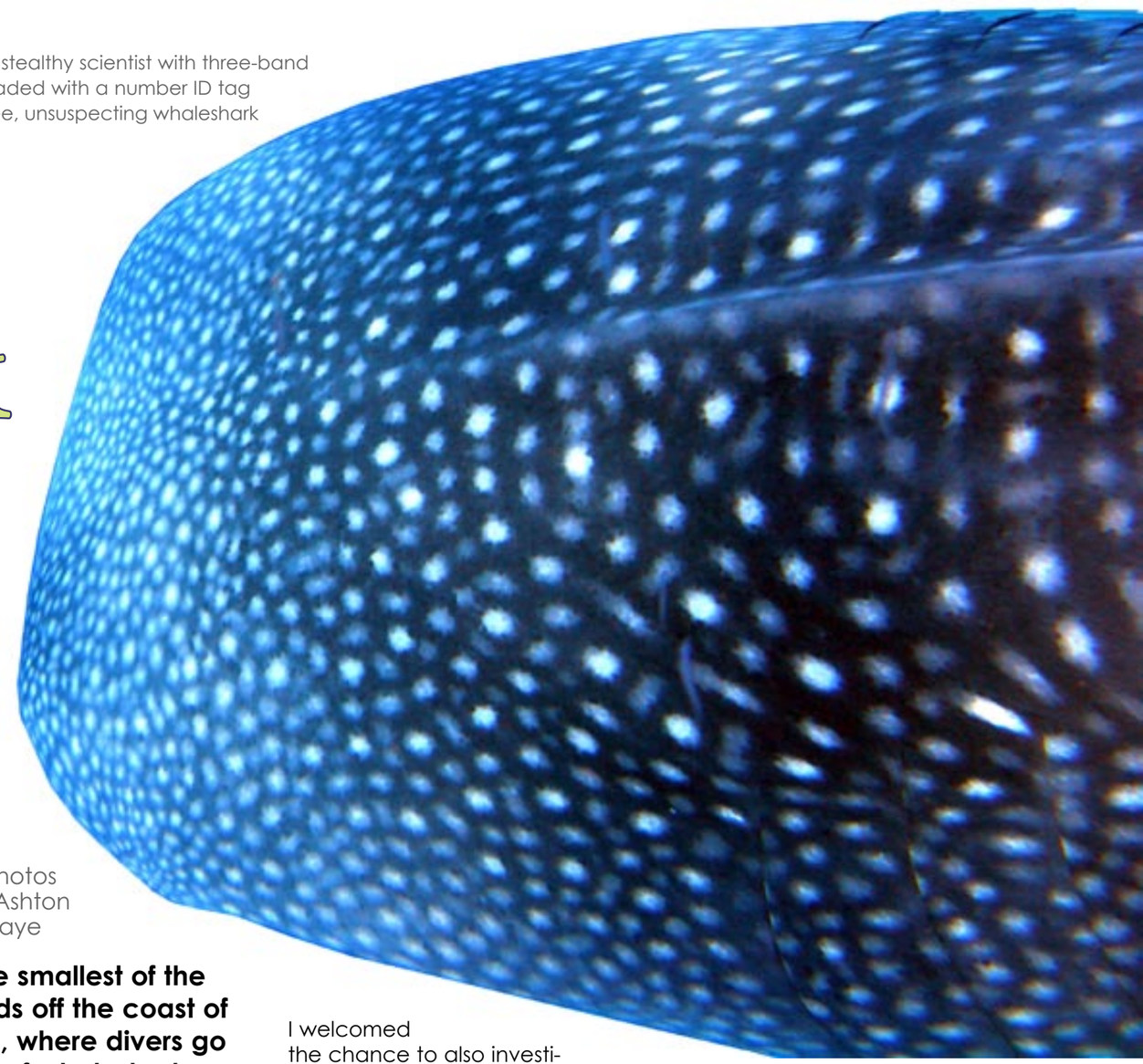
LEFT: Starry night
BELOW: Solitude
RIGHT: Two stingrays

For more information, visit:
Cathy Church's Underwater Photo Centre and Gallery
www.cathychurch.com
Academy of Underwater Arts and Sciences
www.auas-nogi.org
Sunset House Hotel
www.sunsethouse.com

OF WHALE SHARKS AND MANTAS

Playing Tag with a whaleshark

LEFT: Tagger, stealthy scientist with three-band spear gun loaded with a number ID tag
RIGHT: Taggee, unsuspecting whaleshark

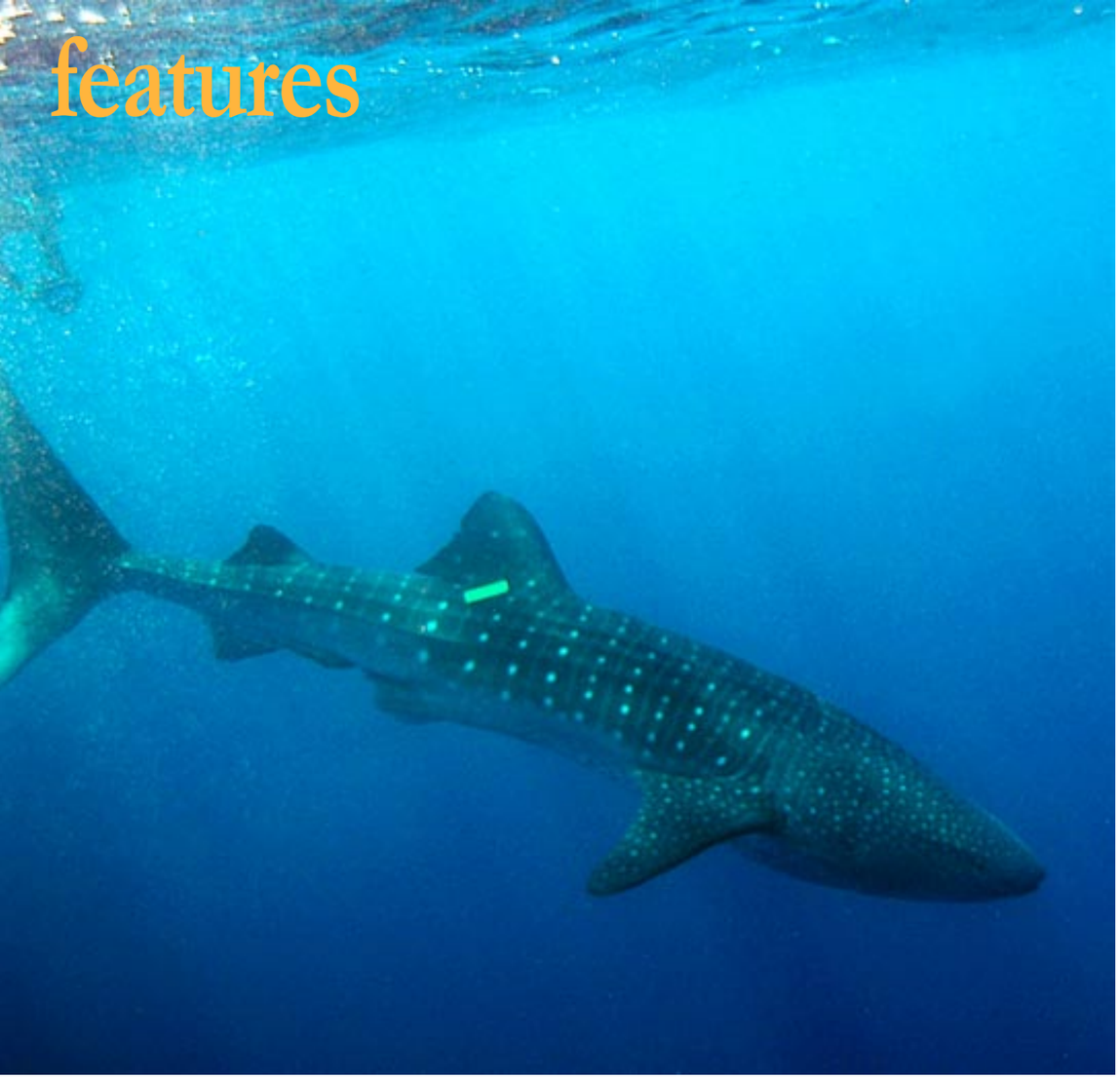


Text and photos
by Robert Ashton
and Lynn Jaye

Utila is the smallest of the Bay Islands off the coast of Honduras, where divers go in search of whalesharks, but find much more. Being the Executive Director of The Manta Network, a global conservation organization, I was very interested in the local efforts to protect whalesharks. Patric Douglas, Director of SharkDiver.com, invited us to stay in Utila and write about his dive group's whaleshark experiences.

I welcomed the chance to also investigate pelagic animal field research and local conservation efforts. Whalesharks are the largest of all sharks and are the largest fish in the sea. They can grow to more than 50 feet long and feed on plankton, which are some of the smallest organisms in the ocean. These highly migratory animals are capable of sustaining high speeds yet usually display a leisurely grace. These gentle giants show no fear of humans but have been mercilessly exploited and are now on the World Conservation Union's Threatened Species list as vulnerable to extinction. CITIES (Convention on International Trade in Endangered Species) has also listed them in an effort to protect them from the international trade of whale shark products.

Several worldwide manta ray programs have recently been initiated and we are taking many of the same directions as global whaleshark conservation efforts. I received several reports saying that Utila was the best place to see manta rays on the



A tagged whaleshark

Caribbean side of Central America. Only a few months earlier in Roatan, another of the Bay Islands, I was able to obtain some footage from a local photographer who was lucky enough to catch a rare glimpse of manta rays. Therefore I was eager to see what I could find in Utila.

During our stay, we learned more about the problems that face Utila than could possibly be imagined. One of the main attractions of this island is the opportunity to be in the water with whalesharks. However, this eco-tourist experience is being threatened by many factors. The number of dive boats racing to see each whaleshark that surfaces was creating a dangerous and chaotic situation. Whalesharks were being disturbed, snorkelers were being hurt and fishermen were angry because the presence of so many dive boats affected their ability to fish. There was a report of local fishermen who had purposely killed a whaleshark. They were threatening to kill more in order to stop the dive boats from surrounding the *boils* of jumping tuna where the whalesharks surface to feed.

The government is trying to decide on what actions to take and the biologists are trying to establish guidelines for all the dive operators to follow in order not to frighten the whalesharks away and to give them space to feed.

There are two local groups researching whalesharks on Utila. Jim Engle, who runs the Utila Lodge and BICA (Bay Island College of Diving), has been studying whalesharks for more than 12 years. In the last few years he has also been working with SRI (Shark Research Institute). He has now established an independent research and conservation organization called WSORC (Whale Shark Oceanographic Research Center) and has started a tagging program. Another resort and dive operator, Deep Blue, has also begun to collect information about whalesharks. They are working with Ecocean, a whaleshark conservation group in Australia that has created a Global Photo ID Library. The library consists of a visual database of individually catalogued whalesharks and encounters. It is maintained and used by marine biologists to collect and analyze whaleshark data in order to learn more about the behavior of these amazing creatures.

Dynamics of a Boil

A *boil* (also know as a bait-ball) is an area on the water's surface that has so much activity of fish jumping and splashing that it resembles boiling water. This is where we can find whalesharks, other types of sharks and even manta rays. Jim Engle has found that only the boils containing bonito tuna are where the whalesharks feed.

There are two schools of thought on how a boil is created: one theory is that the whale harks create the boil themselves and the other is that the boil is created and the sharks use their superior senses to locate the bait-ball.

It is possible that the whaleshark may first locate food and then circle from the depths to force the baitfish upwards. Circling ever closer, the fish are concentrated and are forced to the surface. When the boil has sufficient density, the whaleshark opens its mouth and a ton of small fish cascade down into its waiting gill rakers. The other theory is that the whaleshark may sense a boil from far below and ascend directly into its center. Whalesharks have cartilage spines that run the length of its body. Some biologists believe that these spines are sensing devices and can accurately pinpoint an active boil. Tuna circling the small fish may be responsible for creating the boil.

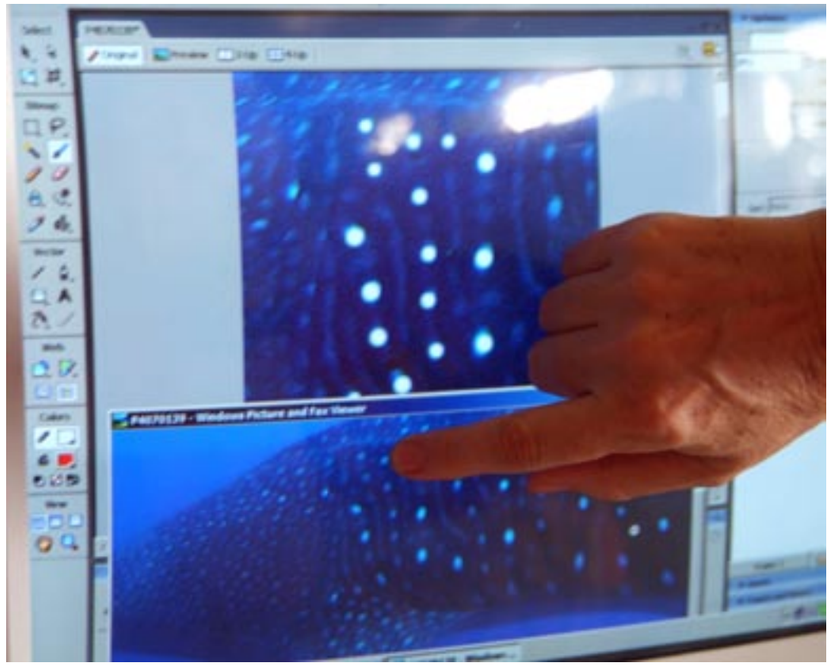
Whaleshark Tagging

We were invited by Jim Engle to participate in the tagging of a whale-

A member of the tag team holds up one of the number ID tags to be attached to a whaleshark in order to identify it and track its movements for scientific research

ABOVE: The splashing of a boil of fish can be seen at the surface while a whaleshark hunts its prey. INSET: Members of the tag team prepare for an encounter with a whaleshark

Whalesharks



ABOVE: Unique spot pattern behind the fifth gill identifes individual whalesharks

shark. Luke Tipple, a young and energetic biologist working for WSORC, spearheads the tagging program. Luke has a BSC in Marine Sciences and has been studying whalesharks since coming to Utila from Adelaide, Australia. In the last three months he has successfully tagged at least ten whalesharks.

Luke is also planning to take tissue samples for DNA analysis to learn about the relationship of Utila's whaleshark population to that of other areas around the world. These samples will be sent to Ecocean and will combine with other data to build a picture of the whaleshark's family tree and possibly their long-range migration behavior.

Using a three-band spear gun, visual identification tags are attached just below the dorsal fin. These white or yellow tags are large enough to be visible from a distance. Luke is a highly accurate shot, having grown up free diving and spear-fishing. He can place the tag at precisely the best location for reading without hurting the animal. Shooting the tag into its thick skin requires a lot of force but it does not harm the whaleshark.

With cameras in hand, we spent the better part of a day searching the waters on the north side of Utila for surface boils. Birds gathering from a distance signal the creation of a boil. Not all boils attract whalesharks so we had to be very patient.

On our second encounter, Luke successfully attached tag No. 0173 to a small 20-foot whaleshark, but did not determine its gender until a later dive. We then recognized the whaleshark by its tag and my photograph determined that it was a female. Filing the sighting report and photograph with Ecocean's on-line global database is the first step in the identification process.

Spot Pattern Recognition

The Ecocean Library began in 1995, building on the research of Brad Norman at Ningaloo Marine Park, Western Australia. Every whaleshark has a unique pattern of white spots on its grey skin. The spot pattern behind the fifth gill on the left side is used to document whalesharks. Any scars also help to distinguish between individual animals.

In 2002, Jason Holmberg established the Shepherd Project, which has enabled the library to grow through sighting submissions from research, conservation, and eco-tourist communities around the world. As part of Ecocean's global database of whaleshark sightings, they have developed image-processing software that performs pattern matching on the whaleshark's spots.

The best way to spot whalesharks is from the air. On three occasions, Patric hired a scouting plane. We circled and watched while flocks of birds and dive boats converged below. When viewed from above, the whalesharks look like large catfish in the blue water below.

While snorkeling with Patric's group, we captured some images of whalesharks underwater, one of which clearly showed the spot pattern behind the fifth gill on the left side. We submitted the image data and learned that we had identified a new animal, now nicknamed *lynnjaye* for the photographer. These activities will lead to insights into whaleshark migratory behavior and will make possible the development and establishment of better conservation practices.

Rules of Encounters

The whalesharks off the coast of Utila exhibit behavior very different from anywhere else in the world. It is believed that they may be shyer because they are juveniles. Here, the sea is nearly a half a mile deep and encounters take place in the deep blue water. Whalesharks dive quickly when they are startled or have finished feeding. It is for this reason that tourists are only allowed to snorkel with them. It is feared that scuba divers will follow the whalesharks on their quick descent and lose track of their depth in the excitement of the chase.

It has been the practice in Utila for many dive boats to surround one unsuspecting shark. All of a sudden there can be as many thirty snorkelers in the water splashing and kicking. The young whalesharks are usually disturbed by the onslaught and immediately dive for the deep. Amidst the commotion, some of the snorkelers do not get to see the whaleshark at all.

We accompanied Luke and his team on several tagging trips. On our second excursion, members of the Honduran Ministry of Tourism were on board. They were witness to several boats racing to get snorkelers in the water to see the whaleshark before it disappeared. They were also on board when a dive boat steamed through the center of the boil right over a whaleshark and narrowly missing a snorkeler.

One day as we joined the snorkelers jumping into the water, a woman received a major injury consisting of a large gash on her calf, a fractured tibia and a huge bruise on the other inside thigh. Although no one actually saw one, it was guessed that a silky shark was responsible. This has never happened before in Utila and hopefully the new guidelines will prevent it from ever happening again. If this were truly a shark bite, it was probably not the shark's fault as the woman may have accidentally jumped right in its path or on top of it, or it would not have bitten her. It probably only did so in defense.

Obviously, whaleshark eco-tourism will not be allowed for long unless strict rules for the safety of sharks and snorkelers are established and enforced.

New rules for whalesharks encounters were drawn up by Luke and his team at WSROC and were modeled after those initially developed by Ecocean. These include creating a 600-foot diameter contact zone around the whaleshark in which only one boat, designated by a special flag is allowed at a time. Only a maximum of eight snorkelers are allowed in the water at a time and entry must be made as quietly as possible. Touching, riding or obstructing the path of the whaleshark is not allowed nor is the use of flash photography. The ten guidelines were approved by the local dive association but are yet to be fully adopted by everyone.

Politics and Education

As with most small island politics, the needs of several groups have to be carefully balanced. Fishermen, dive operators, scientists and government all have their special interests. The Honduran Government is quickly becoming aware of the importance of the marine ecosystems and the value of whaleshark encounters to the tourist industry. However, Luke and the other marine scientists face an uphill battle to protect the young whalesharks. He is intent on educating and building awareness through sound eco-tourism principles. These include programs to educate and integrate the fishermen, dive operators and the island's children, who are often found catching the rare seahorses which are dried and sold to tourists.

Producing informative materials for each group is important but they must also be convinced of the economic benefits. The fishermen need to realize that over-fishing will lead to a complete collapse of the food chain, causing the reef to die along with their livelihood. This has already begun as most of the grouper, barracuda and snapper have been overfished. Algae have proliferated, suffocating parts of the reef and affecting the diminishing population of reef fish. This situation is unaided by the lack of sewage treatment on the island.

Conservation

Conservation plans in Utila include rewards to fishermen for whaleshark sightings. It is hoped that many fishermen will elect to become whaleshark tour operators thereby earning a better income. In order to protect their economy, the fishermen and the dive industry must learn to work together. With the aid of the government and the scientists, they must learn to protect the entire marine eco-system including the whalesharks, the fisheries and the coral reef.

The Bay Island College of Diving, where Luke also works as a dive

instructor, has been first to implement the guidelines that he proposed to the local dive association. We were there the evening Luke announced that they had been approved and everyone was jubilant. It is a big step towards safeguarding the presence of whale sharks in that area and the tourist economy that surrounds it. This was a large accomplishment for Luke, the young marine biologist who came to Utila to take on his first assignment after graduating from the University of Adelaide in Australia less than a year ago.

Once these safeguards are fully adopted and enforced, the whaleshark encounters should prove to be more enjoyable and of longer duration. The dive operators must learn to understand that the guidelines will not only ensure that whalesharks return each year but that encounter times will be longer. This will lead to higher satisfaction for the divers and assure a growing eco-tourism industry.

Luke's important work will help establish a baseline to determine whether Utila's whaleshark population may be declining. His data may also shed important insights into the health of the world's populations.

Whale Sharks & Mantas

Manta rays are often seen in the vicinity of whalesharks in the deep waters that surround Utila. While waiting for a whaleshark to surface within the boil, we spotted a large manta ray close to the surface. This was the first time that we had observed two of the largest fish in the sea together. The possible interdependence of these two important pelagic species raises new questions as to their migration patterns and increases the importance of protecting their common food source. In other parts of the world, mantas generally swim in the shallow waters over coral reefs and this also applies to whalesharks.

In Utila, it is extremely rare to see a manta ray in the shallow water and whalesharks are never found there. This suggests that the manta rays are not resident to Utila but are migratory and they may even accompany the whalesharks on their long pelagic migrations.

We left Utila with a new-found appreciation for the work being done there and for what lies ahead in our efforts to protect the world's manta and mobula populations. The challenge we face obtaining scientific data to make the case for manta ray protection is only a small part of the ultimate conservation effort. Economic impacts, political meanderings and the need to balance local interests must be carefully weighed. In the end we are all connected and must realize that biodiversity also includes human beings. ■

Robert Aston is the Executive Director of The Manta Network and Chief Editor of On-The-Edge Magazine. Lynn Jaye is a contributing editor and photographer for both organizations. Both Aston and Jaye are actively involved in conservation efforts worldwide. They can be reached via email at **Robert@mantas.org** or **Lynn@mantas.org**

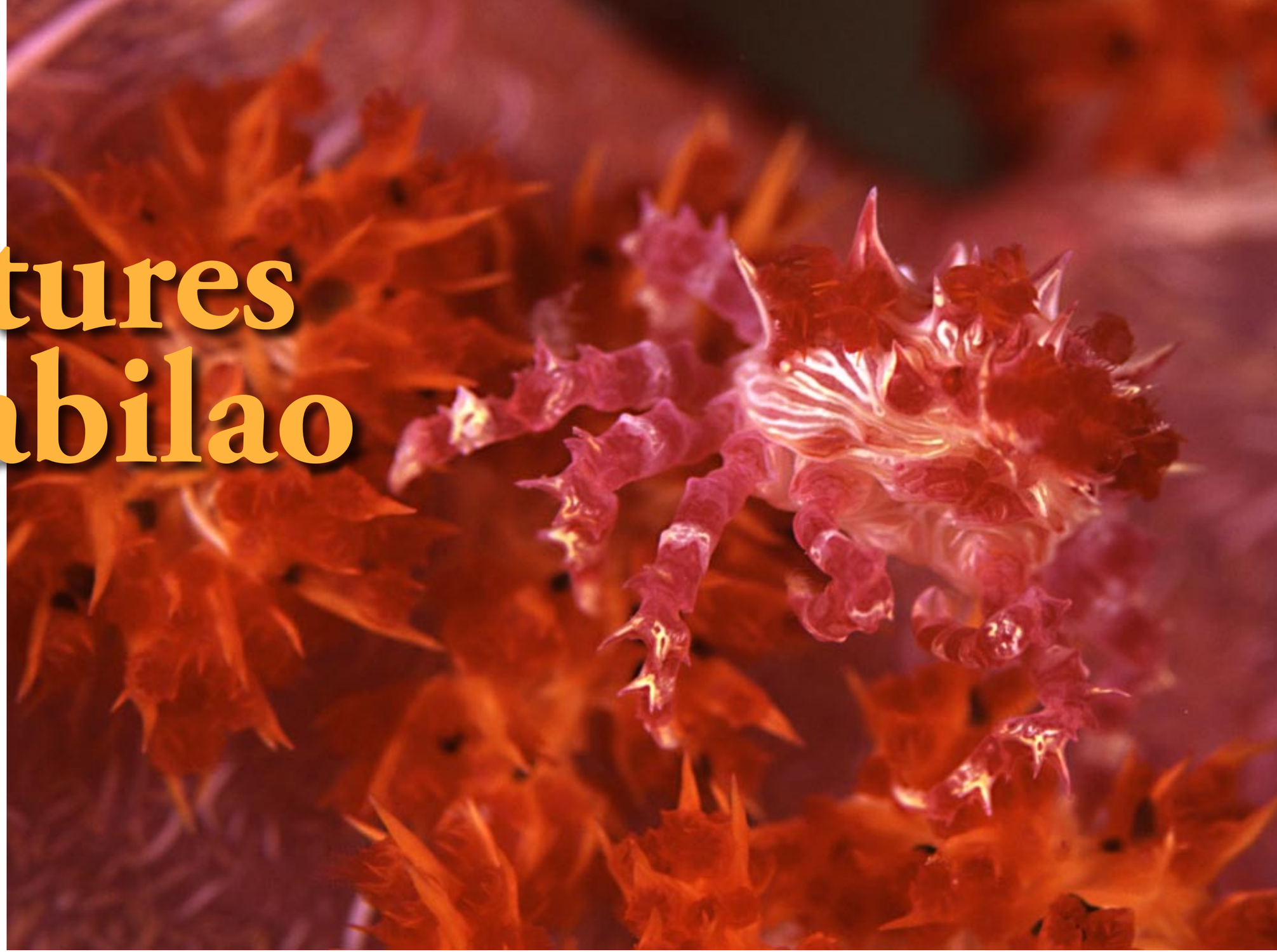
For Additional Resources, visit:
The Manta Network
www.Save-the-Mantas.org
On-The-Edge Magazine
www.on-the-edge.com
Shark Diver, Patric Douglas
www.SharkDiver.com
Whale Shark Oceanographic Research Center
www.WSORC.com
whalesharks@WSORC.com
Ecocean
www.ECOCEAN.org
Utila Lodge
www.UtilaLodge.com
Deep Blue Resort Utila
www.deepblueutila.com/whale_sharks.htm

Creatures of Cabilao

Discovering the fancy faces of the Philippines

Text and photos by Nonoy Tan

After a two-hour car ride and an hour boat travel, I finally reached my destination—Cabilao, an island paradise located near Cebu, Philippines.Before coming here, I had read exciting accounts about Cabilao Island, particularly about the stargazers and pygmy seahorses that reside in its surrounding waters. On this trip, I was determined to see these critters, at the same time discover other things that Cabilao had to offer.



A decorator crab mimicks the color and texture of its soft coral host

Completely oblivious to my presence, this white octopus continued it search for prey

Cabilao

The white-sand beaches and crystal blue waters immediately captivated me. As I went to shore, my gracious host Babie gave a pleasant welcome of her vacation haven called La Estrella dive resort. The ambiance scene was very tranquil. Apart from the intermittent courting sounds of the birds, I could hear only the rhythms of the sea and wind. Located a few steps from shore was the native-inspired restaurant where I had an ice-cold drink offered to me by the staff. Later, I was guided me to a nipa hut that would be my home for the next four days. In front of the hut was a hammock tied between two coconut trees. It was very inviting.

After settling in, I decided to comb the beach. At a distance, I could see the scuba diving facility earlier pointed to me by Babie. I headed towards its direction. Upon reaching the place, I was met by the Sea Explorers dive personnel with whom I had a chance to plan my diving itinerary for the subsequent days. I would be provided with a dedicated dive guide so I could have a lot of flexibility and time to take photographs. My expectations were high.

Diving adventure

The following morning, I was at the dive facility early. In no time, I was geared up and ready for the dive. Together with an expert guide, we took a shore entry into calm and clear waters. Less than ten minutes into the dive, I discovered a long-snout pipefish hidden among the seagrass. With a length of about a foot, I could easily have mistaken it for a dead tree branch. Apparently confident of its camouflage, it was unmindful of my presence as I took a few photographs. A few minutes later, my guide pointed a porcelain crab to me. I clicked the shutter several times and then continued to trail my escort.

Upon reaching 80 feet, I noticed a magnificent red sea fan stretching out to the open sea. Upon closer inspection, I detected a red spider crab slowly moving across its branches. The crustacean had overly long and thin legs; it looked like a spider. After taking several shots, I realized that this dive was becoming photographically intense.

Subsequently, my guide led me towards an adjacent sea fan. He aimed his finger to a pair of red pygmy seahorses. One was a third of an inch in size, while the other was even smaller! They easily blended with the color and texture of the tiny coral branches; their camouflage was perfect I had to keep my eyes glued on them in order not to lose them from my sight. At one time, I made the mistake of glancing at my camera controls and consequently lost sight of the pair. I spent several minutes searching the same coral while the seahorses remained motionless. Completely delighted at finding them again, I took their images until my film was almost exhausted. It was time to head back to shore.

On my return journey, the sight of a two-inch Pegasus seamoth darting across the sand caught me attention. It had a long snout and a scaly body, but looked nonetheless beautiful. Just as I had used my last film exposure, another seamoth emerged into the scene. This new seamoth was larger and had an alluring mint green body color. Too bad, I did not have any film left in the camera. Nonetheless, I was determined to go

Closer inspection of soft corals reveals a variety of residents such as the porcelain crab

back later in the evening. In the meantime, the hammock in front of my hut was waiting for me. As a result, I spent the rest of the day in dreamland (sleeping).

Night diving

By nightfall, I was well rested and ready for another dive. Armed with a flashlight, I was soon underwater. Crabs, prawns, eels stalked the reef for food. Particularly interesting was a stargazer that laid motionless underneath the sand waiting for unsuspecting prey. As I took a mug shot of this monster in disguise, another

Cabilao

LEFT: A brown leaf fish poses for a portait

TOP RIGHT: Sea moth

BOTTOM RIGHT: This stargazer waited underneath the sand for an ambush

Spider crab on a sea fan

fact file

Cabilao, Philippines

History: The Philippine Islands became a Spanish colony during the 16th century; they were ceded to the US in 1898 following the Spanish-American War. The islands attained their independence in 1946 after Japanese occupation in World War II. The 21-year rule of Ferdinand MARCOS ended in 1986, when a widespread popular rebellion forced him into exile. In 1992, the US closed its last military bases on the islands. The Philippines has had a series of electoral presidential transitions since the removal of MARCOS. The government continues to struggle with armed Muslim insurgencies in the south.

Government: Republic
Capital: Manila
Currency: Philippine peso (PHP)
per US dollar - 56; per Euro - 70.

Geography: Southeastern Asia, archipelago between the Philippine Sea and the South China Sea, east of Vietnam, mostly mountains with narrow to extensive coastal lowlands; **Coastline:** 36,289 km; **Elevation:** lowest point: Philippine Sea 0 m; highest point: Mount Apo 2,954 m **Agriculture**: rice, coconuts, corn, sugarcane, bananas, pineapples, mangoes, pork, eggs, beef, fish **Natural resources:** timber, petroleum, nickel, cobalt, silver, gold, salt, copper.

Climate: Tropical marine; northeast monsoon (November to April); southwest monsoon (May to October).

Environmental issues: Uncontrolled deforestation especially in watershed areas; soil erosion; air and water pollution in major urban centers; coral reef degradation; increasing pollution of coastal mangrove swamps that are important fish breeding grounds.

Population: 86,241,697. Percent of population below poverty line: 40%, Ethnic groups: Christian Malay 91.5%, Muslim Malay 4%, Chinese 1.5%, other 3%. Religions: Roman Catholic 83%, Protestant 9%, Muslim 5%, Buddhist and other 3%; **Language:** Filipino & English

Medical/Decompression chambers:
Cebu City Recompression Chamber
Camp Lapu-Lapu Lahug / Doctor Memerto Ortega. (032) 310-709 or (032) 312-325 / (032) 746-652 loc. 2625

Dive Travel: The best time to visit the Philippines is during the period from November to June. Precipitaion is lowest during April and May. Temperatures are cooler during December to February (26- 27°) and warmer between March and May (29°).

Web sites:
Sea Explorers Dive Center
www.sea-explorers.com
El Dorado Beach Resort
www.eldoradobeachresort.com
La Estrella Resort
www.laestrella.ph
Philippines Department of Tourism
www.wowphilippines.com.ph

Dive info: www.starfish.ch

A pigmy seahorse uses its ingenious camouflage to disappear in the matching patterns of the corals it inhabits

stargazer suddenly jumped out of the sand beside me. Curiously, it exposed itself for a few seconds before digging back into the sand. Other critters showed up as well, such as the brown leaf fish that posed while I took a portrait photograph. After a few minutes, an octopus appeared. This nocturnal predator was oblivious to my presence as it prowled the reef while using its tentacles to poke inside rock crevices in search of prey. I followed the octopus for several minutes until I spotted a soft red coral. Upon closer inspection, I discovered a thorny little crab crawling across the stems. Its red and white coloration, and spiny body mimicked its soft coral host. Unless it had moved, I would not have noticed it.

As I explored the reef, I realized that the underwater night scene was full of life. I was already awed by the large amount of activity in the reef. Again, I ended the dive with great anticipation that the succeeding days will be as enchanting. I was not disappointed.

For three more days, I savored the sights underneath the waters of Cabilao – beyond doubt, a paradise for critter shutterbugs. Cabilao is best dived and experienced with the warmth and hospitality of La Estrella Resort (**www.laestrella.ph**) and Sea Explorers Philippines(**www.sea-explorers.com**). For additional information about diving the Philippine islands check out the Philippines Department of Tourism website (**www.wowphilippines.com.ph**). ■

In our next issue, we will visit the mystical and magical Philippine island of Dauin with dive writer and award winning underwater photographer, Nonoy Tan.

The embedded Quicktime videoclips in this article are between 2 and 7Mb in size

Exploring U-boats in Ireland

Text by Jim Tierney
Underwater pictures by 10barpics
Historical Pictures by www.uboat.net

U89

A long awaited dive trip to Malin at last came and went all too quickly, but with great success. On the dive, visibility was 25-30 meters with sea conditions prime. On board a fast 8 meter rib, we got out to the dive site within an hour. For October, water temperature was good, and the air was fresh and crisp. The targeted wreck for the day was the *U-89*. The *U-89* was a relic from "the war that would end all wars" but at last was not. Now laying 25 miles off Malin Head, time stands still for this very impressive war machine. Rammed and sunk by *HMS Roxburgh,* all lives were lost on board the *U-89*.

Crawling with life, the *U-89* is now patrolled by large cod, pollock and, of course, conger. Its 60 meters boasts life everywhere.

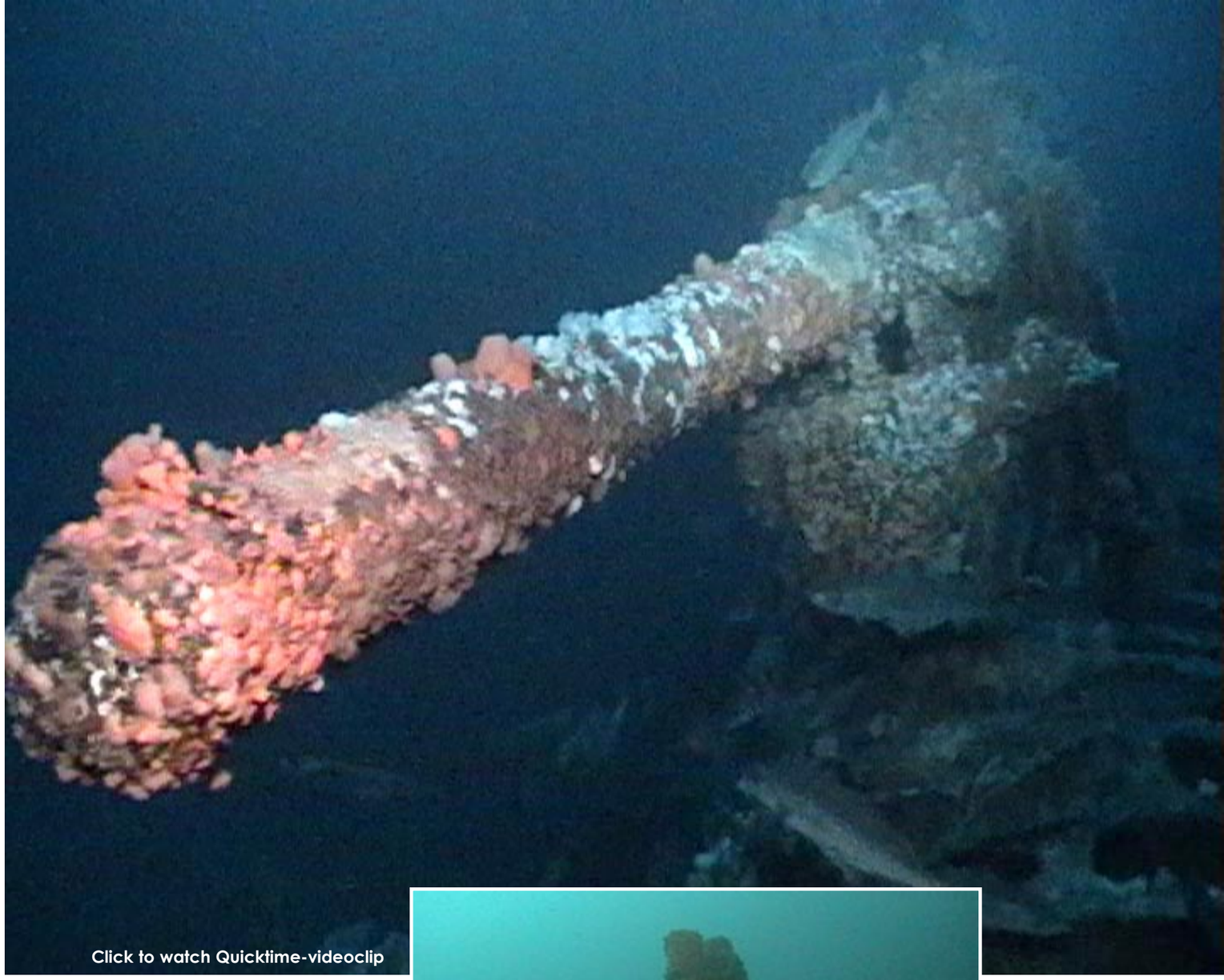
For the last four years, both my dive buddy and I have been diving with Buddy Inspirations. We agreed that this was our most memorable dive. Using a 19-60 trimix, all was very sober at 60m. Our bottom time was a little under 30 minutes, and our total run-time was 85 minutes. Decompression was carried out with VR3's. Bail out tables were planed with V-Planner.

Loaded

Armed with only a video camera, I was no match for the very impressive arsenal on board the *U-89*. Deck guns were located both bow and stern. Torpedoes were left in storage never to be used again.

It is quite easy to see why the U-boat packs terrorised the seas. A period named by the U-boat fleet as the happy days, it was a time during which they were sinking vessels at their ease. Enemy ships with no radar or sonar were very vulnerable. U-boats would surface in well-known shipping lanes, select a target, shoot and be on their merry way.

Unfortunately for the *U-89,* the vessel popped up 200 yards in front of the cruiser *HMS Roxburgh*, which with out hesita-



Click to watch Quicktime-videoclip

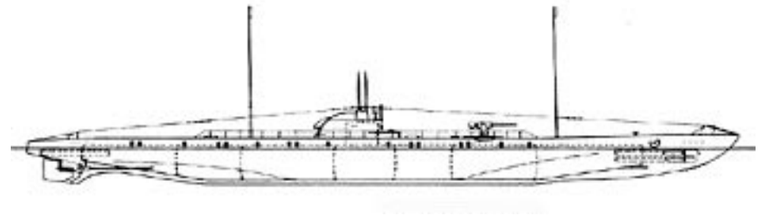
Click to watch Quicktime-videoclip

ABOVE: Stern gun
LEFT: Natural light at 60 meters

ABOVE LEFT TO RIGHT: Bow gun with conning tower; Two views of bow torpedo hatches; Hydrofoil stripped from Its outer skin

LEFT: U-Boat Crew 1918. Men who trained with and grieved the loss of the U-89
INSET: Mark of U89

RIGHT: Diagram of U89



tion, rammed *U-89*'s conning tower. Soon after, explosions were heard.

German voices were also heard amongst the waves. *U-89* was sunk with the loss of all their lives. So, out of respect for the dead, the only souvenirs I took were in the format of pictures to share with all. The rest was left to the memory of the many souls lost regardless of personal beliefs about the war – who was right and who was wrong.

Close quarters

Most of us have seen the film *Das Boot* and can picture how claustrophobic and cramped it was on board the vessel. As big and impressive as the *U-89* was, it was still daunting to look inside a hatch and imagine that men used to sleep, work and fight in those conditions and sometimes survive.

They knew their chances for survival were low. Even if you did survive a battle and make it to the surface, it was most likely instant execution for you. One was most likely shot in the water. Such instances have been reported after the sinking of the *Lusitania*. No doubt the action was revenge for the sinking of the *Lusitania* by a comrade U-boat, *U-20*.

Inside history

As I investigated further into the U-boats' history and talked to islanders with memories of the past from the South and West coasts of Ireland, I learned how U-boats and Allied boats would come to the islands to trade for provisions. In doing so, unwritten rules of war were made where momentary cease fires occurred in

U89 in action

Aft torpedo tube with torpedo remains

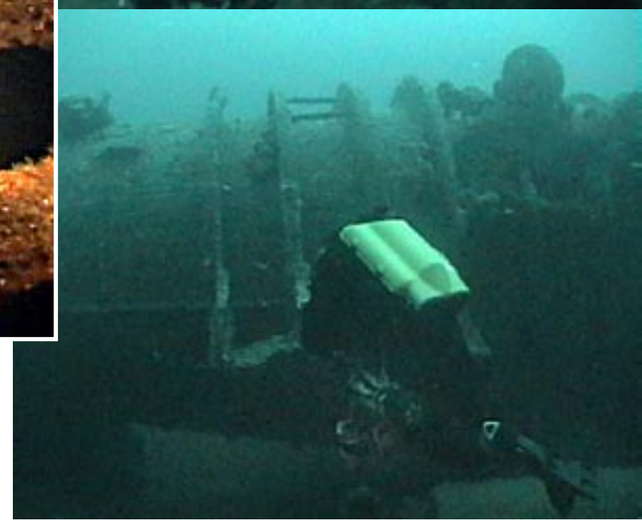
Natural light at 60 meters

U89

TOP RIGHT: Gear-laden diver ascending after an adventurous dive
CENTER RIGHT: Natural light at 60 m
BOTTOM RIGHT: Natural light at 60 m

BELOW: Conger on guard duty mid ship. Torpedos were propelled by petrol or alcohol steam generators

INSET: Torpedoes in storage room

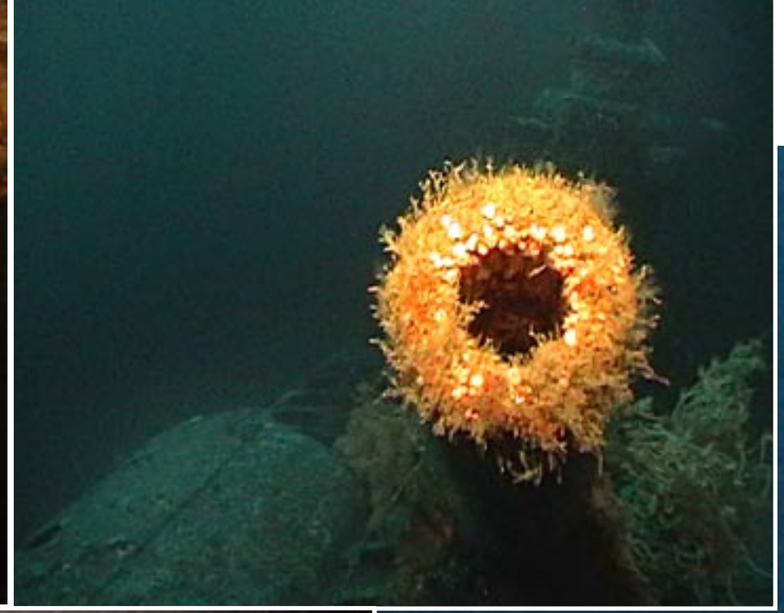


order for both sides to gain supplies.

Sir Roger David Casement (1864-1916), the British traitor and Irish nationalist hero who was hanged by the British in mid-1916 for his part in working with Germany and Irish nationalists in planning the Dublin Easter Rising of 1916 came back from Germany in a U-boat after arranging armaments for the 1916 Rising. There is no doubt that U-boats played a part in Irish history.

These wrecks are our underwater museums and should be treated with respect. *U-89* offers layers of U-boat history to view. Open in some areas. Intact and in good condition in other areas. Don't forget that this is a vessel that has been in the open sea for nearly a century. Peering at the wreck's cross-section, it is as if you can see different levels of construction. (Take notes and build your own).

There were plenty more U-boats operating around Malin and all the coastal waters of Ireland at this time. The vessels, *U-30, U-43, U-44, U-57, U-60* and the *U-64,* helped sink the *Justicia*. The vessels, *U-68, U-70,U-73, U-79* and the *U-80,* laid mines in Lough Swilly and caused the sinking of the *Laurentic*. The vessels, *U-94, U-95, U-107* and the U-45, lie offshore near Donegal. *UB-82* lies off Rathlin Island. *UB-85* lies in Belfast Lough. *U-110* lies off Malin Head. *U-124,* which also helped sink the *Justicia*, lies off the north coast of Donegal. *UC-42* and *UC-44* were sunk offshore at Cobh Co Cork. *UB-65* lies



ABOVE LEFT: Torpedo
ABOVE RIGHT: Gun
CENTER: Torpedo

ABOVE: Good-bye natural light

near the Fastnet Rock. *U-68* and *UC-29* are located off the Coast of Kerry. *U-83* lies offshore at Bullrock, Co Cork.

And that's just the list for WWI. There are many more U-boats off the coast of Ireland from WWII with the highest number of wrecks off the coast of Malin identified by Operation Deadlight (**www.operationdeadlight.co.uk**), an expedition which was the first attempt by technical divers to survey and identify the wrecks of German U-Boats scuttled by the Allied forces after WWII in the waters north of Ireland. It was a scuttling of 42 plus U-boats. So, the next time you get in the water, it might not be a shark stalking you but a U-boat instead.

Malin matters

Malin offers excellent visibility. Relaxed atmosphere. Diving for all occasions, not just deep wrecks. There are shallow wrecks and all the scenic diving you could want.

The dive operator we choose with 100% satisfaction was Dive North (**www.divenorth.com**). Thanks to our host and guide, Geoff, we will be back for more.

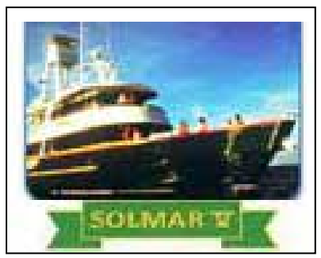
But this was not the first time I have been to Donegal. I had the pleasure of diving the *Laurentic* as part of the crew of Teilifis na Gaeilge (TnaG), Ireland's Irish language TV channel, and I dived the *Audacious*, through the courtesy of the Inishowen and Derry Sub Aqua Clubs. I shall be back for more.

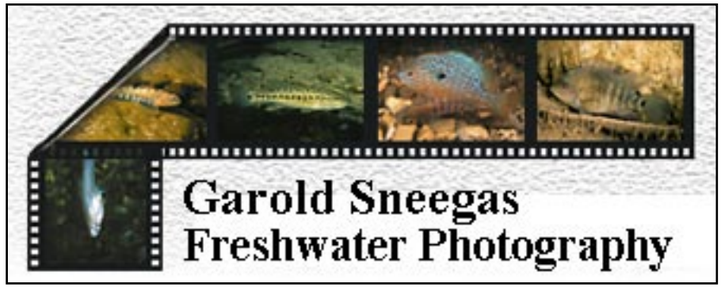
Malin also seems to be becoming a very popular destination for technical diving courses of all disciplines under the guidance of Gary Fox who comes to Malin to get good diving and pass on his experience through training and courses (**www.diveaction.co.uk**).■

For more information, visit:
www.10barpics.com
www.uboat.net

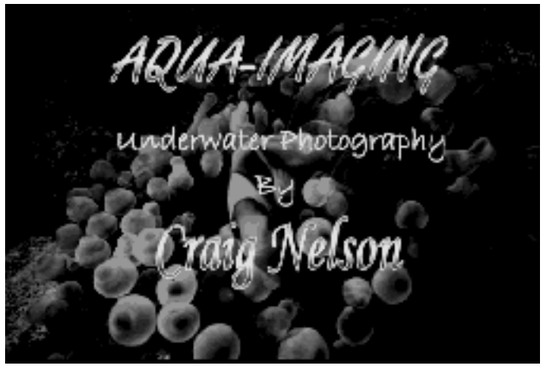
X-ray mag

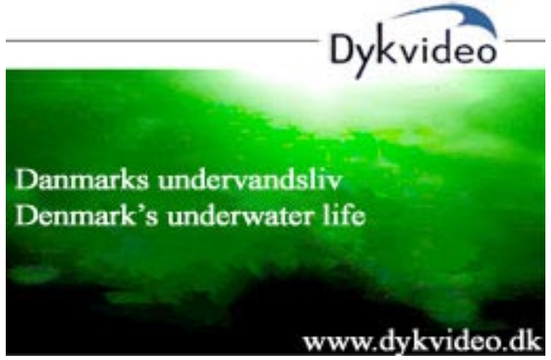
Classified





www.becher.com





To order a classified ad:

Call or email to reserve space 30 days before publication. 15 days before publication date, send logo and link information to: **sales@xray-mag.com**
Invoice will follow.

Price: 90 x 60 mm ad with logo is EUR 90 / USD 112
Price: 50 x 33 mm ad with logo is EUR 50 / USD 63
Text listing with link is EUR 20 / USD 25

INFORMATION:
www.xray-mag.com
sales@xray-mag.com

X-ray mag

Dive Directory

Cayman Islands

GRAND CAYMAN ISLAND

Abanks' Diving
www.abanks.com.ky
Absolute Divers
www.absolutedivers.com
Ambassador Divers, Ltd.
www.ambassadordivers.com
Aqua Adventures, Ltd.
www.caymaniac.com/aqua
Aquanauts
www.aquanautsdiving.com
Atlantis Adventures Grand Cayman
www.atlantisadventures.com
Black Princess Charters
flyfish@candw.ky
BlueWater Instructors
www.BlueWaterInstructors.com
Bob Soto's Reef Divers, Ltd.
www.bobsotosreefdivers.com
Captain Crosby's Watersports
www.cayman.org/crosby/
Carson's Stingray City Tours
csctours2@candw.ky
Cayman Aggressor IV
www.aggressor.com
Cayman Diving Lodge
www.divelodge.com
Cayman Diving School
www.caymandivingschool.com
Cayman Marine Laboratory
marlab@candw.ky
Cayman Submariners Ltd.
www.caymansubmariners.com
Dive 'N Stuff
www.divenstuff.com
Divers Down
www.diversdown.net
Divers Supply
diversup@candw.ky
DiveTech
www.divetech.com
Don Foster's Dive Cayman
www.donfosters.com
Eden Rock Diving Center, Ltd.
www.edenrockdive.com
Fisheye
www.fisheye.com
Kelly's Watersports
www.kellyswatersports.com.ky
Kirk Sea Tours
www.kirkseatours.com
Neptunes Divers
www.neptunesdivers.com
Ocean Frontiers
www.oceanfrontiers.com
Off The Wall Divers
www.otwdivers.com
Ollen Miller's Sun Divers
sundiver@candw.ky
Peter Milburn's Dive Cayman, Ltd.
www.petermilburndivecayman.com
Quabo Divers
www.caymandiving.com
Red Baron Diving
www.redbarondivers.com
Red Sail Sports
www.redsailcayman.com
Resort Sports Ltd.
www.caymanresortsonline.com
Rivers Sport Divers
rivsport@candw.ky
Seasports
www.bestdivingingrandcayman.com
Sunset Divers
www.sunsethouse.com
Tortuga Divers, Ltd.
www.tortugadivers.com
www.redsailcayman.com
Treasure Islands Divers
www.tidivers.com
Wall to Wall Diving
www.walltowalldiving.com

NOTE: DIRECTORIES ARE COMPILED BY ONLINE RESEARCH OF DIVE OPERATORS/RESORTS IN YOUR AREA. WE DO OUR BEST TO INCLUDE EVERYONE. HOWEVER, IF YOUR DIVE CENTER IS NOT LISTED OR LISTED INCORRECTLY, PLEASE CONTACT OUR SALES OFFICE.

LITTLE CAYMAN ISLAND

Conch Club Divers
www.conchclub.com
Little Cayman Diver
www.littlecaymandiver.com
Paradise Divers at Paradise Villas
www.paradisevillas.com
Pirates Point Resort
www.piratespointresort.com
Reef Divers Little Cayman Beach Resort
www.littlecayman.com
Sam McCoy's Diving & Fishing Lodge
www.mccoyslodge.com.ky
Southern Cross Club
www.southerncrossclub.com

CAYMAN BRAC

Brac Aquatics Dive & Photo Centre at
Brac Carribbean Beach Condos
chakotay.candw.ky/users/cay3931/
Dive Tiara
www.diviresorts.com
Reef Divers Brac Reef Beach Resort
www.bracreef.com
Village Scuba School
Tel. 345.948.1467 or 1509
weedee@candw.ky

INFORMATION:
www.xray-mag.com
sales@xray-mag.com

Sam MacDonald

Detail of "Opah", moonfish
Silver and copper
36 cm x 12 cm £250

Text by Gunild Pak Symes
Photos by Lighthouse Photography

A move to the remote northern Scottish province of Orkney sparked a love of the sea, fishing and diving for the increasingly known metals artist, Sam MacDonald. Made up of 70 islands, Orkney, which also has a rich cultural and historical heritage, is a haven for diving, fishing and outdoor enthusiasts. Sam has taken inspiration from his beautiful and magical surroundings to inform his work of marine life forms and textural surfaces.

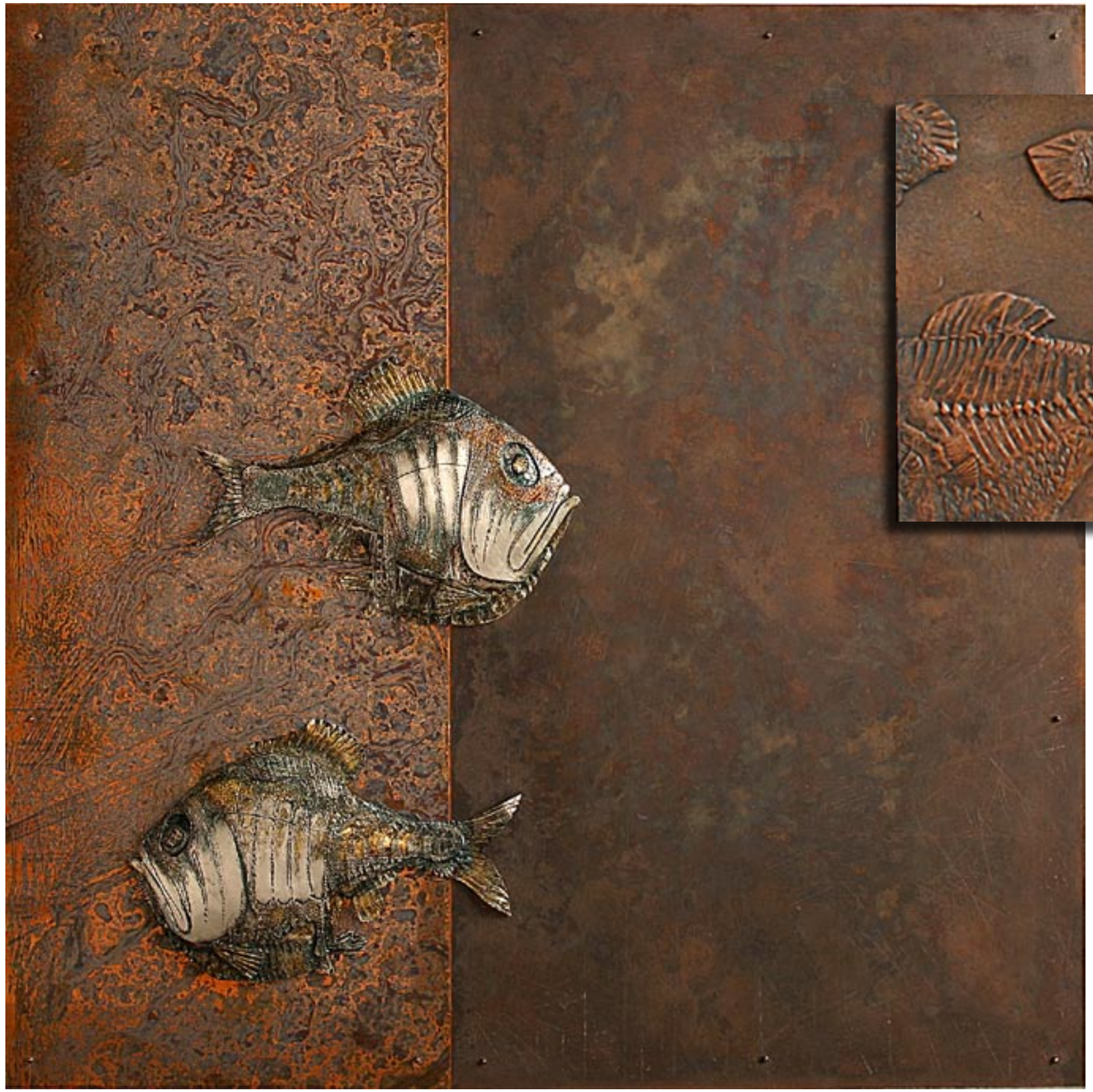
Originally from Lewis, Sam began to study and contemplate the sculptural form of fish after taking up fishing. From the glint of scales to the skeletal structure, Sam captures the textural and fleeting forms of fish in various metals of copper, lead, pewter and gold leaf. He finds the dimension of time in his work by utilizing the concept of fossilization. By studying the impressions of sea life left in split rocks millions of years old, Sam fashions prehistory and ancient memory in his sculptures with masterful manipulation and disstressing of metal materials.

He often leaves out visual information of fish forms, offering only clues to the subject, thereby creating a sense of mystery to the image. He says that the mind's eye will often fill in missing visual information in a way that gives the viewer a more full and rounded experience of the artwork.

Sam is

Fiona MacDonald

Detail of "Herring Hook"
Pewter copper and gold leaf
160 cm x 50 cm x 2 cm £5000



Detail of "Slimehead Composition"
Brass, ferracotta and copper
58 x 58 cm £500

"Born in a Storm"
Pewter, copper and gold leaf
40 cm x 40 cm £780

"Turbot"
Ferracotta and copper
53 cm x 54 cm £550

"Velvet and Gold"
Silver, copper, brass and gold leaf
58 cm x 122 cm £1100

"Sandeels"
Pewter, lead, copper and gold leaf
58 cm x 122 cm £1500

"Slime Head Bed"
Lead and copper
25 cm x 48 cm £1600

"Silver Darlings"
Pewter, copper and gold leaf
50 cm x 163 cm £1500

interested not only in the beauty of the sea, but also in its more terrible aspects and its predatory side. He finds inspiration in the the exposed beauty of a skeletal structure in, for example, the remains of a fish. He sees the beauty in its "dead eyes". Beauty and meaning can often be found in what many would call *ugly.*

Sam often works in lead. He says that since it is an ugly and poisonous metal, "there is a feeling of alchemy when crafting something of value from a supposedly dead material". He also works with gold leaf to accentuate the flash of scales that can be seen in nature when a school of fish changes direction.

Ecology is a great concern to Sam as he questions what will be left of the world's natural treasures in the future and what fossilized remains of our present time will be left for future generations to contemplate.

These concerns are often expressed in his artwork where both a texture of the natural world of today and the timeless experience of the prehistoric past co-exist. ■

Sam has exhibited his work widely and has a two year waiting list on commissions from patrons all over the world. For more information or to contact the artist, visit his web site at: ***www.sam-macdonald.co.uk***

"John Dorys"
Lead and copper
81.5 cm x 21 cm £900

"Flounder"
Pewter, copper and gold leaf
50 cm x 70 cm £500

"Herring Shoal at Depth"
Pewter, gold leaf, copper and brass
81.5 cm x 122.5 cm £2500

TOP: “Herring Square“
Pewter, copper and gold leaf
20 cm x 20 cm £280

BOTTOM: “Oxeye”
Lead and copper
30 cm x 30 cm £650

TOP: “Old Fish”
Lead and copper
30 cm x 30 cm £650

BOTTOM: “Herring Square“
Pewter, copper and gold leaf
20 cm x 20 cm £280

TOP: “Hatchet Fish”
Silver, brass and copper
40 cm x 40 cm £500

BOTTOM: “Hatchet Split Frame I”
Pewter,copper and gold leaf
30 cm x 30 cm £350

TOP: Detail of "Hatchet on Plate"
Pewter, copper and brass
25 cm x 28 cm £150

LEFT: Detail of "Skate Profiles"
Copper
77 cm x 46 cm £700

For more information or to order art works, visit **www.sam-macdonald.co.uk**
e-mail: **sam@sam-macdonald.co.uk**

IN OUR NEXT ISSUE

SPECIAL FOCUS
Diving in Ireland!
plus...
Bikini Atoll Wrecks

COMING IN AUGUST
Subscribe now FREE!
www.xray-mag.com