



X-ray mag

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2005  
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Italy

**Polluce Wreck**

History

**The Frogmen**

Ecology

**Mangrove**

Science

**Salt**

Profile

**Miranda K**

Portfolio

**Michael Portelly**

COVER PHOTO BY PETER SYMES



**BALI**  
**Tulamben**

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## COVER PHOTO

Soft coral as elegant as a cherry branch  
Photo by Peter Symes. Tulamben, Bali

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Goby on sponge. Tulamben, Bali. Indonesia



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\*Projected figure for year-end 2005.

Some of our dive location advertisers are probably not going to be too happy with me for this editorial. It is about terrorism. "Why bring up such a depressing subject, which may even make our clients think twice about coming out to see us?" I hear them say. Because it is in the back of our minds anyway, that's why.

So, let's face it instead of sweeping it under the carpet. The good news is that a lot of travellers are staring the terrorists in the face and refusing to be subdued by their destructive activities. Divers want to go diving no matter what, and this might be the very best antidote to terrorism—showing that we are not shaken... perhaps stirred, but not shaken.

A couple years ago, the devastating events on 9/11 changed our traditional views overnight of the world and our safety. Trips were cancelled and the airlines, the tourist industry and a lot of local dependants all suffered great losses. It is just human nature to react, to retract and to be scared when our picture of the world and of our daily lives is shaken to the core—down to the bedrock—as was the case back then.

Then came SARS (remember that, anyone?) topped off with a tsunami in the Indian Ocean that devastated areas from Asia to Africa and sent a shock wave throughout the dive and travel industry world-wide.

Recently, we had bombs in London and in Sharm el Sheikh. The Londoners had seen it all a couple of times before, and amidst the apprehension, they stood up and once more refused to let their way of life be affected.

Following the bombs in Sharm el Sheikh, which, while they were obviously meant to hurt Egypt's all important tourism industry, paradoxically and sadly killed mostly a lot of Egyptian workers and damaged a lot of Egyptian property and businesses.

Even so, travellers didn't want to cancel their trips. When travel agencies cancelled their flights,

## Brave New World Brave New Citizens

they had customers scolding them for giving in to terrorism. It seems that the general public has come to a new realisation that we can't withdraw ourselves from this problem. We need to face it out there. We can't hide at home anyway. And we shouldn't.

But it isn't what the George Bush'es, Tony Blairs and top brass military state on t.v. that will make the difference. We all know what they are going to say anyway, and we have heard all their standard phrases before. It is what you and I do that will make a difference. If we stand our ground, the terrorists will lose the war.

And we must not forget the other main part of the whole tragedy. It's always the locals who get hurt the most from terrorism, directly as well as economically. They are left with the pain and devastated businesses when we tourists check onto our flights home and don't come back.

### Bali

In this issue, the travel story is about Bali. There are a thousand good reasons to go to Bali as there are to go to a lot of other fine dive locations in the world. Yet, given a range of choices, when we visited Asia earlier this year, we opted to go to Bali because we wanted to put the spotlight back on an island which was hit hard by a big terrorist attack a couple of years back.

This may not be the most professional of reasons, but it has a global objective. There surely are numerous other locations out there that are also worthy and deserving of a visit with all the promotional spin-offs a major magazine article affords them. But the positive changes in Bali since the terrorist attack speak volumes about the local people and their resilience to disaster. It is a story we are seeing a lot of around the world lately.

Fanatical religiously-based terrorism will hopefully be confined to a limited space in history, just as the political terrorism we had in Europe in the 1970's and 80's did. Those terrorist activities are now pretty much a thing of the past.

What can we do? Dive on!

We salute you fellow travellers. ■



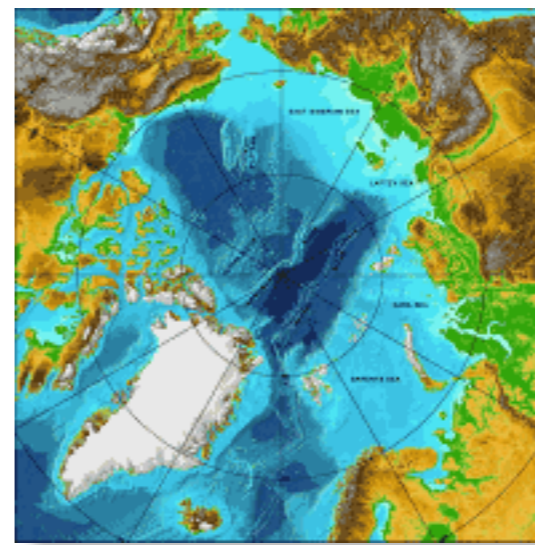
X-ray mag

News edited by Peter & Gunild Symes

*That's a'spicey*

# NEWS

## Lots of new Marine Life



Map of the Arctic



be thriving in the extreme cold under a lid of ice currently 1-21 meters thick. These unexpected populations have been sheltered under the Arctic ice for millennia.

The US Coast Guard Cutter *Healy* sailed 24 scientists from the US, Canada, Russia and China on the 30-day Hidden Ocean expedition coordinated and funded by the US National Oceanic and Atmospheric Administration (NOAA). The independent Census of Marine Life involved eleven of these scientists in an unprecedented 10-year global scientific collaboration to inventory the biodiversity of the seas in order to create a comprehensive portrait of life in the oceans.

The scientists of the expedition returned with thousands of specimens from the isolated ocean, the Canada Basin, as well as the Chukchi and Beaufort Seas. Some of these specimens appear to be new to science. The expedition's scientists' early findings include the discovery

of the first squid and octopus ever found in the area as well as new species of comb jellyfish, sea anemones and benthic bristle worms. They also found two species of amphipods, or sand flea-like crustaceans, which were previously thought not to exist in

Arctic environments. In addition, scientists found a sponge with a calcium-based skeleton at a surprising depth of 4,500 meters.

The expedition employed a number of tools and high tech equipment to gather specimens at 14 locations and data from depths to 3,300 meters below the ice, which will prove important in



the study of the impact of climate change, energy exploitation, fishing and shipping. These

tools included a remotely operated underwater vehicle, under-ice cameras and SCUBA divers, pelagic nets, an ice corer, benthic camera platforms and box cores. Scientists said that modern technology has enabled them to obtain comprehensive high-resolution mid-water and seafloor images of the area and its creatures like never before.



THIS PAGE: photos of various marine animals discovered by the explorers of the Arctic. Courtesy of NOAA.

### Arctic Marine Life Diversity & Density Higher than Expected

*Explorers of the Arctic have found a surprising density and diversity of marine life – some creatures are new species yet to be identified.*

High numbers of large Arctic squid, cod, jellies and other creatures have been found to

Members of the expedition to the Arctic



Edited by  
Peter Symes &  
Gunild Symes

Plans to study the Antarctic in a similar expedition are in the making. The Antarctic expedition will be funded by with a \$525,000 grant from the New York-based Alfred P. Sloan Foundation and led by Australian Antarctic Division in Hobart. It will involve up to 200 scientists from 30 different countries and cover 35 million square kilometres in the Southern Ocean. Scientists want to study the role of the recently identified Antarctic Circumpolar Current, a

powerful force flowing west to east at 145 million cubic meters of water per second, in genetic diversity of the seas.

With DNA research collected from the expedition, scientists hope to piece together the history of marine evolution. ■

LEFT: The US Coast Guard Cutter *Healy*

All photos this page courtesy of NOAA

## Can Sea Ice on the Rise in the Antarctic be due to Global Warming?

In a recent study, researchers from NASA have found that the increase of precipitation due to warmer air temperatures from greenhouse gases might actually be helping to increase the volume of sea ice in the Southern Ocean of Antarctica. It is evidence that there is a potential asymmetry between the North and South Poles. It may

indicate that climate change may have different impacts on each end of the planet.

Counter to mainstream thinking that climate changes cause the melting of glaciers and sea ice in the Arctic, the study's simulation findings suggest that a counterintuitive phenomenon is in effect in the Antarctic.

Warming climate typically leads to increased melting rates of sea ice cover and increased precipitation rates. But in the Southern Ocean, the increased precip-

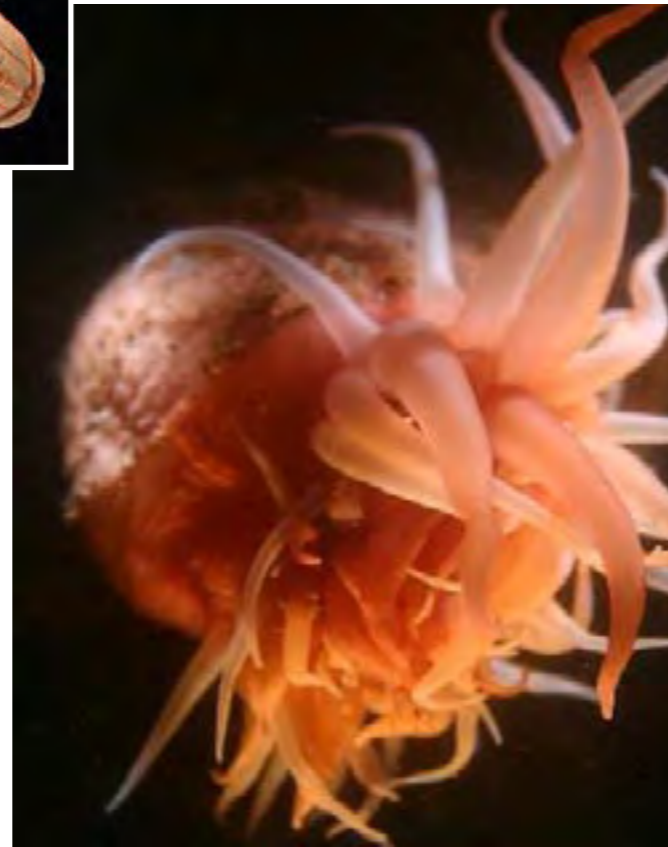
itation is loading sea ice with additional snow, which then becomes so heavy that it pushes the Antarctic sea ice

under the surface of the water. The snow then freezes and creates thicker sea ice. While the findings of the study were made through computer-generated simulations, plans to corroborate the findings through long-term ice thickness measurement on location is a goal for future research. ■

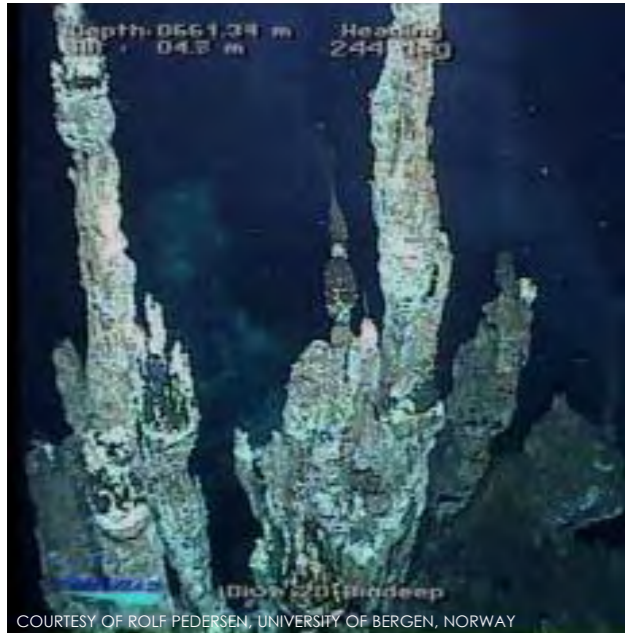
TOP & ABOVE: Scientists of the expedition in action. Courtesy of NOAA.



THIS PAGE: Marine animals discovered by explorers of the Arctic. Courtesy of NOAA.



Edited by  
Peter Symes &  
Gunild Symes



Vent sites are discovered along the Arctic Ridge

## Northern vents discovered

The most northerly and isolated undersea hydrothermal vents have been discovered by a Norwegian-led expedition in the Arctic. Two vent fields were found north of Mohns Ridge between the island of Spitsbergen and Iceland. The vents were located 500 to 700 metres below the surface, which is a shallow depth according to marine geologist, Rolf Pedersen, from the University of Bergen in Norway who was part of the team of experts exploring the area.

Scientists found 50 chimney vents using methane sensors and a robotic submarine. They recorded temperatures over 250 degrees C. What appear to be tube worms were found thriving near the hydrothermal vents. These worms were known only to exist in the Pacific prior to the discovery of the northern vents. ■

## Deep-sea city of eels discovered

*Large numbers of eels near a South Pacific deep-sea volcano surprise divers and researchers.*

Hundreds of eels were discovered slithering around the seafloor of a volcano near American Samoa this spring. Nicknamed Eel City, marine scientists were astounded to find its huge eel population, which is a discovery that is said to be unprecedented in ocean research. The deep-sea community is the first known to be dominated by eels.

Researchers from the Scripps Institute of Oceanography and other institutions used submersibles to explore the volcano this spring on an expedition of the crater summit of Vaialulu'u. Indeed, the scientists also found a new volcano growing in its crater summit.

The emerging 1,000-foot (333 meter) volcano located 2,000 feet (666 meters) below the surface is named Nafanua after the Samoan goddess of war. According to geologists at Scripps, Nafanua is growing 8 inches (20 cm) per day. It is not known what the eels are feeding upon, but it is known that there are thick mats of bacteria around the volcano that are suspected to serve as a food source.

Marine biologist Dr Adele Pile from the University of Sydney said, "We were amazed to find not only a very rich hydrothermal system that had a very thick bacterial mat covering it, but living inside of these mats and all the craggles and all the little holes you could find in this brand new volcanic rock, were all these eels." ■



Eel City near Samoa

## Bacteria discovered in the Antarctic

Bacteria are known to survive and indeed thrive in environments of extreme heat such as hot springs. Now they have been found to thrive in environments of extreme cold as well. Researchers accidentally discovered large numbers of bacteria and clams on the ocean floor in March while exploring the Antarctic waters that became accessible after the 2002 collapse of the Larsen B Ice Shelf.

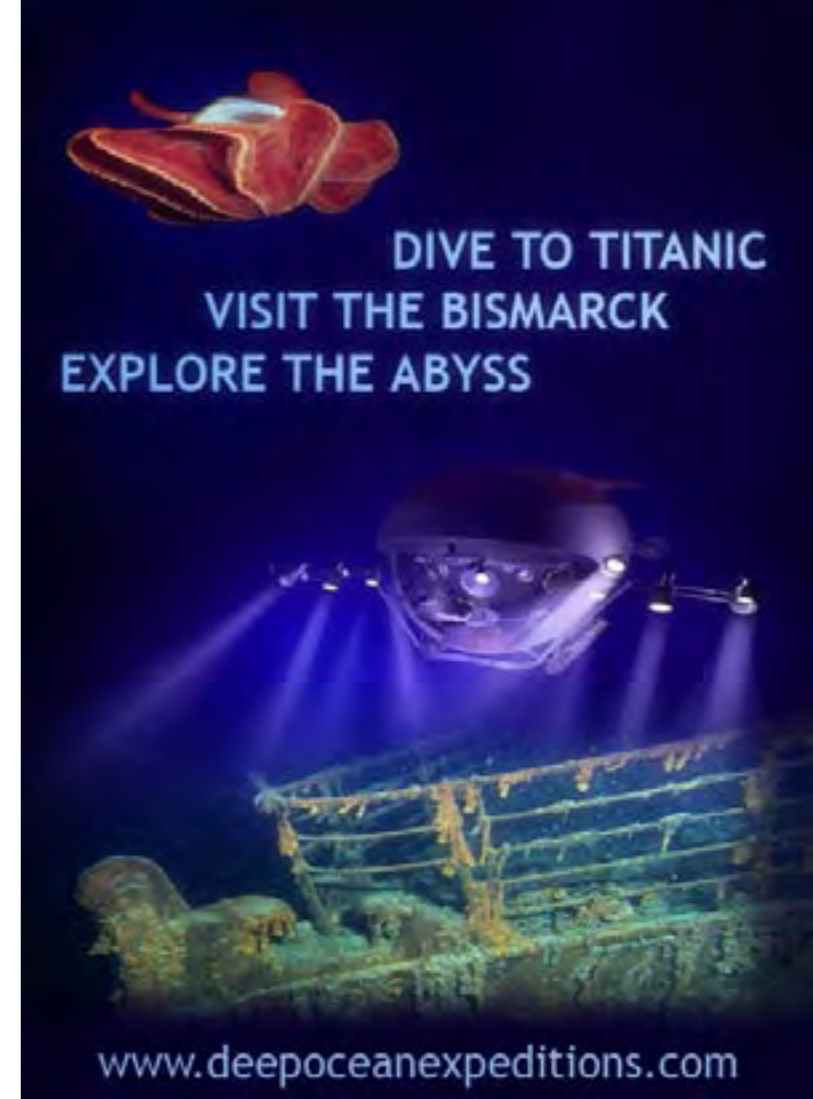
Found at a depth of 2,800 feet (933 meters) in an area isolated under ice for over 10,000 years, the bacteria form a white sheet up to one centimeter thick upon which clusters of clams lie. The discovery leads scientists to theorize that the chance of life in even more extreme environments may be possible. In addition, the bacteria may hold secrets to life without photosynthesis or properties such as enzymes that could be used in industry for various needs. It is not known at this time how the bacteria survive or what their food source is. ■

## Scientists discover new Antarctic ecosystem near underwater volcano

A vast ecosystem has been discovered on the sea floor under what was once the Larsen B Ice Shelf, which collapsed in 2002. Scientists, Amy Leventer and Jimmy Maritz of Colgate University, used an underwater camera attached to their boat in May 2004 to capture video images of what appeared to be large mats of bacteria supporting colonies of clams 20-30 centimeters in diameter.

The ecosystem, located at a depth of 850 meters under the ice, is known as a cold seep or cold vent community and is fed by chemical energy rather than photosynthesis. It is thought that methane from deep underwater vents provides the energy source of the ecosystem.

The research by Leventer's team was sponsored by grants from the National Science Foundation to Hamilton, Colgate, Southern Illinois University and Montclair State University. ■



## Canada to patrol illegal fishing in Arctic waters for first time

In an attempt to clamp down on illegal fishing in the far northern regions of Canada, the federal government will send a frigate to patrol the waters of the Arctic for the first time.

Amid growing pressure to curb over fishing by foreign vessels in the region outside of the 200-mile exclusive economic zone off the East Coast of Canada, the Canadian government is sending the HMCS Fredericton from Halifax to the Davis Strait, Pond Inlet and Iqaluit to see who is fishing in the area and to make their presence and sovereignty in the area known. Authorities want better monitoring and control over vessels operating in international waters.

The trip is not related to an ongoing dispute that Canada has with Denmark on the claim over Hans Island located between Ellesmere Island and Greenland. ■

Edited by  
Peter Symes &  
Gunild Symes

## PADI announces new Ecotourism Training Center in Tsunami hit area of Thailand

PADI Asia Pacific announced the opening of a new Ecotourism Training Center (ETC) on August 4th in Khao Lak, which was one of the hardest hit areas of the tsunami last year in Thailand. The centre, which was the brainchild of US expat Reid Ridgway and Swiss national Pascal Hernikot, a Khao Lak tsunami survivor, was built in response to the devastation of the area and local population by the tsunami.

The mission of the centre is to provide professional diving instruction to young men and women affected by the tsunami so they can develop careers in diving and tourism. It aims to help revive the once thriving international ecotourism destination for divers and naturalists. According to founders Ridgway and Hernik, many of their friends in the diving industry in Khao Lak lost everything – homes, jobs, possessions, businesses and many tragically lost their lives.

The centre will focus on three areas in its professional curriculum: computers, dive training and English language. The programme emphasizes environmental education and sustained tourism. Over nine months, students ages 16 to 41 can gain certification as a divemaster or can



be upgraded to open water instructor if they are already divemasters. Students will receive 6000 baht per month from the ETC for living expenses during the programme.

Ridgway and Hernik realized their dream of the eco-tourism centre with the help of PADI who was one of the first industry leaders to stand up and support

the programme.

The eco-tourism centre now houses a fully accredited English language component provided by the TEFL Teacher Training language institute in Phuket as well as a computer lab, video editing suite, projection screens, dive gear maintenance laboratory and two long tail boats equipped for diving and research.

The first year students, which number 12, will document their entire experience on video in order to produce a film to be released at the one-year anniversary of the tsunami disaster. Ridgway said the film would show the remarkable resilience of the local community and culture as they recover and rebuild. He said it would also highlight the natural beauty above and below the sea in Thailand to encourage



IPOD BY APPLE

travellers to return to vacation in the area.

Although the non-profit organization is privately funded, the ETC continues to seek funding from individuals and businesses to fund student scholarships and help make the program a permanent yearly course for the young people of the region. For more information, visit: [www.etcth.org](http://www.etcth.org). ■

## PADI Introduces Diving Podcast

The Professional Association of Diving Instructors (PADI) announced that it plans to produce a new podcast programme devoted to scuba diving. The world-wide scuba diving organization is seeking contributors for possible broadcast.

According to a PADI spokesperson, PADI wants to involve divers from all over the globe. Content of the future shows cover beginning dive training, dive travel insights from divers and dive operators, environmental issues, the latest dive conditions from specific dive locations, dive celebrity interviews, first aid and safety information, continuing education and entertaining news from divers all over the world.

While other podcasts cover overland issues, PADI's Scuba Chat plans to cover the underwater world including stories from returning divers, unique diver behaviour, effects of hurricanes on shipwrecks and other serious and fun issues. ■

## Speed limits for dolphins

In Ireland, the Department of the Marine has established new speed limits for boats and other sea vessels in order to protect the growing number of dolphins and whales present in Irish waters.

Whale-watching boats must not exceed seven knots and must stay 100 metres away from the animals. The department also requires these boats to be licensed passenger vehicles. They must not attempt to corral the whales or dolphins between boats, nor are they allowed to swim with the animals.

The dolphin and whale watching industry brought in 12.3 million euros in tourism revenue in 2003. According to marine biologists it is becoming more and more important to protect dolphins and whales from harassment. The new regulations should provide the mammals with more protection. ■



NURC PHOTO BY DOUG KESLING

A diver swims with wild dolphins

## Don't swim with the dolphins

In Costa Rica, officials have banned the activity of swimming with dolphins or whales effectively closing down a highly criticized growing tourism industry according to an environmental group. With the new regulations effective in July, even researchers are not allowed to swim with the marine animals, nor are they allowed to hold the mammals in captivity.

Tourists pay top dollar in Mexico and the Caribbean to swim with dolphins held in captivity. Environmentalists who feared that the 45 sea tourism companies in the Costa Rica would also start advertising swimming with the animals, proposed the rules to avoid this development. ■

## DEMA Show will alternate between Las Vegas & Orlando

The American trade show for the diving industry, Diving Equipment and Marketing Association (DEMA), has announced that for the next six years it will be alternating its venue between Las Vegas and Orlando, Florida. A spokesman said it will be dropping Houston in Texas – the venue of last year's show. The organisers also said that after this year the four-day show will be at the end of October or the beginning of November. This year's show will be held in Las Vegas from 4-7 October. ■

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## Odyssey's Shipwreck & Treasure Attraction Opens In New Orleans

Odyssey Marine Exploration, Inc. a leader in the field of deep-ocean shipwreck exploration has opened an interactive shipwreck and treasure attraction in New Orleans' French Quarter. Located in the Jax Brewery, Odyssey's Shipwreck & Treasure Adventure will reveal the compelling stories behind some of the world's most famous shipwrecks, their treasure and historical artifacts, and will allow visitors to experience the adventure and excitement of deep-ocean shipwreck exploration through multiple hands-on exhibits.

The attraction will feature the SS Republic, a Civil War-era ship with an intriguing connection to New

Orleans. The ship sank in a hurricane off the coast of Georgia while sailing from New York to New Orleans in 1865. Odyssey discovered the Republic nearly 1,700 feet below the surface of the Atlantic Ocean in the summer of 2003 – nearly 138 years after the ship went down. More than 51,000 gold and silver coins, and approximately 13,000 additional artifacts, were recovered in the world's most extensive deep-ocean archaeological excavation.

The aftermath of Hurricane Katrina has fortunately left Odyssey in relatively good shape. According to officials, the company's building in which the attractions are housed experienced no flooding, fires or looting. In addition, Odyssey was able to remove all irreplaceable artefacts and valuables such as coins safely from New Orleans to Florida. Tampa-based employees have offered their homes and resources to help the staff and families in the New Orleans location. ■



COURTESY OF ODYSSEY'S SHIPWRECK & TREASURE ADVENTURE

## Priceless artefacts salvaged from ancient shipwrecks auctioned

An exhibition, "Treasures of the Nanhai", in Malaysia featured artefacts from nine 9th and 10th century shipwrecks. In September, collectors had, for the first time, the opportunity to buy

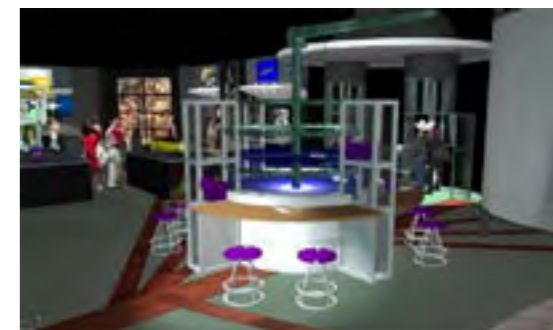
a valuable piece of his-



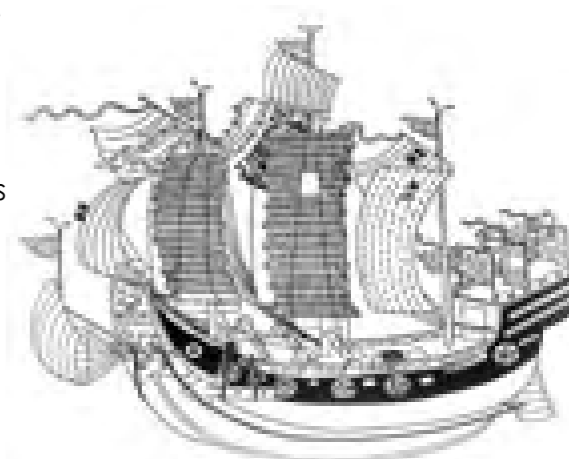
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tory including thousands of Ming blue and white, celadon and underglaze black ware. Many of the artefacts date from the Song, Yuan, Ming and Qing dynasties. The Chinese, Thai and Portuguese shipwrecks were discovered off the coast of Malaysia by Nanhai Marine Archaeology, a company led by Swedish naval architect Sten Sjostrand. The Nanhai, which means Southern Seas in Chinese, was part of the Asian Maritime Silk Route that connected China with Southeast Asia, India and the Middle East. Silk, porcelain, pottery and other

exports were traded on this route. Thirty percent of the recovered items have been donated to the Department of Museums and Antiquities according to Sjostrand, and money earned from the sale of the relics will be used to fund more research and excavations. Divers involved in the recovery of the artefacts said that while the work was exciting, the process of excavation was not easy and required knowledge of the depth of the sites and focus on the use of nitrogen gas, which if inhaled too much could cause intoxication. ■



[www.shipwreckandtreasure.com](http://www.shipwreckandtreasure.com)





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Gunild Symes

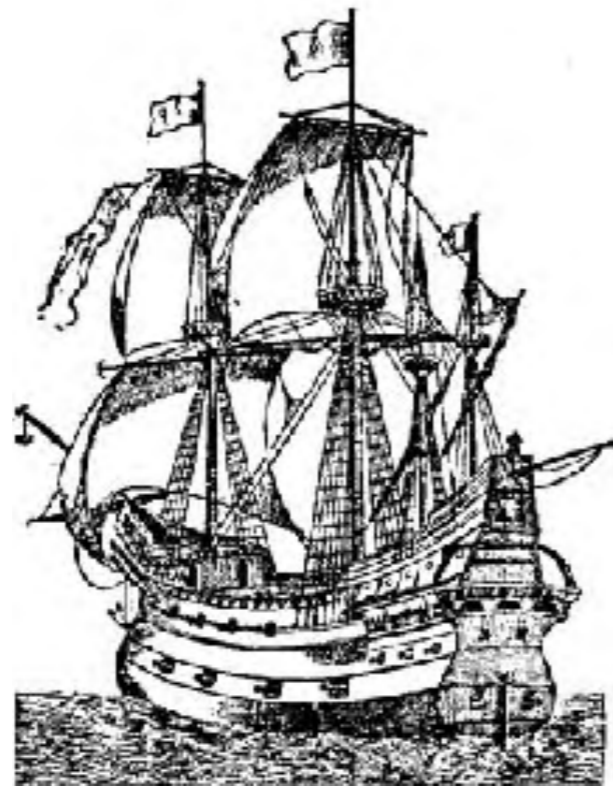
## British team rescues Russian submariners

*Rescue of trapped submariners prompts Russia to buy Scorpio underwater robots*

After a British rescue team operated by James Fisher Rumic Ltd used a Scorpio underwater robot to free a Russian mini-submarine with seven submariners trapped underwater for three days in the Pacific Ocean, the Russian navy planned to purchase two unmanned devices as well as technical support. According to officials, the sophisticated Scorpio-45 underwater robot managed to free the Russian Priz AS-28 vessel snagged in nets and equipment at 190 meters with just a few hours of oxygen supply left for its sailors. The devices are not compatible with Russian technology according to authorities, but the two robots will be handled by Russian experts. ■



This image taken by the Scorpio 45 during the rescue shows the Russian Priz submersible and the mesh of underwater nets and steel cables that trapped it 190 meters below the surface with 7 sailors inside



Spanish Galleon

## Underwater archaeologists search for 16th century Spanish wreck

In the early 1500s, a Spanish lawyer and explorer named Lucas Vazquez de Ayllon, sailed down the southeastern coast of North America on a ship called The Capitana. De Ayllon led the expedition to the Georgetown area in an attempt to settle a colony there. It is thought that aboard his vessel were men, women and children as well as a large cargo of supplies. The galleon met its demise at the mouth of Winyah Bay according to archaeologists who are part of a long-term project to map around 11,000 miles (22,000 km) of inland water and over 187 miles (360 km) of South Carolina coastline in search of several historic wrecks.

The project received US\$6,000 in private donations to conduct the initial search for The Capitana. The archaeologists from the Maritime Research Division of the South Carolina Institute

of Archaeology and Anthropology worked from a 25-foot research vessel in Winyah Bay for three weeks in September. Experts say that the Capitana was most likely beaten apart, but more sturdy objects such as anchors, ceramics and a load of olive oil would remain.

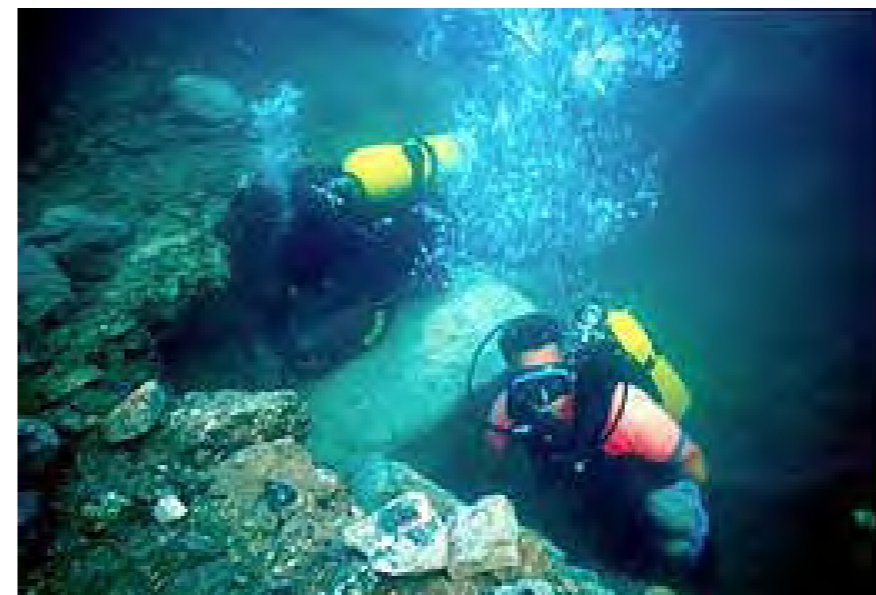
According to experts, passengers of the Capitana escaped before the ship went down with its cargo of tools and food. De Ayllon led his expedition south in 1526 to establish a colony in what is now called Sapelo Island, Georgia, but the effort failed after de Ayllon and the colonists died of fever.

The project covers a very large area and could take months or years to search, so long-term funding is being sought from the National Oceanic and Atmospheric Administration to continue the research. ■

## Excavations of the ancient underwater city of Limantepe resume

*Ottoman relics believed to be hidden here*

Renewed efforts to excavate the ancient sunken city of Limantepe have begun according to the Dean of Ankara University Professor Nusret Aras. The underwater site is located near the coastal town of Urla in the province of Izmir. Authorities say the excavation will take a lot of hard work and painstaking conservation by the Underwater Research Center. The president of the Limantepe Archeological Excavation, Professor Hayat Erkanal, said that plans now are to launch the excavation with the support of the Urla municipality. Erkanal said that there is a need for a museum in Urla to preserve and display the artefacts recovered from the site. Although the Ministry of Culture has halted the opening of new museums in the country and plans to close some of the smaller ones, the Mayor of Urla Selçuk Karaosmanoğlu supports the initiative. ■



Divers excavate an ancient underwater city at Limantepe

## Diving in a Quarry?

**New technical dive training site at inland location in Wales**

The newly named National Diving and Activity Centre has been purchased by Exhibitor Limited who plan to develop the site, which is located in a quarry, into one of the UK's best diving centres. The new centre offers divers some of the best inland diving in the country.

Depths range from 6 to 80 metres according to the diving manager of the centre who added that safety was a primary concern at the centre. To this end, the centre has allied itself with the Royal Society for the Prevention of Accidents during the course of development. Permanent signage above and below the surface marks deep water as well as the deep end of the quarry.

Future plans of the new owners of the 55 acre site include new hotel accommodations, road and access entrance, log cabins and additional outdoor recreation activities. Some of the activities to be introduced include zip sliding, abseiling and 4x4 off road weekends.

The centre has extensive training and rescue facilities including qualified first aid personnel, new classrooms, educational equipment and technology, a 3 metre training tank, shop, café, restrooms and changing rooms. The centre also has full gas blending facilities for nitrox and trimix. Located 2.15 hours drive from the Hammersmith Fly Over in London, the centre is a member of the Inland Dive Site Forum, which includes other members such as Capernwray, Horsea Island Dive Centre, Stoney Cove, Vobster Quarry and Wraysbury.

For more information, visit:  
[www.ndac.co.uk](http://www.ndac.co.uk) ■

PHOTO  
COURTESY  
OF NATIONAL  
DIVING AND  
ACTIVITY CENTRE



Edited by  
Peter Symes &  
Gunild Symes



## Tracked turtles face different fates

Two Atlantic leatherback turtles fitted with satellite tracking devices in South America in June this year as part of a monitoring program have met very different ends. One of the turtles swam over 3000 kilometers around the Atlantic Ocean while the other turtle died in a fishing net before ever reaching the open sea. The second turtle's demise draws attention to the dangers sea turtles face with fishing gear and raises concerns as to how the fishing industry can reduce turtle bycatch. One solution according to officials is the use of circular fish hooks that prevent turtles from being caught as well as fishing nets that use Turtle Excluding Devices. While the second turtle's life ended tragically, the first turtle's long journey around the Atlantic Ocean provided vital evidence of the routes used by the leatherbacks useful in the better understanding and protection of the species. The monitoring program was managed by WWF. ■



MEDIA LINK FEATURES

## Sea turtles dying by the thousands in Nicaragua

Green sea turtles protected by Costa Rica and other neighboring countries are being killed by the thousands by the unregulated and unsustainable commercial fishing industry in Nicaragua. A study by the Wildlife Conservation Society of the Bronx Zoo found that tagged turtles in Nicaragua have little more than a 50 percent chance of surviving to the next year. Researchers say that if turtle fishing is not drastically reduced soon, the sea turtles will vanish in a few years.

It is estimated by CITES, the

Convention on International Trade in Endangered Species, that 11,000 green sea turtles are harvested annually by Nicaragua for local consumption. Experts say that a quota between 1,000-3,000 turtles needs to be put into place to save the species.

According to scientists, green turtles are slow-growing and slow to mature. They are the only herbivorous species of sea turtle and travel throughout the Caribbean to Nicaragua to graze the

rich sea grass beds there. Scientists warn that removing so many adults and large juveniles from the population spells disaster for the species. This includes the adult turtles from Tortuguero in Costa Rica, well known for the turtle nesting beaches located on its coast.

Scientists believe that the largest remaining greenturtle population in the Atlantic lives in this region. ■

# TURTLE NEWS

## Saving Endangered Sea Turtles

*Sea turtles in Mexico are making a comeback*

The beaches of northeastern Mexico are the only nesting ground for the world's most endangered sea turtle, the Kemp's Ridley. For millions of years, these turtles have returned to the beaches now known as La Pesca, Tepehuajes and Rancho Nuevo. The female Kemp's Ridelies lay their eggs here each year, but only one out of a thousand hatchlings make it to adulthood. However, with the success of a joint project by the U.S., Mexico, biologists and the shrimping industry, these turtles are no longer harvested as food by Mexican communities.

More than 10,000 nests with an average of 100 eggs per nest have been successfully transported to

nearby corrals and protected until they hatched. Workers from the Kemp's Ridley Recovery Project have patrolled the beaches and collected the eggs.

In support of the project, the American shrimping industry helped build a community center and ceramics workshop in the center of Tepehuajes where locals can create hand-crafted turtle related pottery to sell instead of catching sea turtles. The money they make on these products offsets the income lost from the prohibition of turtle harvesting. Authorities from the shrimping industry said that industry leaders realized the importance of helping the sea turtle make a come back since their disappearance would negatively affect shrimp stocks in the area. ■

## Turtles on jellyfish trail set a course for Scotland



PETER SYMES

Large numbers of leatherback turtles are headed toward Scottish waters following a surge of jellyfish, their main food source, which is traveling north-

ward in the next few months. The moon jellyfish have experienced a huge bloom in the region where tens of thousands of jellyfish are washing up on the shores. It is not known for certain why the jellyfish bloom is occurring, but scientists fear it is just another sign of global warming since increasing temperatures produce more plankton, the food source of the jellyfish.

The news of the coming of the leatherbacks has prompted calls for sightings. Marine biologists say that the turtles should reach Scotland by way of the Gulf Stream. The

leatherback turtles, which can measure up to eight feet long (2.5 meters), nest in Trinidad and Florida, but can also tolerate the cooler temperatures of the waters around Scotland. Leatherback turtles have a slightly flexible "rubbery" shell and are the largest living turtle. At adulthood, the turtles' core body temperature in cold water is several degrees centigrade above the temperature of the water surrounding them. This allows leatherbacks to thrive in ocean regions where other marine reptiles cannot survive. ■



Edited by  
Peter Symes &  
Gunild Symes

## Stopping illegal fishing the scientific way

*New initiatives give illegal fishermen an alternative way to make a living*

Australian scientists are funding a new project to curb illegal fishing in Australian waters. It is estimated that 20,000 sharks are taken each year by impoverished fishermen from Indonesia who sell the creatures on the Asian market where they are bought by an increasingly affluent Chinese population. The program gives these fishermen an alternative source of income through the harvest of seaweed and sponges.

According to Australian experts, seaweed, when dried, is a valuable commodity. It is used in industrial products and toothpaste. Already the program funded by Arafura Timor Research

Facility in Darwin has helped up to 60 families in Roti Island near Timor to make a new living harvesting seaweed and cultivating sponges. Although it will be difficult to compete with the shark fin market in which fishermen receive up to \$200 per kilo, tougher protection laws may drive fishermen to alternative industries such as the harvesting of seaweed and sponges.

Australian Navy ships have taken a hard line in the fight against illegal poachers encroaching on Australia's northern fish stocks and threatening to cause irreversible damage to the marine ecosystem. Operation Clearwater has apprehended up to 90 illegal fishing vessels. According to the federal government, it is the largest ever sea and air operation against foreign poachers. ■

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NOAA. PHOTO BY JOE HEATH

Seaweed

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ROYAL AUSTRALIAN NAVY PHOTO

HMAS Brisbane

## HMAS Brisbane

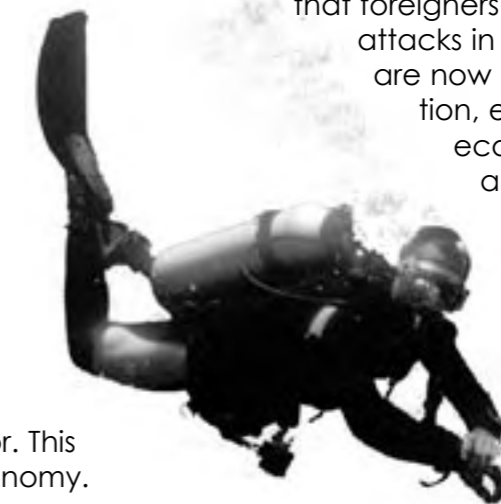
The *HMAS Brisbane* has been scuttled as part of an artificial reef project in Australia. Nicknamed 'The Steel Cat', the *HMAS Brisbane* was a Charles F. Adams class guided missile destroyer constructed by the Defoe Shipbuilding Company in the USA. The third ship of this class to be purchased by the Royal Australian Navy, the 133 metre former warship is now part of a reef park off the Sunshine Coast. Divers can explore the wreck and its passageways through access holes that lead to the forward engine room, boiler room and the ship's interior including the living and sleeping quarters used by the crew during the ship's service from 1967 to 2001. Launched in 1966 and commissioned in 1967, the *HMAS Brisbane* completed two tours of duty in Vietnam, the first in 1969, and the second in 1971. It was one of four Australian warships to serve in the first Gulf War in 1990 and 1991. ■

## Sharm el Sheikh blast has modest impact on dive tourism

Officials report that the affect of the bombing attack of a resort in Sharm el Sheikh, Egypt, has not had the powerful effect on dive tourism as feared. Dive centres in Sharm report that diving, while slightly lighter than normal at this time of year, is continuing. Travel agents in Europe say that there have been relatively few cancellations and that most European travellers are not changing their travel plans to the area.

Egyptian authorities say that travellers are not as easily scared away as they were after the 1997 bombing that killed 58 tourists at a pharaonic temple in the city of Luxor. This tragedy badly affected Egypt's economy.

The death toll of the recent attacks in Sharm reached 64. However, government officials say that the tourism flow is far more resilient to these events than in previous years. It is thought that foreigners are now more used to attacks in other parts of the world and are now harder to scare. In addition, economists say that Egypt's economy this year is stronger and more resilient due to government reform programs, tax cuts, rising business confidence, high oil prices and healthy world growth. The rest of the country is so far unaffected. ■



STOCK PHOTO BY PETER SYMES

## Researchers Find Recovering Coral Reef

A team of researchers has made a rare, valuable and positive find off the coast of Antigua: The reef is recovering fast from an epidemic of "white-band" disease that attacked the region's unique, tree-like elkhorn coral and most of the coral reefs in the Caribbean are in pretty bad shape,

But Antigua's North Sound, currently under study by Dr. McManus, director of the University of Miami's National Centre for Caribbean Coral Reef Research (NCORE) and his team, boasts an "immense" surface area with good signs of recovery. Massive thickets of elkhorn

coral are growing up to 14 feet long, with lots of holes and therefore the ability to support very large volumes of fish. "Most of the predatory fish are there, along with herbivorous fish that eat algae, and we're finding a good mix of juvenile fish, which is a sign that this population will recover" says Dr. McManus.

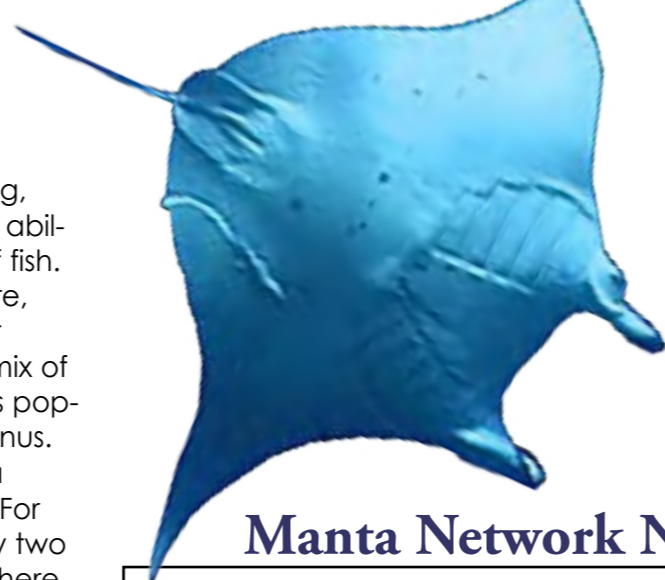
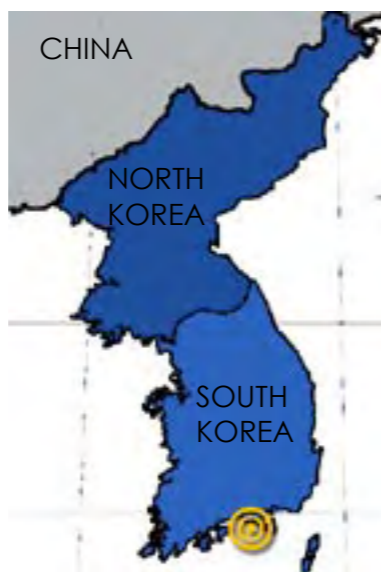
However, the North Sound has a way to go, Dr. McManus cautions. For example, researchers counted only two groupers in a five-kilometre area where there should have been thousands. Rebuilding the fish community is a vital but complex task, that needs a plan. ■



COURTESY OF THE KOREA NATIONAL PARK AUTHORITY

## New Coral Reefs Found off Korea

The Korea National Park Authority has announced the discovery of a coral colony off the coast of Namhae County, South Gyeongsang province. It is the first time a coral colony of this size has been found in Korea. Lying four meters below the sea's surface, the colony is about five meters long and four meters wide. Among its exotic coral species is the *Corynactis*, which had never before been found in Korea. ■



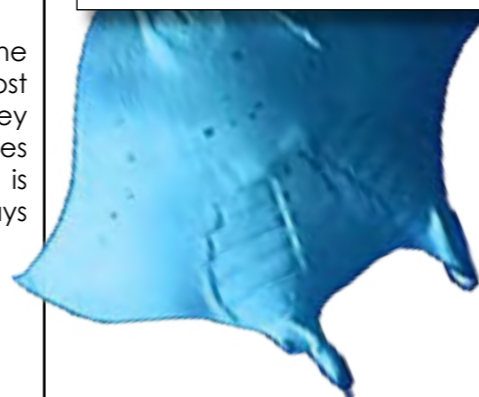
## Manta Network News

### Saving Ticao's Mantas

The body of water within the area of Burias island in Sorsogon, and Ticao island in Masbate is known as Ticao pass. Like Donsol's waters, it has a dense concentration of plankton, krill, and small fish, making it ideal as a feeding ground for mantas. Ticao, one of the three major islands of Masbate, has received scant attention from tourists. Then news of manta sightings in the area that would later on be called the Manta Bowl reached local and foreign divers - mostly Japanese - who started visiting the area to get a glimpse of the friendly creatures close to their hearts.

Unlike sightings in dive sites elsewhere, the mantas of Ticao are big. They are also almost a guarantee, aside from the fact that they are known to linger for a while and sometimes even get near adventure-seeking divers. It is estimated that an average of three manta rays are being killed in Ticao every week. This is equivalent to 144 mantas killed each year but the number could even be higher. ■

Read more on how you can help to save the giant rays on [this link](#)



## Coral Reefs Relocated in India

Marine biologists claim success in coral relocation

300 corals are thriving in the Gulf of Kutch. These specimens were relocated by a group of marine biologists from the National Institute of Oceanography over the past three years. The work was done to minimize the damage caused to the marine ecology of the area by undersea petroleum pipelines and sedimentation. The corals were moved one kilometre away from their original home.

Scientists monitoring the project reported in January 2005 that the corals are now healthy and growing. Funded by Essar Oil Ltd, the relocation project is said to have saved the species. Essar Oil will be building a new refinery in Vadinar in Jamnagar and pipelines would have damaged the coral living at the location.

Experiments in relocating corals have not been successful in the past. With the success of the Gulf of Kutch relocation, biologists are encouraged to take more initiatives in the Indian Ocean. ■

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## Scuba thief dies after chase

Maritime officials in the Philippines reported that a patrol vessel discovered four divers looting a shipwreck in Subic Bay. One diver jumped into the water from the small boat at the site where the *USS New York* sank in 1941. The diver was critically injured in his attempt to escape. He died on the way to the hospital.

A second diver was arrested by officials at the scene and three others are missing. Officials continue to search for the missing divers.

The *USS New York* was scuttled in 1941 by American forces in an attempt to prevent the invading Japanese from capturing it. ■

Edited by  
Peter Symes &  
Gunild Symes

## New underwater eyes spy unknown sea creatures

With the aid of a new camera which operates on dim red light, ocean researchers are gaining a new revealing look at the deep sea in the Gulf of Mexico. After Hurricane Katrina passed over the area, oceanographers from Harbor Branch Oceanographic Institution in the U.S. aboard the National Oceanic and Atmospheric Administration Research Vessel Seward Johnson are studying the area with new eyes and finding a variety of deep-dwelling shellfish that produce their own light as well as other creatures with surprising abilities to see ultraviolet light. In addition, a previously unknown type of squid

that is six feet long showed aggression towards the camera.

The 200-pound camera was left at the bottom of the sea before Hurricane Katrina hit the area. When scientists returned, they found the camera upended not by the storm, but by some large predator upset by the camera. No recording of the animal was made as the battery had run out. But sharks have been filmed attacking the camera before. Studies in the past used cameras with bright white light or caught animals in nets. The drawback to this technique is that the white light blinds these creatures. The new camera's red light does not as it seems that they are unable



NOAA

to see it.

But the most exciting aspect of the new discoveries for scientists is the investigation of why some creatures see ultraviolet light as it is thought that there is no ultraviolet light at such deep depths. Researchers wonder what the animals might be doing with this ability. One theory suggests that they might be able to detect other luminescent creatures with this sensitivity. ■

## Flourescent sharks found in Gulf of Mexico

Scientists of the Deep Scope 2005 expedition run by the National Oceanic and Atmospheric Administration discovered a new

species of glowing shark. A photo of the three-foot long (one-meter-long) creature was captured on August 22 and provided visual evidence of a

fluorescent chain catshark on the sea floor of the Gulf of Mexico. The footage was taken shortly after Hurricane Katrina passed over the area. ■



NOAA

A fluorescent chain cat shark is found by the Deep Scope expedition at about 1820' feet (603 meters) deep

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Edited by  
Peter Symes &  
Gunild Symes

# U.S. to ban Caspian beluga caviar

It is expected that the U.S. government will ban the import of beluga caviar from the Caspian Sea due to the creatures dangerously low numbers and decreasing size. According to authorities from the Division of Scientific Authority of the U.S. Fish and Wildlife Service, states surrounding the Caspian Sea have failed to file a joint management plan for the endangered beluga sturgeon. These states include Azerbaijan, Kazakhstan, Russia, Turkmenistan and Iran.

The beluga sturgeon is the largest of its kind and the most prized. Due to over

fishing, it is now one of the rarest. At \$3000 a pound in the U.S., the caviar of the beluga is the world's most expensive wildlife food product.

Beluga population in the Caspian Sea dropped 50 percent in the last five years. The Black Sea beluga population dropped by 20 percent according to the Convention on the International Trade of Endangered Species of Fauna and Flora, an organization of in the United Nations based in Geneva.

The two main producers of beluga caviar are

Iran and Kazakhstan. Beluga is harvested at sea in Iran and fished in its last natural spawning ground in the Ural River in Kazakhstan. Two hatcheries in the main town on the Ural failed for the first time to catch a single female in their regular activities to restock the species, according to officials.

In addition,



tion, the beluga sturgeon is shrinking. Once found at nearly 20 feet long or 6 meters and weighing 1.8 tons, the few belugas caught now weigh about 150 kilograms. Authorities claim that over fishing in the 1980s and poaching since the Soviet Union unravelled contributed to the change in the creatures size.

Efforts have been taken by the endangered species organization to place quotas on how much beluga caviar can be exported from Kazakhstan and Iran. In

Clare recieved treatment at The Alfred hospital and Portland's Professional Diver Services and has recovered completely.

The diver's rare reaction has reminded other scuba divers to be more attentive to their health while diving even while all appropriate precautions are taken and guidelines followed. Scuba divers are encouraged to be aware of the risks involved in diving and seek immediate medical attention when they feel sick. ■

addition, recent proposals to ban beluga at a meeting of the sturgeon fishing regulatory commission in Kazakhstan were put forth by the Russian delegation as well as a ban on Russian sturgeon whose numbers are also in steep decline.

The United States was the largest importer of the world's beluga caviar in 2003 at 60 percent according to the endangered species organization. In second place is France at 11 percent and Germany follows third at 8 percent. ■



Caviar connoisseurs are heralding the growing selection of American caviars. Innovative varieties produced from farmed white sturgeon, farmed paddlefish, wild Alaska salmon and whitefish offer excellent taste and are environmentally sustainable. Photo by Bill Reese. Courtesy of Caviar Emptor

In the past decade, fishermen have rarely seen mid-size beluga sturgeon like the one pictured here, captured from the Volga River in Russia. Photo by Hans-Jurgen Burkard/Bilderberg. Courtesy of Caviar Emptor

## Simulated dive leads to the bends

A mother of four, Rachael Clare, suffered delayed decompression illness after participating in a simulated dive in a hyperbaric chamber in Portland in Australia. The simulation took Clare and two other divers as well as a dive instructor to 39 metres where a written test was completed at the bottom and then a return to normal pressure was achieved within 35 minutes. Clare said she felt fine after the simulation but began experiencing increasing pain in her left leg and knee within an hour.

Clare recieved treatment at The Alfred hospital and Portland's Professional Diver Services and has recovered completely.

The diver's rare reaction has reminded other scuba divers to be more attentive to their health while diving even while all appropriate precautions are taken and guidelines followed. Scuba divers are encouraged to be aware of the risks involved in diving and seek immediate medical attention when they feel sick. ■

## New deep sea creatures discovered near Australia

Unidentified deep sea creatures and underwater canyons off the Western Australian coast have been uncovered by new marin research at depth of up to 1.5 kilometers. A research vessel mapping the ocean floor on the continental shelf found the new fish and coral species. Scientists hope the discoveries will lead to a better understanding of the evolution of marine

animals. According to government officials, the research will be used in determining which marine areas need protection. ■





*Discover Tulamben  
Diving Paradise*

# Bali

## Dark grey

Usually a colour associated with dull. Not here. The dark lava sand creates a perfect neutral backdrop to make all the colours of corals and critters stand out beautifully. It also dampens the often harsh and bleaching tropical sunlight into something of a less eye-squinting exercise to enjoy. I am reporting from the slopes of the house reef at Scuba Seraya at Tulamben on Bali, and I am equipped with the usual oversized camera gear and curiosity... oh, and a local guide with a fabulous eyesight and an ability to tease out and point out even the smallest and best camouflaged creatures. He never ceased to amaze me. I have come to fancy house reefs.

## Tulamben

Admittedly, in some overcrowded places, the reefs can be as worn as the grass in a park after a rock concert. But mostly, these areas provide you with constant round-the-clock access to a location. You get to know and learn where to find all the small critters. It gives you the chance to get comfortable with the surroundings and establish a work process. You can always come back and shoot some more film, redo a shot in another fashion, do various experiments and be a little creative. Well, those were my thoughts about it anyway, although I also fancy seeing the variety and different locations to

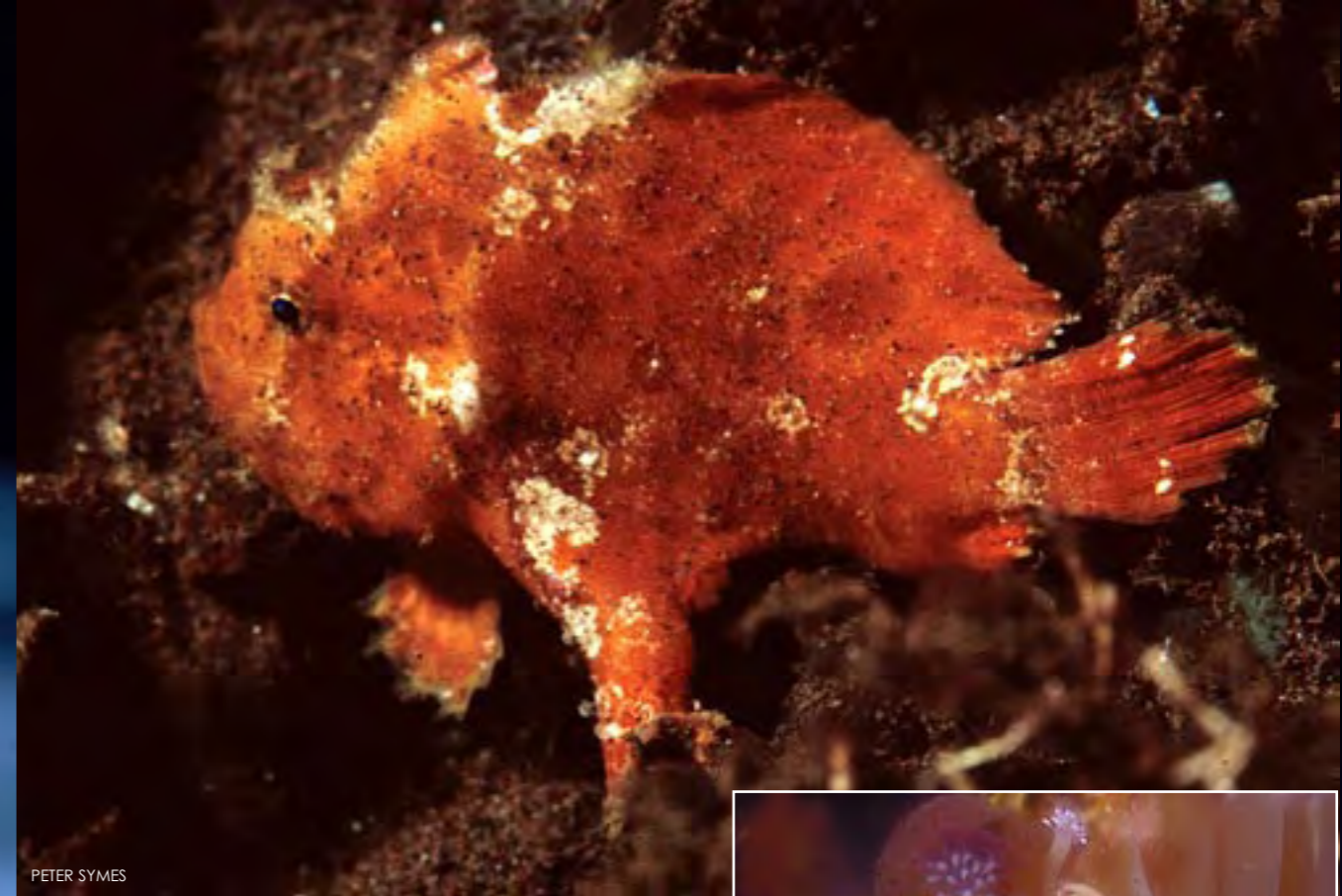
Text by Peter & Gunild Symes. Photos by Peter & Gunild Symes and Jesper Meyer

PETER SYMES

PETER SYMES



Juvenile paperfrogfish.  
This little fella was barely  
an inch and skipping hap-  
pily along the bottom



PETER SYMES

Detail of a seapen. These animals has the appearance of a stalky plant and are very decorative where they are found in clusters on the gravelly bottom



PETER SYMES

cover the whole spectrum

Tulamben proved to provide us with ample opportunities to do both. It is a site that holds quite a reputation among dive aficionados. Once we were on location ourselves, it was obvious why. It is said that it is the single best place in Bali to find rare and unusual animals. Even on my first acclimatisation dive, I saw three different varieties, or species, of sea horses, half a dozen different nudibranchs and numerous juvenile paper

frogfish, gobies and blennies. The house reef, Seraya Secrets, is the perfect place for macro-photographers and naturalists because it never runs out of surprises, and it is so easily accessible right there in front of the resort. It starts with a shallow plateau where we could often find many different species of scorpionfish willingly posing for our lenses, or perhaps just trusting their camouflage to hide them from us.

Some 15-20m from the beach, the bottom starts to slope down more abruptly, so it is easy to get down to a depth of 25-30m quite quickly. The depth gauge is something that needs to

be observed closely here. It seems easy to get carried away with all the marine life and end up going quite deep. The light is beautiful down here too.

In the first few days, we had a bit of an unusual swell that stirred up particles in the top layers, which created a matte filter of blue-grayish light that added a magical romantic touch to the sub-sea landscape.

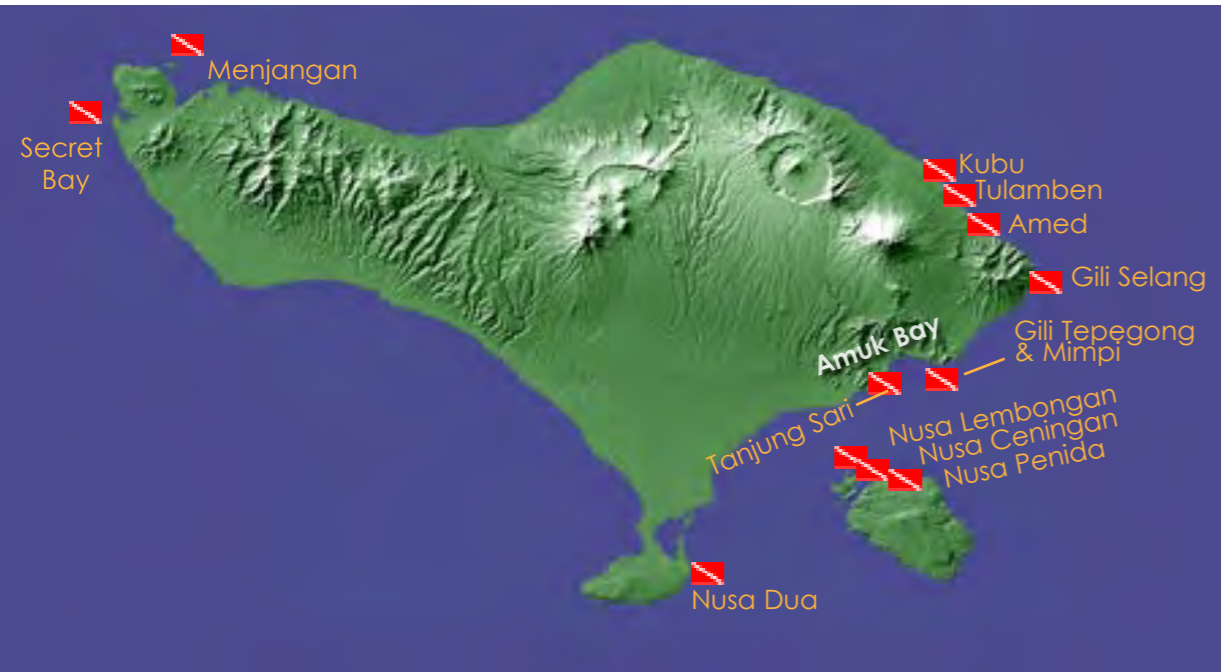
The coastline looks towards the northeast, which means that light late in the afternoon will arrive from behind the slope. It brings out all the sculptural structures in the lava and the corals.

Once back topside, I couldn't help contemplate how a dive location obtains



Commensal shrimp of a yet undetermined species





its fame. This location, as such, is somewhat unassuming and doesn't immediately stand out in comparison with so many other pretty locations on the planet or island.

No offense—the resorts here are very nice, comfortable and intimate and provide for a very enjoyable and relaxing get-away. Seemingly endless coastlines

extend into the horizon. So why here, three hours away from the main tourist areas around Denpasar and Nusa Dua?

### Liberty Wreck

One reason could be the *Liberty* wreck, one of the main dive attractions in the Tulamben area, and certainly one that holds fame beyond Bali.

This 120m wreck is said to be one of

the easiest to dive, and sure enough, it lies just off the beach and a very short 35m swim from the coastline. It is lying on its starboard side parallel to the beach with the keel pointing towards the coast. It lies port side and some of the twisted superstructure seems to be just below the surface. The wreck is indeed very nice because it is so accessible and covered with interesting growth. It is a good hiding place for a wide variety of sea life. As a wreck for wreck fanatics, it is probably less interesting as, for one, there are no artefacts to recover.

It is a WWII wreck indeed. It was a casualty of a Japanese torpedo. But the wreck actually first sat on the beach for more than 20 years, during which period everything worthwhile salvaging, including her propeller was removed. The *Liberty*, not to be confused with a Liberty class vessel, was a cargo ship carrying rubber and railroad parts from Australia to the Allied forces in the Philippines, when she was struck by a torpedo in the nearby Lombok strait on January 11, 1942.

Two US destroyers took her on tow towards Singaraya hoping she could be repaired, but she was fatally wounded and took on too much water. She was then beached at Tulamben in an effort to keep her from sinking, but there was no time to salvage her cargo before the Japanese invaded Bali. She then sat here for over two decades until 1963 when Bali's highest mountain and volcano erupted violently and created earthquakes that rolled the ship off the beach and broke the hull in several pieces.

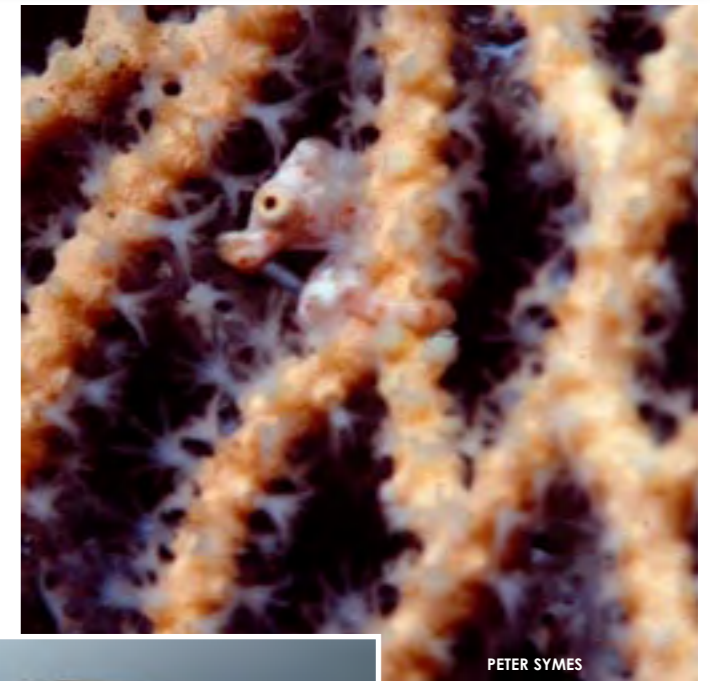
Paper frog fish in gorgonian on the *Liberty* wreck

It is no longer advisable to penetrate the wreck as it is starting to break up, and the steel is very fragile in places. But is still a haven to go look for creatures.

On my first dive I even caught a glimpse of the elusive pygmy sea horse. This was my first sighting of the species, and I was absolutely taken aback. I could not believe how small it was. Amazing... and truly pygmy, indeed. No wonder that they were only discovered in recent years.

We started the dive off the stern, which was decorated with majestic fan corals, and to the right, we saw the stern gun that was hastily retrofitted to the *Liberty*. This wreck is like the gardens of Babylon as regards to fan corals and other hanging or

What everyone is looking for. This little fella I saw on my first dive at the *Liberty* wreck skitting around the coral to avoid the light



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**THE LIBERTY WRECK**  
 Built in 1918 by the Federal Shipbuilding Company in Kearny, New Jersey, USA  
 Length: 120m (395 feet)  
 Width: 17m (55 feet)  
 Draft 7.3m (24 feet)  
 Gross tonnage: 6,211 tons  
 powered by 2,500 hp steam turbine  
 position 8° 16'29" S and 115° 35'35" E



Mount Agung is Bali's landmark. It produced a major devastating eruption in 1963. Hard to believe on such a beautiful and peaceful day as this

protruding corals, and within the branches we see seahorses, shrimp, crabs, paper frogfish and a couple of hawkfish. Hiding in the wrecks, we see a school of grunts and trumpetfish dart around as trawlers patrol the water above the wreck. The most obvious route to take first is the swim along the superstructure of the wreck as it lies at its deepest point.

One thing to be said about the wreck however is the early bird gets the worm. Get up early! It is said to be the most popular dive site in Bali, so it gets many visitors on a good day in the high season. Some of these visitors are driven all the way up from the major resort areas on the southern coast, so those who reside in the Tulamben area will have a couple of hours head start. I took a pre-breakfast dive with my guide and we had the wreck virtually to ourselves. It was wonderful, and back at the

resort I had a stack of yummy hot pancakes waiting.

### Giant barrels

In the opposite direction, towards the eastern end of Tulamben bay, and just past that massive lava river that's now solidified outlet into the sea, there is another bluff under which we are going to have our next dive. This site is quite different and characterised by massive barrel sponges everywhere. It looks almost like a plantation, and a bit surreal. The diving is easy here. There is little or no current and no need to move far anyway. The devil is in the detail here, so what you want to do is inspect the coral branches very closely and every other nook and cranny for exciting and weird looking critters. Again, my trusty dive guide, Semut, proved to have a stunning eye for spotting even the smallest and most camouflaged creatures. I simply did not have film enough, and while I was taking one shot, he was over at some-



BOTTOM LEFT: Rice is the main crop in the island



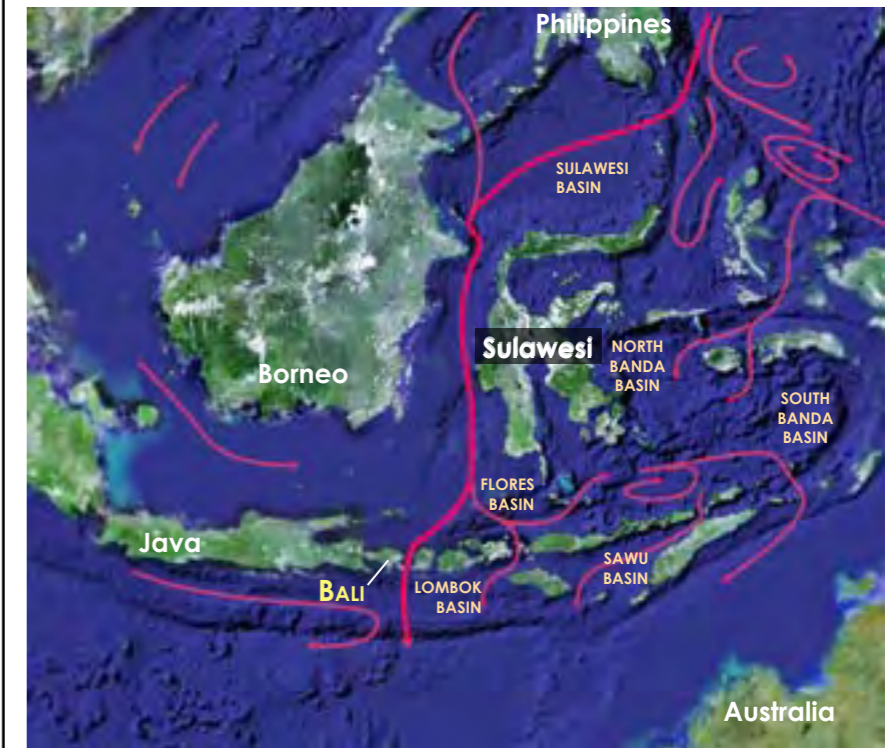
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BELOW: Giant barrel sponges can be found together in large groups



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## Bali



### Why are the Balinese waters so rich?

## The Indonesian Throughflow

The source of the species richness in Balinese waters stems from Bali's strategic position in the great systems of currents known as the Indonesian Throughflow. It all starts east of the Philippines where the constantly blowing of the tradewinds and the ocean currents force huge masses of water up against the Philippines, where it is trapped and forced southwards. Most of this current, are directed by ocean bottom morphology to flow into the Sulawesi basin and down between Borneo and Sulawesi - the fat red arrow on the figure above. The only thing sitting in this giant current's way is the lesser Sunda Islands, predominantly Bali, Lombok, Sumbawa, Flores and Timor - with Bali sitting right in the ideal position to benefit from this flow. Approximately 25% of the total outflow into the Indian Ocean is passing through the 35km wide strait between Bali and Lombok, which is one of the main reasons that Bali is so

immensely diverse. Every bit of fishlife, plankton and eggs that gets swept away pass through here.

But that is not all. Bali, unlike most of the rest of Indonesia also receives water from the Indian Ocean as well. While there is a net outflow from the Pacific into the Indian ocean, there are periodic cycles that let in water from the Indian ocean and with it, its creatures, into Balinese waters. The ocean south of Bali is location for one of Indonesia's five major seasonal upwellings, the others being at West Sumatra, Makassar strait, South Java and Banda sea. These upwellings bring cold but nutrient rich water up from the deep basins to the surface. In Bali's case this happens during the south east monsoon, where the easterly winds generate a strong westward current along Java, which then pulls water of from the deep ocean basins south of Bali.



GUNILD SYMES



GUNILD SYMES



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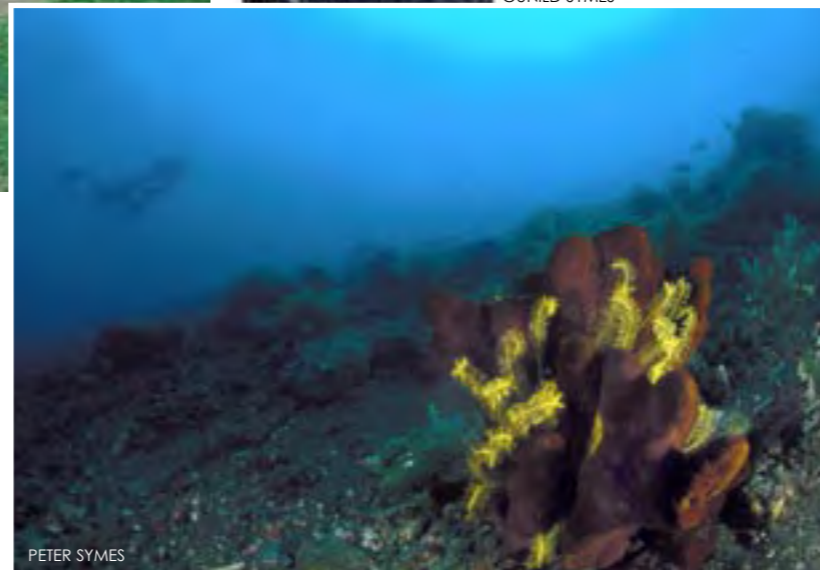
ABOVE: Tirtagangga Water Palace. LEFT & ABOVE RIGHT: Statues at the Water Palace. RIGHT: Diver explores slope with sponges

thing else waving me toward him to see what he found. I just went from spot to spot. It was, however, all very relaxed.

Once I got back inside and uploaded my dive profiles onto my laptop, I saw that my average air consumption was very low—about half of what an average dive back home would have required. I had no problems extending my dives well beyond the hour or so, until hunger or craving for coffee drove me out of the water. With all the stuff going on in the shallows, you just can't help hanging around as long as your air supply lasts.

### Tirtagangga Water Palace

A favourite day excursion from Tulamben is the Tirtagangga Water Palace. Tirtagangga, which in Balinese means "holy water of the Ganges", was once home to royalty. The gardens and pools at the Tirtagangga Water Palace are now open to the public. Locals and tourists alike enjoy bathing in the pools fed by naturally filtered fresh



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water gushing from under an ancient Banyan tree perched on the mountain upon which the palace gardens reside. It is said that the waters here have healing qualities that lead to long life and health.

The modest palace was built by one of Bali's last kings, Anak Agung Anglurah Ketut, in 1947. The Raja of Karangasem was inspired to build the palace and gardens after a tour of the Versailles Palace in France. The Raja chose the location for its view that overlooked his kingdom and named the gardens after the holy river Ganges in India, which is known for its healing powers.

We took a cab up the steep curving road that led us to the water palace. Our friendly cab driver was also a knowledgeable tour guide and led us

## Bali

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Phill Short, pioneering cave diver after a 14 day exploration of a cave system in Siberia.

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Traditional wood carving



LEFT; Moray eel gets the works wash at a cleaning station with cleaner shrimp. BELOW: Nudibranch



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behind the palace where fields of regional crops and writhing rice paddy terraces are cultivated by the local farmers and their families who watch over the fields and scare away ravenous birds with loud shouts from small grass huts on stilts and a multitude of home made noise makers that spin in the wind.

We walked through the fields of sweet potato, corn, rice and a spinach-like green leafy vegetable. Small canals irrigate the fields with rushing cold fresh mountain water. Children and families can be found bathing in them and cooling themselves from the ever-present heat and humidity.

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Detail of Balinese sculpture

to strategic points along the way where he stopped to let us take photographs of the majestic countryside and mountainous terrain terraced in the traditional style with rice paddies climbing up the steep slopes.

Once we arrived, we paid a nominal entry fee and were led by a kindly young priest who told us the story of the palace and the royal family that once lived there. Tragedy struck the palace gardens in 1963, when the volcano, Mt. Agung, erupted destroying much of the palace and statuary that graced its gardens and pools.

A continuing effort by the local community, priests and government leaders is helping to restore the gardens to its former glory. Local craftsmen and artists are rebuilding

or renovating the damaged palace villas, which can be rented out by guests, as well as renovating the mythical statues that watch over the reflective pools.

Indeed, the statues, which characterize various gods and spirits, seem to float on the surface of the reflective pools. There are also steps throughout the pools upon which Balinese dancers dance during special events and festivals. Beautiful flowering trees and shrubs shower the gardens with brilliant colour and lovely flowers while elegant fountains carved of stone give life and sound to the reflective pools.

With a small fee that went to the maintenance of the park, the priest gave us an additional opportunity to see a slice of life

## Bali

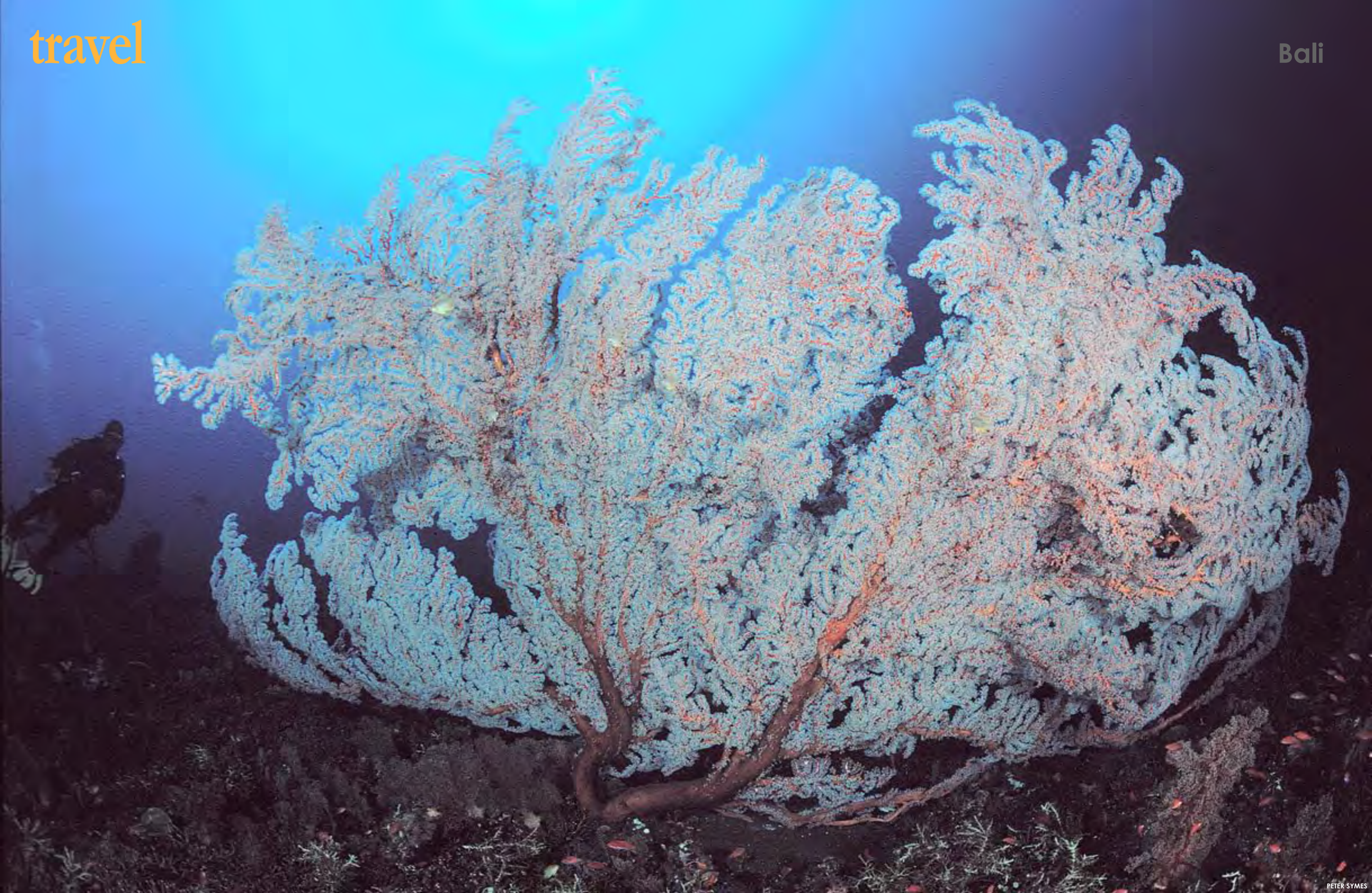
The royal villas, including the King's own domain, can be reserved for lodging. There is also a restaurant on the premises. For more information, visit their website: [www.aabalivillas.com](http://www.aabalivillas.com)

### The VW bus

We were setting out for another early pre-breakfast dive on a beautiful crisp morning. This time we were heading for the Tulamben drop-off and, according to Francesca, the dive manager, the fan coral was so big it was beyond belief. I must admit, I was a little bit sceptical—exaggeration is a national sport almost everywhere, but I would soon find out that she was right.

The Tulamben drop-off lies in the opposite end of Tulamben Bay so we had a 20 minute pleasant cruise before we arrived at our destination. Meanwhile, to our left, behind the beach and above the palm trees we could enjoy the sight of majestic mount Agung in the background.

When we congregated in the shallows, we came down onto a school of blue-spotted maskrays, some of them kept hiding in the sand only with their piercing eyes sticking out. They certainly don't have a winning appearance, but they let me creep very close to take the picture of just their eyes. We grouped and went on down the slope to explore the lava ridges, which from above, must look like a three-fingered hand jutting out from the coast with sandy areas between the fingers. On these ridges or narrow plateaus were fertile coral gardens with all sorts of corals swaying gently in the little current we encountered here. Small gorgonians were everywhere, black corals, sponges and table corals. I traversed the "index-finger", hum-



Bali



CLOCKWISE FROM LEFT: Detail shot of soft coral; The white stripes are spicules, a sort of an internal skeleton. A well camouflaged commensal Shrimp, Spanish Dancer. INSET: tiny coral goby, a striped sleeper, *Trimma grammistes*

Tulamben (wreck and reef diving)  
 Nusa Penida (drift-diving)  
 Padangbai (sharks and pelagics)  
 Menjangan (wall-diving)  
 Secret Bay, Seraya Secrets and  
 Puri Jati (Muck Diving)

**DIVING IN BALI**

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ming a tune, minding my own business and looking around when I saw it—The Big Gorgonian. It was still some distance away, but I couldn't believe how it dwarfed the diver nearby. It seemed like it could hide a VW minibus. I moved closer and was struck by awe. It stood out like a Vincent van Gogh painting and resembled a blossoming cherry tree.

I had mounted my very wide-angle fish-eye setup for this dive. It can almost photograph my eyebrows and heels at the same

time, but I actually had to back up and then some to get this giant radar antennae fitted within my viewfinder. It was very impressive and by far the biggest fan coral I've ever seen. At about 30m you can't, however, hang around forever to admire this stunning creation, so I reluctantly started nudging myself up the slope again.

At my left, I had a very interesting drop-off falling vertically 10-20m down to a sandy bottom, a place I certainly would like to explore further the next time I visit this

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Bali



CLOCKWISE FROM LEFT:  
Braincoral; Egg rolls at Scuba  
Seraya's restaurant; A villa at Scuba  
Seraya; Pink Plumeria flowers; A cluster  
of nudibranchs at Tulamben, Bali

magical spot.

It looked like the current here ran perpendicular to the lava-finger and was forced up over it bringing the plankton and minuscule food particles right into the fanning tentacles of the corals. Further up, at mid-depths there was a



bed of table corals where schools of cardinalfish were hiding inside the fronds.

**Dining by the waves**

The central meeting place for divers and guests at Scuba Seraya is the deck of the café in the centre of the resort. Here, guests can relax, socialize, plan their dives and look up fish and other creatures in guide books provided while gazing at the waves tumbling onto the beach and the small wooden fishing boats passing by far off on the horizon. There are some wonderful sunrises and sunsets to be enjoyed here.

While the new restaurant is being developed, the café serves a full menu of breakfast, lunch and dinner. On the menu, guests will find a variety of fresh

and tasty dishes of local Balinese cuisine as well as some Western fare.

Favourites on the dinner menu include egg rolls with peanut sauce, a spicy Balinese grilled chicken dish called *megoreng* prepared in coconut cream and served with peanut sauce, rice and fresh vegetables, and *nasi goreng*, another spicy Balinese dish served with an egg sunny-side-up on top of a heaping mound of stir-fried rice and vegetables. On the side, you will find a special braised spinach-like leafy vegetable salad with spicy peanut sauce called *gado gado*—delicious and healthy.

For dessert there is a sweet dish of caramelized fried small finger bananas called *godoh* served with ice cream—excellent with Balinese coffee, which is also quite popular at breakfast time when divers can grab a quick continental breakfast before a morning dive or relax with a full Western style breakfast of bacon, eggs or omelette and toast or pancakes.

The lunch menu includes the Balinese rice dishes as well as pasta, fresh salads with tomato, olives and feta cheese, mushroom soup and sandwiches. For traditional Balinese recipes, please visit [www.baliguide.com](http://www.baliguide.com).

**Blessing the Dive Centre**

The local Balinese people live with their religion well integrated into their daily lives. Each day the women prepare offerings of flowers and fruits in small hand woven baskets that are placed along major pathways and intersections at the work place, outside and inside the home. It is believed that the gods and spirits of ancestors pass

along these paths each day and so must be honoured with offerings and incense.

So, when a new building opens like Scuba Seraya's new dive store and deck, a priest must be called in to do a proper blessing for the future safety and prosperity of the centre and the people who work there and visit.

As guests of the resort, we were invited to attend. All day long, preparations were made in the decoration of the new building and deck with flowers, candles and palm leaves as well as an elaborate display of offerings of fruit, flowers, rice cakes and grilled whole chickens set out





as offerings during the ceremony.

Soon, all the resort staff appeared donning their fancy sarongs and head-dresses that were usually saved for special occasions such as this blessing.

A priest was called, who came with incense and incantations. After a

lengthy meditation and several holy songs, there was a sacrifice of a small chicken upon a coconut shell and the priest blessed all the corners of the dwelling with holy water. Then, he blessed all the people who attended the ceremony with holy water and

prayer. With the priest's work done, the participants turned to celebration—singing, dancing, eating and drinking.

Partying the Balinese way apparently also means consuming copious amounts of *arak* (or *arrack*)—a locally produced aromatic liquor. I can't say whether this version, which was passed round the circle this evening, was moonshine, but it did come in a plastic flask from some soda drink. And, wow, was it not smooth! It had the bouquet of spent jet fuel and could possibly be used to strip the paint off my old desk. Yet, as a mood elevator, it did its thing, and soon everyone was carried away in some entertaining song-dance where the dancer in the circle challenged the next with a song to take a drink and take over the dance.

Being a tourist didn't mean that I was spared from this ritual, so I had to have a go at it too. I think I took the prize for the most humorous interpretation of traditional Balinese dancing that evening, judging from how they all cracked up and rolled over laughing. Well, after that, we all became true friends. As they say, when in Rome do as the Romans...

ABOVE LEFT: Rice paddies on Bali. LEFT: Priest blesses Scuba Seraya's newly built diving cabana with incense and offerings of fruit (ABOVE RIGHT) and handmade gifts



### Night dive

Having this fabulous house reef just 20 metres from the deck where we had our dinner and Balinese coffee encouraged us to have a night dive before a late supper. In the tropics, night drops like a ton of bricks—it becomes pitch black moments after sundown, and the sky turns a deep black velvet with an unbelievable amount of stars draped across its face.

But even without sunlight shining on the dark sand of the Tulamben sea floor, the human eye is still capable of picking out the surroundings. With a healthy local stock of scorpionfishes, I wasn't so inclined to feel my way forward, and anyway we were on the lookout for the blue-ringed octopus



A clam shoots off an impressive long stream of sperm



## Bali

LEFT: a couple of the elusive garden eels poke their heads out of the dark sandy floor of Tulamben.

RIGHT: Scorpion fish are everywhere in the shallows

INSET: Harlequin Shrimp



that was spotted here a little earlier in the week.

I went out with the resort's English instructor, James, into the black night. We saw so many commensal shrimps, juvenile fish, various cupcorals, crinoids, brittlestars, nudibranchs and almost omnipresent seahorses, that we were almost disgusted with ourselves. We were so blessed with such a magnificent dive. It was like a double-length movie that we didn't want to end. There was such a plethora of species out that night. Everywhere, there was something to see, and we just kept moving.

Alas, no blue-ringed octopus. It wasn't going to happen this night. After 1½ hours of pure joy, we two seasoned instructors finally emerged out of the water with goofy,

happy expressions on our faces and spent bodies starving for supper. A heaping mound of steaming Nasi Goreng was already waiting for us on the table.

### Diving Batu Kelebit

The Kelebit Rocks are said to be a good place to observe large pelagics. At this site, we find a series of three steep coral-covered ridges fanning out from the coast with channels of white, not black, sand in between. It is also a place where it is possible to go

very deep if you follow the ridges all the way down. They end in a sandy slope at about 70m, a depth that should certainly not be approached on ordinary single tank scuba equipment.

A number of big sharks have been observed at depth at this site, but not as frequently as they once were. Most sightings have been made down at the 50-60m range.

Sightings include great hammerheads, thresher sharks, mantas and molas (sunfish) and the rare whaleshark. Also, schools of barracudas, jacks and tuna are best spotted here. The reason for this seems to be that because of the local morphology, Batu Kelebit receives deep offshore water that

A colourful nudibranch lies on a slope of a reef explored by a diver



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Tiny square crab among soft coral fronds. It is quite defensive of its territory but in this case it seems to be unsure of how it going to take on the intrusive camera.

also brings in nutrients and plankton.

Because of this, the temperatures here also seem to be on the cooler side, especially at depth, but then it also comes with quite a good visibility at depth. There is a bit more turbidity in mid-water where the plankton seem to congregate.

### Diving Batu Kelebit

We decide to head for the depths straight away and not hang around at shallower depths for the first part of the dive. Down and down I go until I feel the tinge of narcosis and an unruly stomach round 45m where I stop my descent. I can see all the way down to the sandy bottom

here.

After a week of daily +30m dives, I am on the verge of pushing the edge. My buddy descends to about 55m. I swim across the ridges while ascending gradually, keeping just ahead of a decompression obligation. On the other side of the big ridge I see them—Sharks—the first ones I have spotted after a week of intense macro photography. These were the usual white tips resting on the bottom. They lifted off the bottom and swam away once they caught a glimpse of us under-designed bubble-expelling noisy creatures with weird metallic protrusions.

The ridges themselves were covered with a very rich and diverse growth of hard corals,

## Bali

black corals, sponges, gorgonians and every other imaginable encrusting animal.

### Northwest

Close to Bali's northwest corner, we find Majangan Island, another of Bali's famous dive sites and probably the first recognised dive location. It is part of the West Bali National Park and is protected by a great bay, which gives rise to an exceptional visibility and good diving even during the rainy season. The light currents that gently sweep the steep drop-offs are just right to provide the optimum living conditions for a lush abundance of gorgonians. Gorgonians are dependent on current to bring them the plankton upon which they feed, but too strong currents will break their delicate structure.

The impressive walls with overhangs of soft corals and gorgonians are a hallmark of Majangan Island. It is not the best site to see large pelagics and some of the reefs in the shallows have suffered heavily from coral bleaching due to the severe effects of El Nino in the late 1990's.

Schooling Cardinal fish ducks in and out of the coral at the Tulamben dropoff



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White plumeria flowers at the King's Gardens

At depth there is even an interesting little wreck called by many as the Anchor wreck after the anchor was found in the shallows far above the wreck itself. The wreck, which is rather broken down and mostly consists of scattered timbers and remains, does however lie in the 40-50m range just beyond the 40m recommended depth limit for recreational divers. Under all circumstances, it is in a depth range that will give you very short bottom time or send you directly into a decompression obligation. For those trained in decompression procedures, the shallower parts of the reefs provide plenty of entertainment while decompressing.

However, a word of caution is warranted—the depths around Majangan often run down between 40-60m, and one is easily tempted to push the limits here. It also said

to be the site where more divers get decompression sickness than anywhere else on the Island.

**Secret Bay**

Also in the northwest Bali, but facing the Java and the Bali Strait, we find Gilimanuk Bay also known as Secret Bay, which is, however, something of a misnomer since this is where the ferry from Java lands and is probably the best mapped of all the waters around Bali. The bay is only a couple of kilometres across, quite shallow and lined with mangroves and very little of the colourful corals that attract divers elsewhere.

So what's the attraction here? Well, the bay is the only bay along the Bali Strait that is subject to strong currents, and because of these huge exchanges of water, Gilimanuk has become a very interesting place—it

acts as a natural protected fish nursery and natural aquarium for fish larvae.

Here the macro-photographer can find both rare subjects such as dragonets, shrimpfish, various odd gobies, juvenile batfish as well as excellent circumstances for photographing critters in general. Here, a lot of species can be found at shallower depths than anywhere else on the island, and the fish and invertebrates seem to be in a very good feeding condition thanks to the daily influx of nutrients into the bay. Due to the tidal currents constantly flushing the bay, visibility can be vary a lot—so can the temperature where bay and upwelling ocean waters mix to produce some surprising *cold fronts* for the unsuspecting diver.

On the slopes around Tulamben there a virtual gardens of huge barrel sponges



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## Diving in Bali for the Physically Challenged

Exploring the shipwreck at Tulamben, drift diving with Mola Mola at Nusa Penida, and experiencing the clear water and vibrant colours of the marine life at Menjangan should be available to everyone to enjoy. Bali has some of the best diving in the world.

Yet, in reality, it is not so easy for some to achieve. A growing number of divers are struggling to find diving facilities which can assist them with their diving needs. This growing sector of the diving market is the population of divers who are physically challenged.

Able bodied divers may take the sights and sounds of the underwater realm for granted. However, for many of the physically challenged, these sensations can be magnified underwater. Diving for them means a unique opportunity to move freely, weightlessly, without restriction and out of a wheelchair.

In 1990, diving professional Maurice Parry founded the International Association of Handicapped Divers (IAHD). Today, there are literally thousands of IAHD instructors around the world certifying thousands of new physically challenged divers each year.

Through special standards developed to allow disabled individuals to complete performance requirements and gain certification, the IAHD helps physically challenged individuals dive independently or with a trained able bodied buddy. So, there is a structure in place to give physically challenged individuals the skills to dive and enjoy the underwater world.

But the reality in most places, including Bali, is that there are few dive centers that are equipped to deal with this population of divers. So, often times, these divers are turned away or appropriate water entry and exit and in-water protocols are not properly addressed.

But there is one dive center that



ABOVE: Cuttlefish displays its stripes for the camera  
LEFT: Pink coral found at depth at Tulamben

promotes the philosophy that scuba diving is an activity that can be enjoyed by both abled and disabled divers alike. The owners of Bali International Diving Professionals (BIDP), Avandy and Luci provide education services and support for divers who have physical challenges and their families. Avandy is an IAHD Instructor and the BIDP center continues to be the only certified member of the IAHD in Bali. They also offer training to able-bodied qualified divers who wish to become a dive buddy for divers with

disabilities.

It is hoped that more centers such as BIDP and dive instructors will consider extending their services and educational training to physically challenged individuals while sharing the immense natural beauty and cultural treasures both above and below the water.

For more information on IAHD, please visit: [www.iahd.org](http://www.iahd.org)

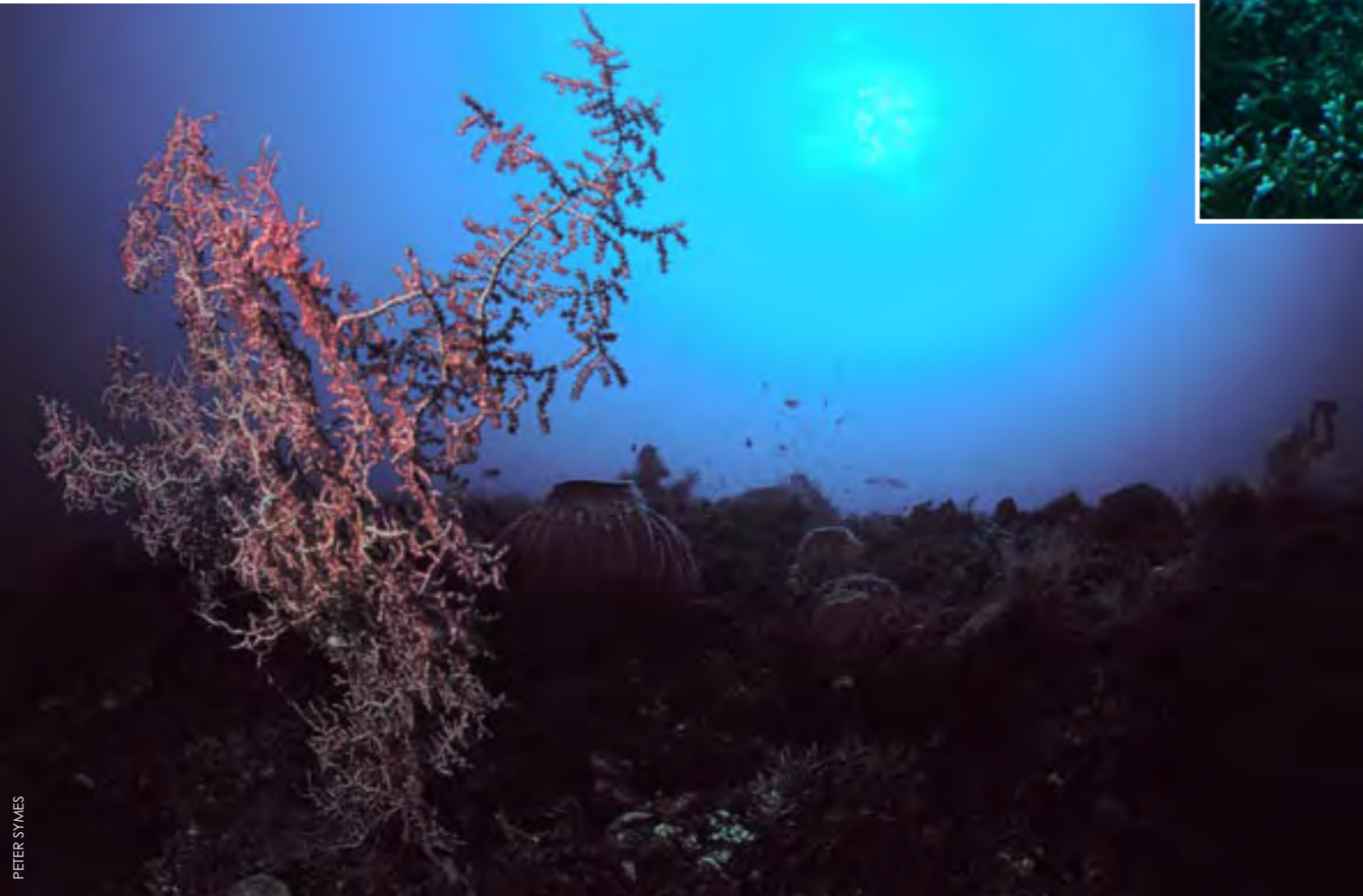
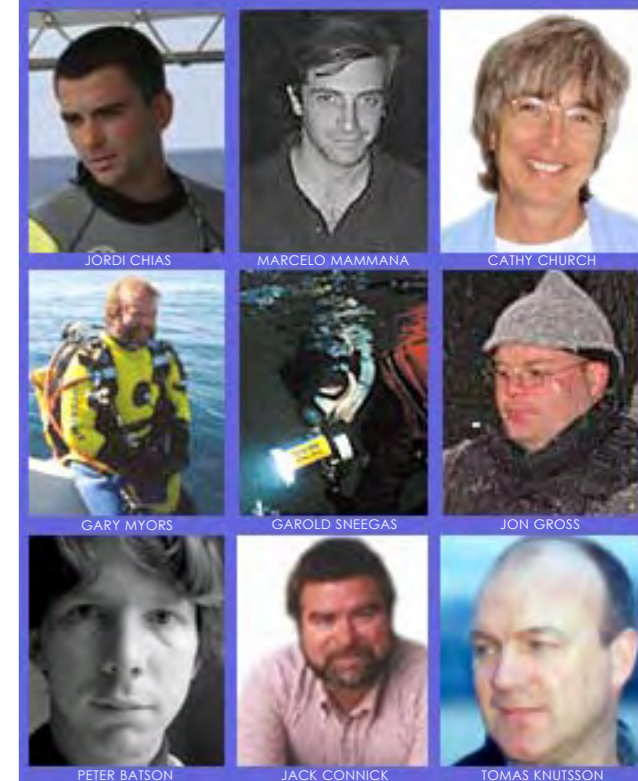
For more information on BIDP, please visit: [www.bidp-balidiving.com](http://www.bidp-balidiving.com) ■



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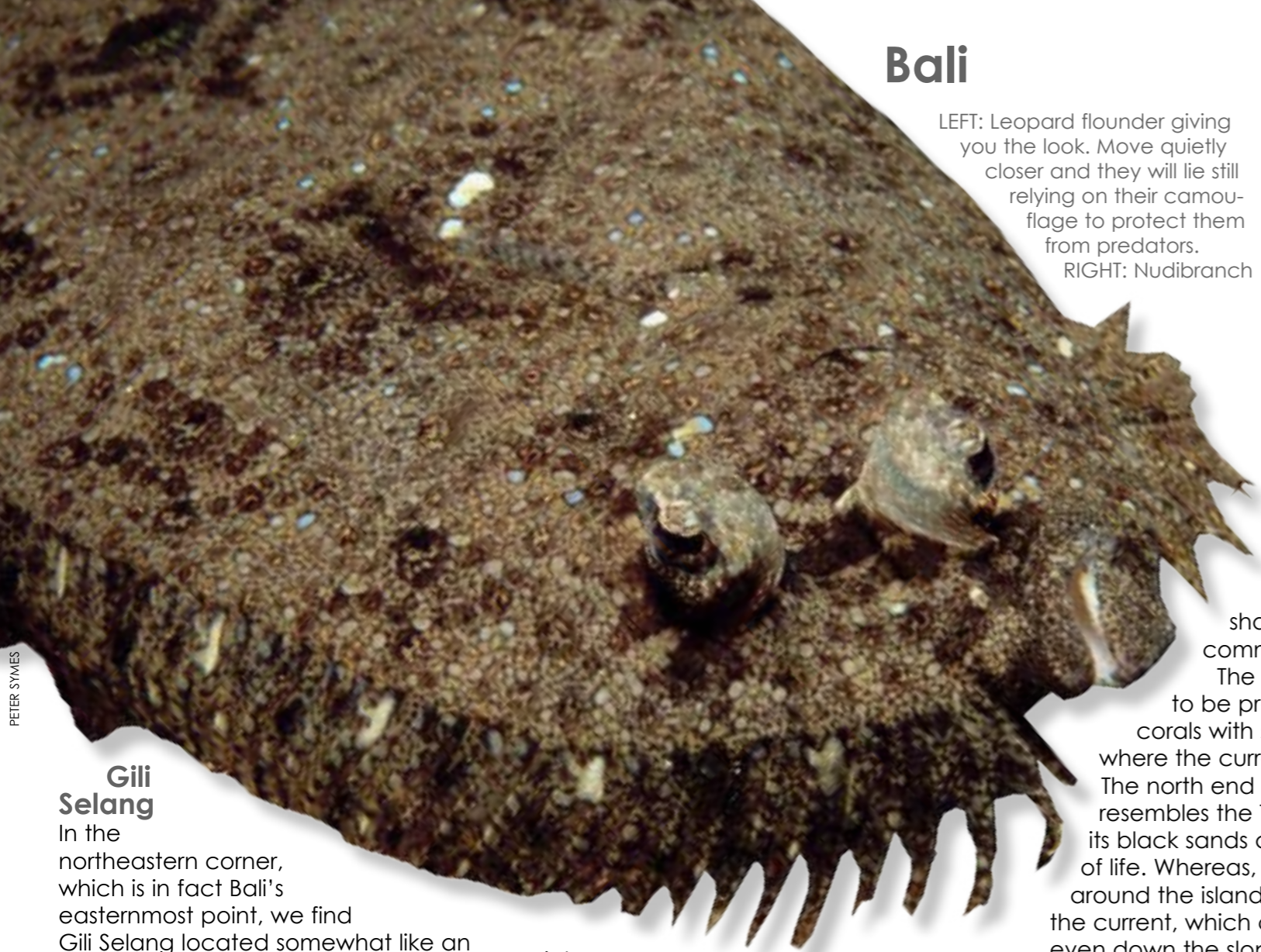


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PETER SYMES

JESPER MEYER



## Bali

LEFT: Leopard flounder giving you the look. Move quietly closer and they will lie still relying on their camouflage to protect them from predators.  
RIGHT: Nudibranch



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## Gili Selang

In the northeastern corner, which is in fact Bali's easternmost point, we find Gili Selang located somewhat like an outpost in the current-swept Lombok strait. This is also where the black sands of the northern beaches meets the east coast. All the schooling fish in the currents create an

interesting mix of biota and bottom types along the slopes of black sand, areas of big polished stones and steep valleys. Everyone seems to utter the word current in the same sentence as Gili Selang, and it is a site that the dive guides and experienced repeat visitors talk about a lot during dinner conversations.

The exposed position does give rise to some rather wild drift dives. Great fun, if you are comfortable in the water, have some experience and can master your buoyancy, so you can enjoy the various schooling fish who seem to like to congregate here, especially jacks, barracudas, trevallies and the occasional humphead parrotfish. Whitetip

sharks are also common here.

The coral cover seems to be predominantly leather corals with some gorgonians where the current is less severe. The north end of the area mostly resembles the Tulamben area with its black sands and gentle slopes full of life. Whereas, the southern part around the island is dominated by the current, which continues south and even down the slope. It is something that might drag the unsuspecting diver a fair bit further downwards than expected. Watch the depth and the current here. Keep to the right and go behind the island to find some shallower areas in which to end your dive.

## East Coast

### Amuk bay

This area holds some of the most exciting but also most challenging dive sites on the island, again due to the sometimes ferocious currents. Sharks are seen on virtually every dive. Molas are quite frequent and fish life is, in general, very rich. But the swells and swirling currents, especially around the islands of Mimpang, Gili Tepegong and Gili Bahia, can be unpredictable and should be

dealt with accordingly. The upwelling of cold rich water is, however, what brings in a rewarding abundance of pelagic species.

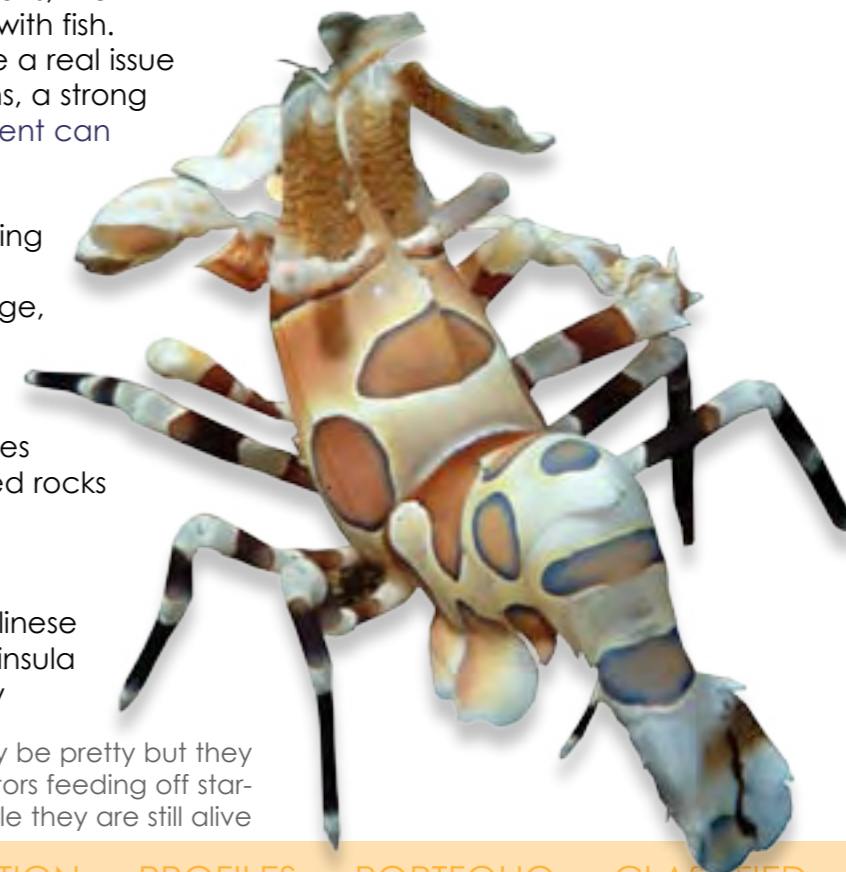
These sites are challenging but can be very rewarding. For instance, at the aptly named Canyon on Gili Tepegong can be draped with schools of sweetlips and fusiliers against a dramatic backdrop of black boulders and steep walls. It is considered by many to be the best dive site here. Under some conditions, the Canyon appears to be filled with fish. However, the currents can be a real issue here. Under certain conditions, a strong and downward spiralling current can be produced.

Conditions need to be assessed closely before entering the water. Because of the currents and the polishing surge, the coral cover is also rather modest, but it is not what this site is about at any rate. It is about the dramatic images and structures made by naked rocks and swarms of fish.

### Tanjung Sari

Skimming the literature on Balinese diving, the Tanjung Sari peninsula doesn't seem to get very rosy

reviews, and as far as first impressions, it doesn't have much going for it either. It has a bottom of light sand with some scattered rocks and quite sparse cover of corals and hydroids. But first impressions can be deceiving, as the site has been found to be an excellent place to spot a wide range of unusual fish—especially some of the rarer sharks including wobbegongs, nurse sharks and strange-looking catsharks, not to



Harlequin shrimp may be pretty but they are merciless predators feeding off starfishes' arms while they are still alive



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mention the omnipresent whitetips and the occasional napoleon wrasse. It is also a good site to spot squid and octopus as well as a good variety of stonefish and pipefish. David Pickell and Wally Siagian write in their recommendable guide, *Diving Bali*, that they have spotted "many oddities" here and mention stargazers, walking scorpionfish and many species of rays of which some are not seen elsewhere on Bali. They also rate this site as one of the most surprising and underappreciated on the island.

The site has for many years during the day time, been a quite popular destination for snorkelling trips out of the nearby Candi Dasa. But at night, the divers can have it all to themselves, and it is an excellent site for night dives. It is shallow, protected and conveniently positioned just around the corner from Padang Bai.

### Current Carrousels

#### Nusa Penida

Lying across the Badung strait, some 20kms from Bali's east coast, we find Nusa Penida, Nusa Ceningan and Nusa Lembongan. The islands can be reached by dive boat in about an hour from Sanur or Padang Bai. Most dives sites here lie to the north around Lembongan and Nusa Penida and in the channel between Ceningan and Nusa Penida. All dive sites are steep slopes or walls which go down very deep. The water here is fairly cold but often remarkably clear with gorgeous corals and prolific fish life, some turtles, sharks and the seasonal oceanic sunfish—or molas for short, after their latin name *mola mola*.

Currents can be really strong around these islands because they lie right in the path of the Indonesian Throughflow (see fact file). The Lombok Strait separates the Indonesian islands Bali and Lombok and is the second most important strait through which water is exchanged between the Pacific



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TOP LEFT: A manta ray performs its elegant maneuvers in the current off Nusa Penida

RIGHT: The sunfish, or mola mola (it 's latin name, which is also widely used) is one of the great sights that attract visitors from afar. There are three species coming through Balinese waters

LEFT; Bluespotted mask-ray hiding in the sand with only the eyes sticking out. Apparently in a quite literal sense



JESPER MEYER



Ocean and the Indian Ocean. The water is also subject to considerable thermoclines jumping from about 24° to 18°C making a good wetsuit more of a necessity rather than just a recommendation. This cold water comes from a 1300m deep basin north of Nusa Penida, which sits as a large barrier to the currents coming from the north and produces strong upwellings of cold water. Consequently, some of these dive sites are not recommended for beginners. It is also a good idea to have your own safety sausage and a signalling device for attracting attention at the surface.

**Nusa Penida**

The main points of interest diving Nusa Penida, the largest of the three islands in the group, are the large pelagics such as giant trevally, sharks, mantas, eagle rays and turtles. The majority of diving at Nusa Penida is drift-diving, and the currents can be unpredictable reaching up to five knots and coming from every possible direction including up and down.

Places on the north coast, on the other hand, offer less extreme currents and a variety of fish that seem to prefer calmer waters. Spectacular barrel sponges and gorgonians can be seen in the deeper waters, sea snakes are very often seen here and occasionally manta rays and schools of chevron barracudas pass by. Also, Gamat Bay is a small sheltered and shallow bay located between Toyapakeh and Crystal Bay and is another of the few places on Nusa Penida where you can do more than drift dive. In the shallow areas, there is a lot of interesting macro life. Malibu Point, on the east coast of Nusa Penida, is said to be the best place to see sharks and schools of large pelagics such as jacks, dog tooth tuna, rainbow runners, sharks and mantas. However, this site is also known to be tricky to dive, and if you are not careful, the current can sweep you off the point and into the strait. Manta Point is a safe bet to see manta rays, but the site can be hard to reach in the swell, which is usually quite strong, giving you a rough ride on the way there.

**Lembongan Island**

Lembongan island lies northwest of Ceningan island but is larger with shallow areas where there are seaweed farms and mangrove forests. It is a fairly small island with pristine unspoilt beaches. With its adjacent deep water trenches, the main attraction at Lembongan Island is the common encounters with the curious molas feeding off large plankton and jellyfish. They can also often be seen at cleaning stations with attendant cleaner wrasse.

The sunfish season on Lembongan starts in July, but the most reliable time to see them is August through September. In some years there have been sightings lasting until November, and often the molas are sighted shortly during March. The best places to spot them are Ceningan channel and Blue Corner in Lembongan. The molas come very close to the reef to certain cleaning stations where they get cleaned by schooling bannerfishes or occasional angelfishes or butterflyfishes. Some believe they come here to mate, but this thought remains a speculation.

LEFT TO RIGHT: Red Goby on coral; rice paddies on Bali; decorative Nudibranch at Tulamben



Scorpion fish excels in camouflage technique and lie everywhere in the shallows.



## Bali

Blue Corner is a steep slope with overhangs, outcroppings and a wide canyon. This dive site, while quite deep at 30-40m, is a good place to see marble rays and eagle rays. Depending on tide there is either no current or a very strong current. In strong current, you can hide behind some of the outcroppings or overhangs often to find that the rays are also hiding from the current here.

Mangrove Point is named after the mangrove forest lying between Lembongan and Ceningan. This is a nice drift dive on a slope covered with huge sponges where you may spot sharks, turtles and tunas. The Ceningan Channel is

characterised by a strong current and by being quite cold, but you might see white tip reef sharks and eagle rays here. Crystal Bay is a part of the channel, which consists of a large sandy area of staghorn corals and mushroom coral blocks that hide big schools of cavalier fish.

Here, we also find the "Bat Cave." This is a cave accessed through a sandy underwater channel where it is possible to surface inside. The cave has a small opening to the sky where all the bats that hang from the walls enter.

Ceningan Point lies at the northern tip of Ceningan island. Here, the currents are strong and unpredict-

Sepia foraging in the coral



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able and only few operators go here. It is worth a visit, but is only for experienced divers. A steep wall is beautifully covered with orange soft corals, sponges, a special tube coral and dense schools of reef fishes.

### Conclusion

How does Bali stick out from the crowd? In Tulamben, the extremely prolific macro-life of the shallows and shipwreck in combination with the molas and the current dives in the cooler waters around the strait does set the destination apart, but so does the special top side ambience of the terraced mountain terrain and Balinese culture. Tulamben is a great place for the discerning photographer and advanced diver. It is also a very romantic getaway for couples. It is not an obvious family destination, at least not for those with small kids who may be better off heading for the fine beaches found in the southern part of the island. Overall, Bali delivers in every aspect. After devastating blows from terrorism three years ago, Bali is once again a blossoming destination. ■

ABOVE & RIGHT: Statues and fountains of the Water Palace



# fact file



## Bali, Indonesia



**Geography** The island of Bali is one of Indonesia's 17,508 islands, an archipelago located south of the equator where the Indian Ocean meets the Pacific. The tropical Indo Pacific region in which Bali is located is considered to be one of the world's richest ecologically biodiverse systems. Bali is in essence a volcanic island with the volcano, Mount Agung, revered as a great spirit by the local people, as its highest peak rising 3,142 meters above sea level. Another peak, Mount Seraya, which lies east of Agung, rises 1174 meters above sea level. Volcanic island with high crater peaks, deep valleys, cultivated lowlands, lush terraced rice fields and thick tropical forests in the highlands.

**Capital** Denpasar

**Time Zone** GMT plus 8

**Climate** Tropical, hot and humid. Temperatures range from a high of 31 degrees C (88 F) to 25 C (78 F) low. Highlands are cooler and drier. Lowlands along the coast are pleasantly drier than the main tourist areas in the south. Monsoons. Dry season: April through November; Wet season: December through March

**Health** No major risk. Unlike islands further east in the archipelago, there is no Malaria/Dengue fever in the north-east province of Bali where Tulamben is located. There is a very small risk for these diseases in the rural areas of the islands north-west. Unless you are arriving from an infected area, Smallpox

and Cholera vaccination is no longer required. Do not drink the water. Buy bottled water from the better hotels and resorts. Watch out for Bali belly, temporarily upset stomach from unfamiliar, spicy foods. Outside higher end hotels and resorts, do not depend on proper heigene. Shower frequently. Dry thoroughly in extensive humidity. It is recommended to dry thoroughly and use medicated body powder when exposed extensively to the heat and humidity to avoid skin rashes and fungus, especially during the wet monsoon season

**Population** 2,640,000; Religion: 87 % Hindu, 3 % Christian, 8 % Muslim

**Visa** Travelers from most Western countries do not need a visa and are automatically given a 30 day stay permit upon arrival. Passports must be valid for at least 6 months upon arrival in Indonesia. Indonesian immigration is very strict. No work is permitted while visiting on a tourist visa.

**Indonesian Law** is very hard on drug offenders; the death penalty is regularly applied on narcotics couriers.

**Driver's License** A valid international driving license is required. Rental car insurance is highly recommended; Drive carefully; traffic rules are not followed as well as in the west. Accidents are frequent.

**Currency** Indonesian Rupiah. Exchange rate: 8,500 Rupiah per 1 US\$



Map of Bali. INSET: Map of Indonesia

since early 2002. Credit cards are accepted by most higher end resorts and businesses. Payment in US\$ cash and travel checks is widely accepted.

**Dive Season** All year round; Underwater visibility varies 15 to 35 meters during dry season, 10 to 20 meters during wet season

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**Web Sites**  
Bali Tourism Authority  
[www.balitourismauthority.net](http://www.balitourismauthority.net)

Bali Guide  
[www.baliguide.com](http://www.baliguide.com)

Scuba Seraya  
[www.scubaseraya.com](http://www.scubaseraya.com) ■



Terraces of rice paddies climb up the steep slopes of the Balinese mountains



GUNILD SYMES

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Edited by  
Andrey Bizuykin  
& Peter Symes

# Equipment

*In the zone...*

## Underwater Whistle

Capable of being heard over a half mile away, the windstorm whistles even work underwater. Available in Jet Black, Safety Yellow and Safety Orange. Size is only 2 3/4 x 3/4 x 1 1/2 inches. Small enough to easily carry. Loud enough to attract immediate attention. From US\$ 4.50 [www.wind-storm-whistles.com](http://www.wind-storm-whistles.com)



## Shark Jewels

Divers who love shark jewelry should take a seriously look at Reef Jewelry's collection. It is not often that a company puts its money where it's mouth is. But that is exactly what Reef Jewelry did when it was founded in 2001. From day one, they have had a commitment to marine conservation donating a percentage of all their sales to help the Shark Trust continue their important work. Today, Reef Jewelry produce on behalf of the Shark Trust, their logo in a choice of metals for the discerning diver. Prices range from GB£18.00 for a polished small Silver Hammerhead pendant to GB£110.00 for a small solid 9ct Gold Hammerhead pendant. [www.reefjewelry.com](http://www.reefjewelry.com)



## Low Mu

The EMC-20H Low Mu is a new Helium compatible computer that has an extremely low magnetic signature meeting the specifications for explosive ordnance disposal teams and developed for military organizations. The

Low Mu version is the basically the computer as the civilian model, except it uses some different components to reduce the magnetic signature which should be of great interest to Search & Rescue teams and Homeland Security teams, as well as the military. The EMC-20H Low Mu features Touch Contact Programming and a Lithium battery for improved reliability and longer battery life. [www.DiveCochran.com](http://www.DiveCochran.com)

## All in one



Rapid Diver is a new lightweight, all-inclusive scuba system that mates a tank, regulator and buoyancy module to a uniform-fit, load-bearing harness. It was created in response to public safety and military needs for a universal fit, compact, versatile and easily deployed scuba system. It is equally well suited to a

range of civilian applications such as shore diving due to its user-friendly design, universal fit capability and ease of transporting and storage. Persons who are unable to wear heavy conventional scuba gear, or who simply feel uncomfortable with the associated bulk and weight, appreciate the light overall weight of just 15 pounds and wearer comfort. The Rapid Diver readies for use in less than a minute and provides sufficient air duration for the average dive of 20 to 25 minutes at moderate depths.

[www.rapidiver.com](http://www.rapidiver.com)



## Dragon

The new Dragon BCD from Mares comes with a full range of features. The MRS plus mechanical release weight release system allows for up to 6 kg to be released with one simple pull, yet the buckle simply clicks in place for optimum security. Dragon is made out of scratch resistant 3D Alutex material with woven metal. The cummerbund comes with the QAS - Quick Adjust System for fast and safe adjustment of the cummerbund.

[www.mares.com](http://www.mares.com)





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## Golden rays

In Seawear's marine sea life jewelry line, we found these elaborate golden eagle ray earrangers. They come in three sizes. The medium sized 14kt textured spotted or eagle ray is about 1" from wing tip to wing tip as it is poised in flight. The large is about 1 1/4". US\$137.50 Weight 5.5gms

[www.seawear.com](http://www.seawear.com)

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## Cleaning up your act

Until now, boat cleaners that were effective used harsh chemicals, and environmentally friendly formulas didn't clean well. McNett Boat Cleaner eliminates stubborn stains (even mold and tar!) from dive boats, rafts, kayaks, PFD's and more. Essential preparation for treatment with UV Tech Protectant & Rejuvenator! UV Tech beautifies, restores and protects your boat and gear from harmful UV damage. McNett Boat Cleaner and UV Tech are great for dive charter boats! Boat Cleaner from US\$13.99 UV Tech™ Surface Protectant from US\$14.99 [www.mcneff.com](http://www.mcneff.com)



## Wear Your Diving Passions!

If you've ever bemoaned the lack of T-shirts that express your passion for scuba diving, it's time you check out the cool tees from Dive Junkie!

The designs found on these casual T-shirts reflect scenes and experiences close to every diver's heart. Some designs are depicted with humour, some with a touch of seriousness, and some with a degree of nostalgia—but always with lots of heart. What you won't find are meaningless loud t-shirts! While some designs bring the beauty and wonder of the underwater world to the surface, others strive to bring home a serious message. An exam-

ple of this is Barcode Shark, which shows a shark trapped behind a barcode strips, a statement representing the commercialisation of these majestic creatures. The precision with which all Dive Junkie T-shirts have been made mirror the meticulous care all divers take with their diving gear. All T-shirts have been made with 100% fully combed cotton fabric knitted from 25-single ring-spun yarn. Weighing in at 200 gms, they have been pre-shrunk and possess reinforced stitching at the collars, shoulders and sleeves to enhance durability. The lycra-ribbed collars ensure that they retain their shape after numerous washes.

[www.divejunkie.com.sg](http://www.divejunkie.com.sg)





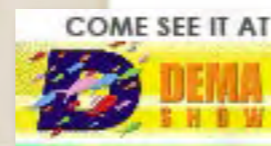
## Get a grip

Max Holding Systems offers the newest form of scuba tank holders and speargun holders by using an effortless, temporary mounting system. Max avoids the unnecessary damages caused from permanent tank mounting systems used today. This system comes with an instant attach and release system. [www.scubastorage.com](http://www.scubastorage.com)



## Limited Edition

Island Image's Limited Edition Tees bring a bit of 'vacation' into everyday life. The World's Best Dives Collectible Series is shown here in white. This 100% heavyweight cotton shirt is part of a collectible series that is in demand everywhere. Featuring the best dives in your area, this item is definitely flying off the shelves. [www.islandimagedesign.com](http://www.islandimagedesign.com)



## It's reely small

Custom Diver's new diminutive Pocket Reel is designed to offer the diver both ratchet and free run functions allowing divers to not only hold the reel in one hand, but also lets them select the Free Running Mode, simply by depressing the spring actioned pawl with their finger, whilst still enjoy-

ing snag-free line deployment.. When it comes to line, the Pocket comes with a 98kg breaking strain 2mm line in a choice of white, neon yellow or pink 50 metre line. [www.customdivers.com](http://www.customdivers.com)

## Easy Loop Lock

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Light on/off in light head	
Batteri type:	NIMH
Charging time(min)	10H

### Description:

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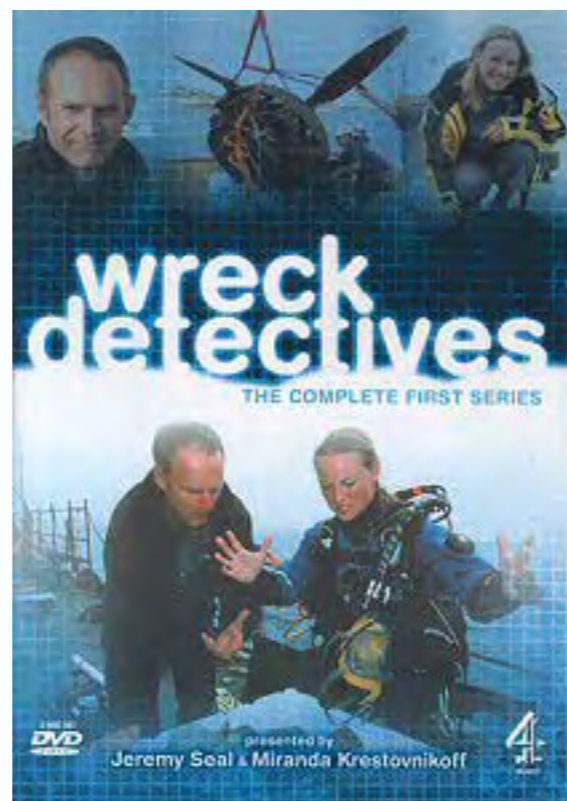


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How the world has come to see and know Miranda K. In an Aga mask, transmitting from the seabed

# Being **Miranda K**

TV-Presenter, Wreck detective and producer



Miranda K and the team of the wreck detectives film series



**Wreck detective Miranda Krestovnikoff recently completed another series of dive programmes for the BBC. The ambitious new series, *Coast*, is to be aired this autumn. We take a look behind the mask...**

*How did you get into diving?*  
I have always been a water baby – born an Aquarius, I was always jumping into water from an early age. I guess I was destined to be a diver; it was just a matter of time...

I was never really exposed to scuba diving as a child as we lived about as far away from the sea as you can get. I started to learn to dive in Bristol, after leaving University. I joined the University of Bristol Underwater Club, as it seemed a cheap and rather sociable way of learning to dive.

How right I was on both counts! I paid a small joining fee to cover weekly pool training,

and after just a couple of weeks sitting at the bottom of the university pool on Friday evenings and practicing a good bit of mouth to mouth resuscitation, I had a diving boyfriend! A good start and a great incentive to keep learning! As the club was a BSAC club, rather than a PADI one, the basic training was quite long and thorough – something which I really appreciate looking back at it. I had an excellent trainer who shouted a lot





Miranda gets help putting on her Aga mask before a shoot

but certainly couldn't have prepared me better for my first few dives. I never felt like so many people do, who dive for the first time abroad, that I had been thrown in the water with only the briefest of lessons. I spent the best part of two terms having weekly training

and only in the summer break did I get my first "open water" experience. I certainly felt more anticipation than nerves when going for my first dive.

I have managed to dig out my first diving log book which states that my very first dive – over 10 years ago now, was near Skomer in West Wales, was to a pathetic 6.2 metres and I stayed down only 12 minutes and saw nothing more than some kelp and

a lone spider crab. But I remember that dive so well. I remember the excitement of getting into the cold water in my new (and rather purple) semi dry suit—a bit of a change from a swimsuit in the university pool! I remember the joy of being underwater—being able to breathe without surfacing and witnessing a whole new world of fascinating sea life which I had only ever seen a glance of while rock pooling or snorkelling. Never did I realise that this experience would lead me onto my future job of presenting underwater.

*And what was your first diving and presenting underwater job?*

This was actually my very first presenting job as well. I was offered a series of 13 shows for Fox Television in the US, called World Gone Wild. This was covering animal=people stories around the work with a number of different presenters. Because I was a diver, 6 of the 13 stories I was to present were going to be based underwater. This was my first time using an Aga mask

and the first shoot was filming reef sharks (See later!). All in all, I had great fun but it was a bit like being thrown in at the deep end!!

*How difficult is it to present underwater?*

When presenting underwater, you have to wear an Aga mask—either a full face one, which has no method of equalising, or a half mask,

which has a nose dam. Apart from the difficulties of the mask and all the cables that tether you to the boat, there are many other things that limit you. You have to plan shorter dives due to the Aga masks using up a lot of air and my talking using up even more air! My depth is

## Miranda K



also limited by the

length of the

umbilicals

especially if we're

not anchored up directly over the site hence the attraction

Miranda presents intriguing sea life under ice



### Going to the Dive 2005 show in Birmingham (United Kingdom)?

Miranda Krestovnikoff will be talking about the recent filming of BBC's ambitious series *Coast on Dive 2005*, which is going to take place over the weekend of 29-30 October.

Miranda's presentation is going to be held in Concourse Suite 2 from 12.45 to 1.45



ABOVE: Miranda K discusses with a colleague the objects found at a wreck site

RIGHT: On location with some unpredictable screen players



protected wreck you are filming, try not to kick up silt and frustrate the cameraman, watch out for vicious moray eels, making sure they are filming your good side... they say that women are good at multi-tasking and I think they might be right!

*Do you like using an aga mask?*

Ah, the beloved Aga masks. These I also loathe because of the problems they bring. It's fantastic to be able to speak underwater and to communicate with topside, but after you talk, you need to breathe and this makes a noise so you

can't hear what others are saying. So, there's a timing problem—you have to speak, wait, listen, breathe, wait, listen, speak and so on. If things aren't going so well—substitute "shout" for "speak" and add a few expletives! Aga masks bleed air unless the seal is really tight around your face

and they only come in one size, so having a beard makes things very difficult—not a problem for me, but definitely one for some of our contributors!

of doing shallower dives. Agas do work without umbilicals but the sound quality is much less reliable. Then there's just the general stuff which goes on—it's a major "multi-task" to monitor your dive time, air, depth, etc. whilst trying to interview someone underwater, maintain neutral buoyancy, hold your breath while you listen to commands from the dive boat, try not to touch the

The full face ones are even harder to work with as there is no way of equalising apart from swallowing a lot, and then you need to remember to flush out all the CO<sub>2</sub> every minute or so.

*What's the best wreck you've dived?*

This has to be the Stirling Castle—a stunningly preserved wreck from 1703. It was sunk in the worst storm to hit Britain in recorded history. A third-rate man-of-war with over 70 cannon, she hit the Goodwin Sands off the coast of Ramsgate—swiftly becoming covered by the shifting sands and disappearing for 3 centuries. She emerged in 1979, almost pristine and I had the pleasure of diving her in 2002 with registered guardian, Bob Peacock. My dive log states that we saw intact gun ports, cannon, intact onion bottles, a bronze cauldron, 18ft anchor deck timbers, human bone, rudder.

It's a tough wreck to dive with only a small tidal window and visibility ranging from near zero to excellent. If you're lucky enough to get good vis—it's an incredible wreck.

*And the most challenging?*

Ever since the second series of Wreck Detectives was being researched by RDF (the independent company making the series for Channel Four), I had been told about this incredible wreck just off Padstow—a German U-Boat. A great wreck to dive, as it's so intact, great viz, only recently discovered and not yet even identified. Just one problem—it's at 60m. So, the question was asked: Was I up for it? I didn't mind doing another training course in order to see another wreck. I would also end up joining that elite group of divers—the



men in black suits—also known as the techies!

Nine days of classroom sessions and endless out of air drills and equipment checks later, I was an advanced Nitrox and IANTD Normoxic Trimix diver.

The training was well worth it—to dive on a practically virgin wreck in stunning visibility. Diving

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# profile



in the UK really doesn't get any better than this!

*What's been your best diving experience?*

Diving with any marine mammal is a

wonderful experience. I've dived with dolphins, sharks, seals, and whales... but maybe the most magical of all for me was diving with manatees.

Sadly, this wasn't in the wild, as they are pretty rare and the waters they inhabit are often too murky to film in, but while filming for a wildlife TV series in Brazil, I was lucky enough to visit a manatee rescue centre where they are rehabilitated and kept in large tanks. When we arrived, it was explained that strictly no one was allowed to swim with them but the vet. No one, that was, apart from me.

We have stories about lured into these you've

all heard the sailors being the sea by sirens - well until heard them sing



to you, you'd have thought that the sailors were mad!

Once in the water, I was surrounded by the most beautiful symphony of sound from these slow and sluggish creatures. They wooed me with their songs... and then moved in for the touchy feely bit!

Wild animals tend to avoid humans, even when kept captive—so to have one come up and touch you of its own accord, was an incredible experience.

Manatees like to explore—this they do with their bristly lips, which are usually used for collecting vegetation and working it to the back of their mouths where their molars are. But they don't limit their exploration to vegetation—why not try human? First, a bristly massage against my arm, then another one on my leg, then all my hoses were explored and tugged.

Never before, and perhaps never again have I experienced such trust from a wild animal—a truly unforgettable experience in the water!

*And your worst?*

I have been pretty lucky not to have had any really bad diving experiences (touch wood), but

one memorable one, due to my lack of experience and having no Dive Supervisor in control is this:

We were filming reef sharks for World Gone Wild—the series I mentioned earlier where I first started my presenting career. We were in the Bahamas and although for anyone who's dived with reef sharks, it's not that scary, things didn't go according to plan from the start. The director was seasick just minutes from land, so we had



Miranda K in action

to turn around and drop her off and continue, undirected, to shoot the sequence.

I was a fairly inexperienced diver at that stage and this was my first time in the water wearing an Aga mask. I was a bit apprehensive about diving with sharks, but after a brief interview with the leader of the project and some "chumming" of the water to attract the starts of

A curious seal taps the back of Miranda's fin

our show, we dived in. Our aim was to create and film a feeding frenzy, but also to indicate that the sharks weren't really interested in eating us—just the fish!

Within minutes, we were surrounded by these huge fish coming at me from every direction—maybe it was a time when one is grateful for the lack of peripheral vision in a mask underwater!

"One's on your head, Miranda!" shouted Stuart.

I never saw it; instead, I felt another one on my arm—biting it! Thank goodness we were wearing chain mail (only on our arms, though!) I felt a huge pressure, but no pain, and all I had to show for it was a small hole in my suit.

The filming went well—I was trying hard to look cool, calm, and collected and it seemed to work...

After what seemed like an eternity on the dive—we ascended—this was when things started to go wrong. No one had been monitoring the dive. I guess, understandably, we were too caught up with the sharks and what they were going to eat next!

I started my ascent, to the sound of my computer bleeping a warning for 10 minutes of deco...

I checked my air—practically empty. With an Aga mask on, it's not easy to just rip it off and to swap tanks. Nothing to do but surface to the RIB, grab a mask, another cylinder, descend,



Miranda K



The wreck detectives kit up for another thrilling underwater production





# profile



Quicktime video clip. Shark diving with Stuart Cove's. Size 4.9Mb



Quicktime video clip. Wreck detectives. Size 5.8Mb



Quicktime video clip. Presentation. Size 2.4Mb

and then carry on my deco (I DO NOT RECOMMEND THIS!!!).

So, that's what I did. Back down at my deco stop, I checked the air in my new tank. Nearly empty! They must have given me a used tank. B\*\*\*\*\*ds!

So, up again for a third tank. More expletives!

With a full tank, I finished my deco and surface, unharmed, and with no signs of decompression sickness. The dive was certainly not life threatening but for me it was an early warning to an inexperienced diver not to rely on others but to take charge yourself—especially with sharks around!



*What plans have you got for future TV projects?*

I am just in the process of filming a landmark BBC series called *COAST*, which airs in the UK from July 22nd. It features a diverse number of stories around the British coastline and I am following the natural history pieces. We have only had the chance to dive in a few locations, but when we have, it's been excellent. We filmed the charming and very inquisitive gray seals in the Farne Islands and also dived with mating cuttlefish off the South Coast at Selsey, near Bognor Regis. I have never been able to touch a cuttlefish before—they certainly had something else on their minds other than me!

*What do you love so much about diving?*

It's something you can't really explain to someone who doesn't dive.... utter weightlessness, therapy, relaxation, the sound of your own breathing, the gentle crackling of life underwater and just... utter calm. ■





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Kitchen salt

Text by Michael Symes  
Photos: Peter Symes

**It would seem to be self-evident to use the adjective 'salty' in connection with the World's oceans. Everybody knows that the oceans are salty. It is perhaps the first thing that comes to mind when we think of the oceans.**

importance for the heat transmission, for example, from the seas to the land and vice versa, and thus affecting global climate, but it is of the greatest importance on the types of life that have evolved in these waters. Because of this salinity special, strategies have had to be evolved not only by the animals that live there but also by the plant life. But how saline are the oceans?

Everyone who has taken in a mouthful of ocean water while swimming knows that the ocean is really salty. About 70% of the Earth is covered with water, and we find 97% of that water in the oceans. However, it is not generally known just how important the salinity of the oceans is for life on this planet. Not only has it

### Salinity of the oceans

The salinity of the oceans depends on the solvent ability of water. It is the most universal solvent known, being able to dissolve both acids and bases. All water has some dissolved material in it. The difference between fresh water and ocean water is that ocean water contains many more dissolved salts. Ocean water is about 3.5% salt. And more than 90 percent of that salt would be sodium chloride, or ordinary table salt.

### Composition of dissolved salts

At least 72 chemical elements have been identified in sea water, most in extremely small amounts. Probably all the Earth's naturally occurring elements exist in the sea. Elements may combine in various ways and form insoluble precipitates that sink to the ocean floor. The tabulated 7 ionic species make up 99.7% of the oceans' salinity.

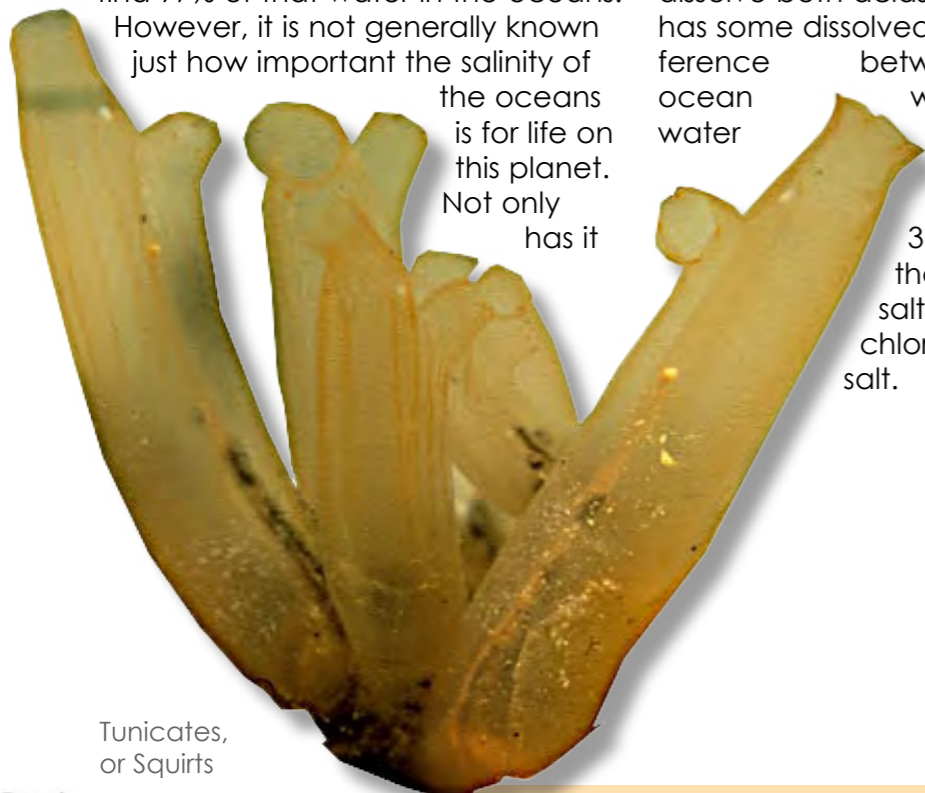
Anion	Concentration %
Cl <sup>-</sup>	1.91
SO <sub>4</sub> <sup>2-</sup>	0.27
HCO <sub>3</sub> <sup>-</sup>	0.01

Cation	Concentration %
Na <sup>+</sup>	1.08
Mg <sup>++</sup>	0.13
Ca <sup>++</sup>	0.04
K <sup>+</sup>	0.04

From the top of the ocean all the way to the depths of the ocean, salinity is between 3.3 to 3.7% with the average salinity being about 3.5%. The salinity for almost the entire ocean at sea surface is around 3.3 – 3.6% with some geographic variations of salinity due to precipitation and evaporation. The salinity of ocean water varies. It is affected by

such factors as melting of ice, inflow of river water, evaporation, rain, snowfall, wind, wave motion, and ocean currents that cause horizontal and vertical mixing of the saltwater. Evaporation leaves behind dissolved salts increasing salinity and precipitation freshens the top ocean layers. So, salinity is high in mid-latitudes where evaporation is high and precipitation is low. Salinity is low near the equator because precipitation is so high. Very high latitudes can also see decreases in salinity where sea ice melts and freshens the water.

The saltiest water, at 4.0%, occurs in



Tunicates, or Squirts

# Life and The Salty Oceans

the Red Sea and the Persian Gulf, where rates of evaporation are very high. Low salinities occur in polar seas where the salt water is diluted by melting ice and continued precipitation. Partly land-locked seas or coastal inlets that receive substantial run-off from precipitation falling on the land also may have low salinities. The Baltic Sea ranges in salinity from about 0.5 to 1.5%. The salinity of the Black Sea is less than 2.0%.

## Life in and around the oceans

The saline environment has quite an effect on life in the oceans. Most creatures that live in the ocean could not live in fresh water. However, when the highly saline waters of the ocean meet fresh water, an estuary is formed. This is a special environment where some creatures have learned to adapt to a mixture of fresh and salt water. When fresh water, ground

water and soils are altered by human actions and salinity greatly increases, it can have an extreme detrimental effect



on life there. Changes in salinity brought about by human residential, commercial and industrial activity can kill plant life, aquatic life, and animal life in a given area. Humans have the responsibility to make sure their actions are not causing this type of devastation.

## Mangrove trees

One important example of plant life that has adapted to salty conditions is the mangrove tree. Mangroves are a unique part of the coastal ecosystem, being found along tropical seacoasts on both sides of the equator. They are thought to have originated in the Far East. There are several types of mangrove with the Galapagos being home to four of them.

They are interesting because they have evolved mechanisms enabling them to cope with high salt conditions.

The Black Mangrove, for example, has the highest salt tolerant leaves of all the mangroves, with its leaves being equipped with special salt-extracting glands. Much research has been done in attempting to elucidate how this salt extraction functions but many fundamental questions remain. The gland ultrastructure has been described but questions remain regarding processes inside



Crab on a red mangrove root off Semporna, Borneo. Plants and animals alike. They all have to cope with the changing salinity and, in some places, a constant cycle of flooding and drying out.

the cells as well as ion transport from the secretory cells to the cuticle.

Incidentally, apart from their ability to survive saline conditions they are also interesting in being unique in having true plant vivipary. Mangrove species reproduce by producing flowers and rely on pollination by bees and insects. After pollination, the seed remains on the parent tree where it germinates and grows roots before dislodging.

## Marine animal life

Due to the salt content, life in the oceans is quite different from that found in freshwater. However, sea water and river water differ in more ways than in just their salt content. For example, rivers carry to the sea more calcium than chloride, but the oceans nevertheless contain

about 46 times more chloride than calcium. Also, silica is a significant constituent of river water but not of sea water. Furthermore, calcium and bicarbonate account for nearly 50% of the dissolved solids in river water yet constitute less than 2 percent of the dissolved solids in ocean water. These variations seem contrary to what one would expect.

## Life's affecting salt composition

Part of the explanation is the role played by marine life, both animals and plants, in ocean water's composition. Sea water is not simply a solution of salts and dissolved gases unaffected by living organisms in the sea. Mollusks, for example oysters, clams, and mussels, extract calcium from the sea to build their shells and skeletons.



Background: Mysids, small crustaceans, usually less than 10 millimeter long, that swarm over the seabed and are often mistaken for juvenile fish. These are from the brackish Great Belt, Denmark  
Center: Young red mangrove, Florida

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# The Salty Oceans



form their shells and they draw heavily on the ocean's silica for this purpose.

Some marine organisms concentrate or secrete chemical elements that are present in such minute amounts in sea water as to be almost undetectable: Lobsters concentrate copper and cobalt; snails secrete lead; the sea cucumber extracts vanadium; and sponges and certain seaweeds remove iodine from the sea.

Thus, sea life has a strong influence on the composition of sea water. However, some elements in sea water are not affected to any apparent extent by plant or animal life. For example, no known biological process removes the element sodium from the sea.

### Global Conveyor Belt

Together, salinity and temperature determine seawater density and buoyancy, driving the extent of ocean stratification, mixing, and water mass formation. Greater salinity, like lower temperatures, results in an increase in ocean density with a corresponding depression of the sea surface height. In warmer, fresher waters, the density is lower resulting in an elevation of

*Thus, sea life has a strong influence on the composition of sea water.*

the sea surface. These height differences are related to the circulation of the ocean. The changes in density bring warm water poleward on the surface to replace the sinking water driving the global thermohaline (heat and salt) circulation within the ocean called the Global Conveyor Belt.

This is the principal mechanism by which the oceans store and transport heat. The ocean stores more heat in the uppermost 3 meters than that of the entire atmosphere and acts as a global heat engine. Salinity is thus a key ingredient in the global thermohaline circulation. We will be discussing the importance for the environment of the Global Conveyor Belt in a coming number. ■

Foraminifers, very small one-celled sea animals, and crustaceans, such as crabs, shrimp, lobsters, and barnacles, likewise take out large amounts of calcium salts to build their bodies. Coral reefs, common in warm tropical seas, consist mostly of calcium carbonate as limestone, formed over millions of years from the skeletons of billions of small corals and other sea animals. Plankton, tiny floating animal and plant life, also exerts control on the composition of sea water. Diatoms, members of the plankton community, require silica to

*Lobsters concentrate copper and cobalt; snails secrete lead; the sea cucumber extracts vanadium; and sponges and certain seaweeds remove iodine from the sea.*



Hermit crab in Littlebelt, Denmark. Crustaceans absorb and leach salts and metals



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# Drink saltwater to save your life - *perhaps*

In Coleridge's famous poem, in which a becalmed crew is dying of thirst in the middle of the ocean, the narrator says:

*"Water, water, everywhere,  
And all the boards did shrink.  
Water, water, everywhere,  
Nor any drop to drink"*



It is certainly ironic that in the middle of all that water they had nothing to drink, for it is well known that if you drink seawater you will die. But, well known or not, can this really be true, or is it just a myth?

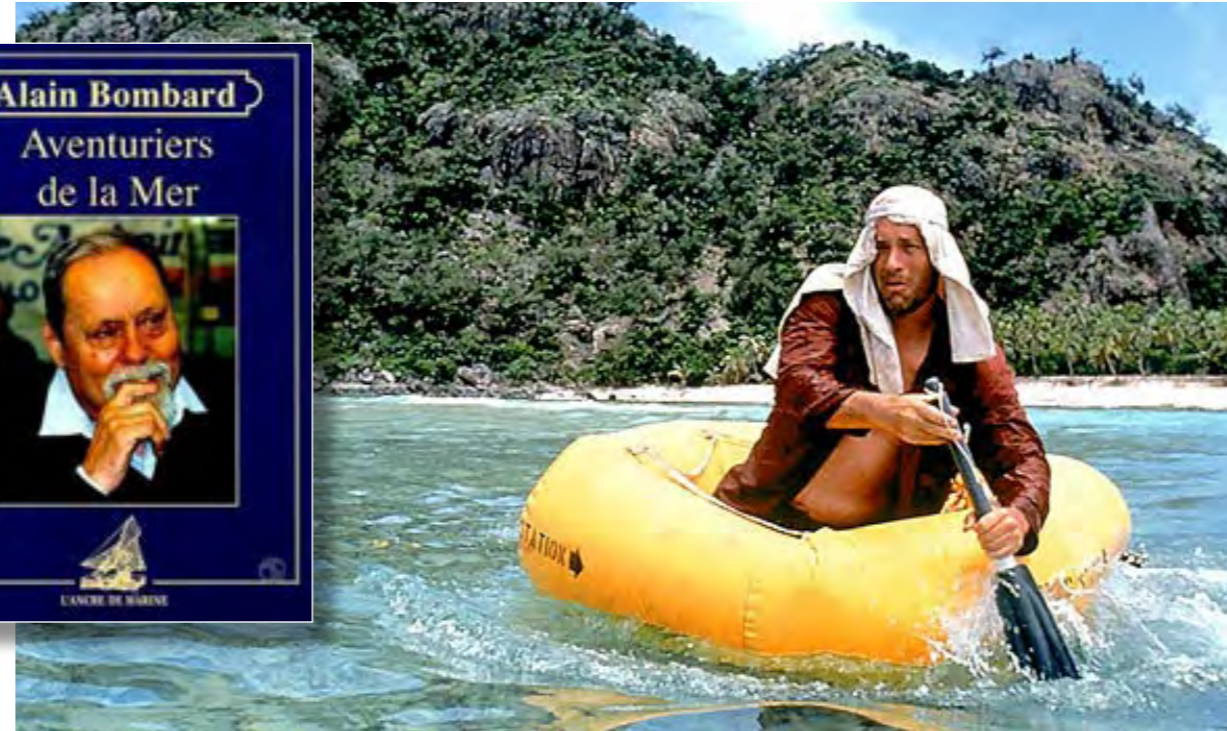
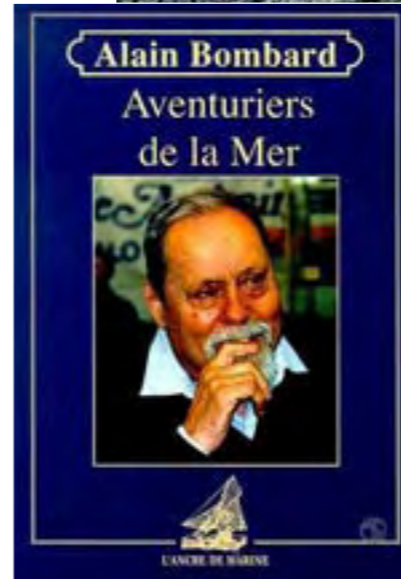
Doctor Alain Bombard, who died in France in July this year, claimed to have proved that you can drink seawater and survive. He, in fact, carried out a trial in 1952 in which he survived 53 days on the ocean in a life raft without any fresh water or food. His theory was that the human system can absorb sea water provided it's drunk in small quantities and taken continuously. Plankton is rich in vitamin C and, filtered from the sea with a special net, it contains all the nutrients required. Bombard drank rainwater and up to a pint-and-a-half of sea water a day on his trip.

He was inspired by Thor Heyerdhal's 1947 Kon Tiki expedition, who crossed the oceans on a raft, living on a diet of fish. This event influenced his life so much that he decided to prove the possibility of survival in a blow-up raft with the very limited amount of resources. Bombard drank only small quantities of salt-water and consumed the plankton which it contained.

His most famous book about his Atlantic raft crossing is titled "The Bombard Story."

### In Theory

After theoretical studies at the hospital of Boulogne sur mer, to determine what quantity of fresh water you can get from a fish, from the rain, how much salt water you can drink, etc, he decided to test his theory on a Zodiac inflatable boat and in 1952 to cross the Atlantic Ocean from the



Tom Hanks starring in the Hollywood blockbuster "Castaway" in which his character also had to depend on his creativity to survive. Promotional photo from 20th Century Fox

Canary Island to the West Indies. He went without any water, just a few basic tools like a net to catch plankton, harpoons to fish, a few books, medical material to study his health, and a sextant.

Emergency provisions were loaded onto the 15-foot-long, 6-foot-wide rubber boat, but a notary sealed them so it would be obvious if Bombard used them. The seal was reported to be still affixed at journey's end. Bombard left the Canary Islands on October 19, and reached the West Indies December 23. He encountered storms, and weeks of dead-calm seas. When he encountered a tanker, he found that he was 600 miles off course. The mix of raw fish and plankton, which he first thought tasted a bit like lobster purée, grew tiresome. He told Life magazine that it added up to "a starving, thirsty hell."

### 64 days

After 53 days of travel, he encountered a ship. The crew offered him a meal and proposed to bring him to some islands but Bombard decided to continue alone and he reached Barbados on December 23, 1952. When reaching Barbados he was in such poor condition that he was immediately hospitalized. The total trip was 4400km and took 64 days.

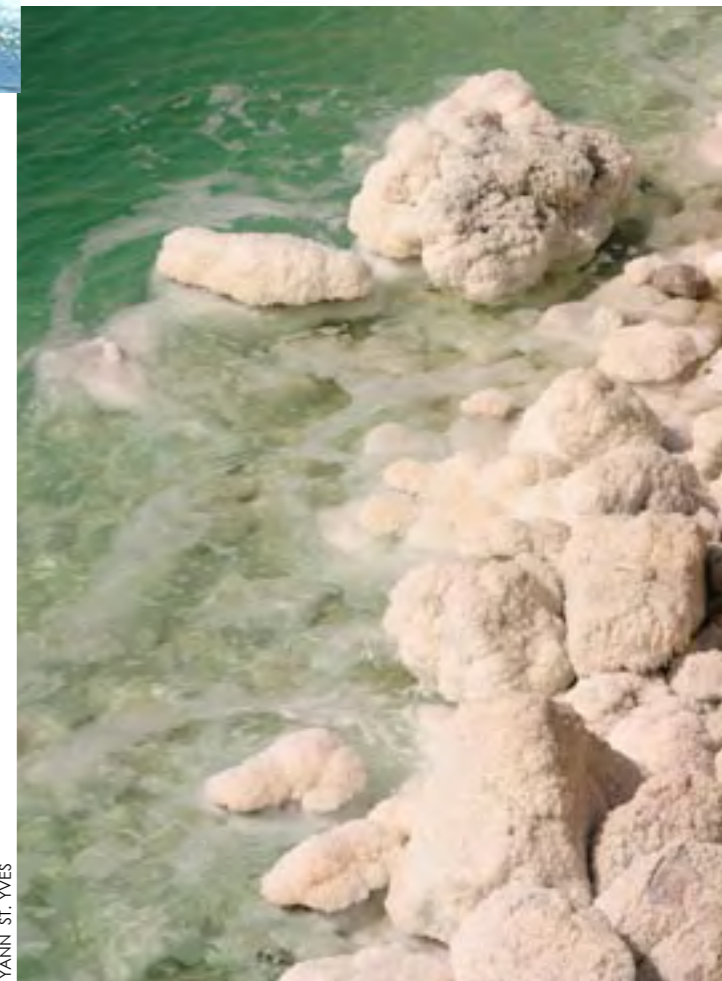
Bombard went to an oceanographic institute in Monte Carlo to develop ways for people lost in small boats to survive on even less. He concluded that drinking limited quantities of seawater and fluids pressed from raw fish, and eating fish and plankton would do the job. Thanks to his achievement and interest in sailors, working condi-

tions and standard safety procedures on board ships have all been greatly improved. He also received many letters from sailors who managed to survive life and death situations using his tips.

### Is it really possible?

So, can you survive by drinking seawater? It would appear that you can if you use it as a supplement to other sources such as the juice from pressed fish. However, it might be advisable first to read "Alone at Sea" by Hannes Lindermann. He tried Bombard's tricks on two short voyages drinking saltwater - and almost died. His feet and legs swelled dangerously. In "Alone at Sea", 1958, he not only cast doubt on seawater's potability, but also charged that Bombard had cheated by sneaking provisions aboard. Find both books at Amazon.com. and judge for yourselves.

It all depends, it seems. The 33% salt concentration in the water of the Dead Sea would however certainly kill you fast if you drank it



YANN ST. YVES



Mangrove breathing roots. *Sonneratia sp*

# Mangroves

*Eco-tourism & education*

Text by Bridget Hedderman  
Photos courtesy of Eco Field Trips

Ecofieldtrips Pte Ltd is a Singapore based company which employs specialist biologists to cover the biology of rainforests, mangroves, sea-shores and coral reefs in the unspoilt ecosystems of Tioman Island, Sarawak and Langkawi, in Malaysia. School groups from Singapore, Malaysia, Hong Kong, Bangladesh, UK and Ireland come annually on the fieldtrips. Fieldtrips vary in length and content- from fun filled educational trips with 11/12 year olds to in-depth GCSE, A-Level and IB survey work- depending on school requirements. The “hands on” field experience and the knowledge and experience of EFT biologists ensures a better understanding of our wonderful ecosystems and how they are interrelated. The fieldtrips support what is being taught in the classroom and it is hoped that fieldtrip experience leads to life long conservation awareness.

*“What would the world be, once bereft  
Of wet and of wilder-  
ness? Let them be left,  
O let them be left, wil-  
derness and wet;  
Long live the weeds and  
the wilderness yet”*

*Gerard Manley Hopkins*



Mangrove quadrat survey



### 4 DAY ITINERARY

#### ENVIRONMENTAL SYSTEMS FIELDTRIP PULAU TIOMAN, MALAYSIA

\* Day 1 -Coach and ferry to Tioman. Programme briefing, Nature Loop - Short walk into the rainforest behind the resort, follows the stream through a stretch of the forest into the mangrove and out onto the beach at Paya Beach. This overview of river/ rainforest/mangrove/coral reef - gives a perfect introduction and holistic approach to field work. Evening educational presentation.

\* Day 2 - Snorkeling on pristine coral reef on nearby island. Explore diversity of the mangrove. Visit the marine Park Visitor's Centre. Snorkel and feed the fish. Evening educational presentation

\* Day 3 - 7km Rainforest trek - examine coastline, river, village development and the impact to tourism. Survey work: Soil development, Hydrological cycle, Climate, Micro-climates and Forest maturity. Wildlife discovery and interaction. Evening educational presentation.

\* Day 4 - Seashore survey using line transects and quadrats - Data analysis & student presentation. Coastal walk to Turtle Sanctuary. Depart back to Singapore.

[www.ecofieldtrips.com.sg](http://www.ecofieldtrips.com.sg)

CLOCKWISE FROM TOP LEFT:  
Mangrove at hightide;  
Horseshoe crab;  
Mangrove survey



### Introduction to the Mangrove forest:

Mangroves seem to have little appeal to the general public and are commonly referred to as "hot, bug infested, smelly swamps that are polluted and mess up the coastline" They are frequently cleared to allow for better sea views or reclaimed to provide more flat land for buildings and aquaculture. The terrible tsunami tragedy of Dec 2004 brought to light the vital function of mangroves in protecting coastal areas during times of adverse weather condi-

tions. During fieldtrips in Sarawak students see exactly how mangrove forests are being cleared to make way for housing development. They also visit a wonderful kampong that nestles amongst the mangrove trees and observe how people can live in harmony with nature.

Mangroves have many other important roles, they are the nursery ground for juvenile fish and crustaceans, they provide food, medicines and a sustainable source of good quality timber for the local people. Mangroves are the home to many creatures such as fruit bats, snakes,



LEFT: Fiddler crab

TOP CENTER: Sarawak reclaimed mangroves development

INSET: Fruit bat-flying fox

ABOVE: Sarawak reclaimed mangroves

RIGHT: Sarawak development within mangroves

monkeys, birds and butterflies.

Mangroves are a specialised group of plants that have adapted to living in the fringe of land between the sea and the land, along coasts and riverbanks where fresh and salt water meets. Here few other plants can survive the harsh environmental conditions. Mangrove plants have adapted to accommodate daily flooding by seawater when the tide is high and exposure to the hot rays of the tropical sun when tide flows out. Mangroves frequently have to survive freshwater flooding when streams overflow during the rainy season.

Mangrove soil is waterlogged and anaerobic with sulphur producing bacteria giving off the distinctive odour of rotting eggs! The strange roots of mangrove trees often protrude upwards allowing air to diffuse into the plant tissue through specialised pores when exposed to air. This ingenious adaptation works in much the same way as a snorkel when skin diving.

Mangroves are without doubt what students know least about when they arrive to take part in a fieldtrip and EFT biologists introduce mangroves to students in a variety of ways.

The first introduction to mangroves is from the rainforest by following a stream which then meanders through a wonderful estuarine mangrove before it reaches the seashore. It is often the case that students find themselves waist deep in water wading through the mangrove. It is this journey from the rainforest to the seashore through the mangrove that makes students realise how ecosystems are interconnected.

Students also approach mangroves from the sea by snorkelling into mangroves at high tide. This gives a very different perception of







mangroves and students can well imagine how mangrove roots are a refuge for smaller fish and how they provide such a good barrier against coastal erosion.

Students also spend time doing more detailed surveys in mangroves. This may involve small groups working together to learn as much as possible about a given area of a mangrove forest. A variety of survey techniques are used including a silent survey to observe

the timid animals that emerge when they are not disturbed. Mangrove zonation, using quadrates and transect lines are carried out as well as water and soil sampling. The affect of pollution and particularly human impact is brought home to students during their surveys.

It is hoped that during the field trips the importance of conservation becomes clear and young people leave with a thorough

knowledge about these amazing ecosystems and a greater appreciation of their commercial and intrinsic value. From our student feedback over the years, these fieldtrips have influenced their attitudes to the environment, conservation and sustainable development in a very positive way. ■

For more information, visit: [www.ecofieldtrips.com.sg](http://www.ecofieldtrips.com.sg)

FAR LEFT: Mangrove roots. *Rhizophora sp*

TOP: Snorkeling in a coastal mangrove

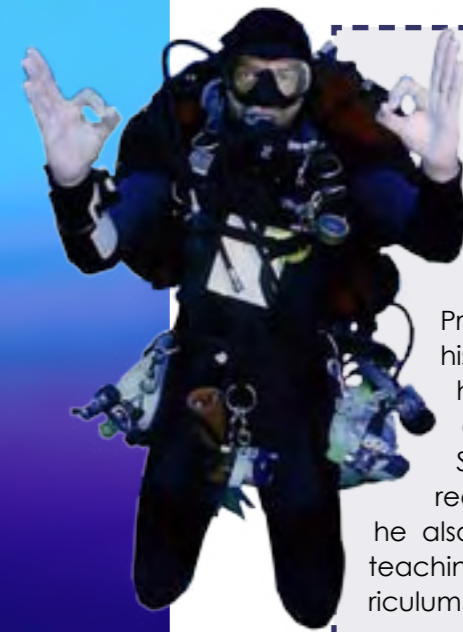
LEFT: Mudskipper nest



# technical matters

Leigh Cunningham

Now, what if a hose bursts?



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.

**When divers run out of gas in open water it can only be down to two possible explanations. Either they haven't been monitoring their pressure gauges and plainly run dry. Or they have suffered some equipment malfunction such as a regulator free flow or a split hose which are technical breakdowns that can happen even to the most conscientious, experienced and well trained diver.**

**But how do we prepare for these eventualities? Do we just rely on our buddy to sort us out? And is that a wise policy?**

Training agencies differ in the degree of self sufficiency training at recreational levels. Most of them instruct divers to, when in a situation where they run low or out of gas, to swim to their "buddy" and share gas from an alternate second stage, or octopus as it is widely known. This obviously requires that the buddy is within swimming distance, which is why we are also taught to keep fairly close together in buddy pairs should anything of this sort happen, however unlikely it may seem.

According to conventions, the alternate second stage, or octopus, should be clearly stowed in the imaginary triangular area between the chin and the lower corners of the rib cage from where it can easily be seen and grabbed in case it is needed. If, however, the diver low on air is too far away from his buddy, the next option would be to swim directly to the surface while exhaling or perhaps breathing from a free flowing regulator. In either case a difficult task. So much for the theory.

### In reality

In my experience, however, in the real world of diving things may be a lot different. One of the most commonly seen deviations from recommended practice are divers stowing their alternate air source octopus in a BCD pocket or have it dangling freely somewhere behind them. Sad but true. Secondly, buddy pairs, once they are beyond their basic training course rarely do a proper buddy check before entering the water ensuring that they know the whereabouts of the very alternate air source that they may urgently need later. And thirdly, they are rarely looking at each other when one runs out of gas. The victim of an out of gas situation will already be under significant stress and only more so if he also has to swim some

distance to reach his buddy. If he then, on top of everything else, also has problems locating a not so clearly seen alternate second stage, the situation will very soon, needless to say, become very serious if not already.

### CESA

Another option may be performing a controlled emergency swimming ascent (CESA), this is, however, a skill we practice only once during basic training—unless we become instructors ourselves. As with any other skill upon which your safety is dependent, it should however be practised at regular intervals. But is it ever?

*Buddy breathing* could be another option, but it is a drill which training agencies have considered optional in training

for many years now. It is certainly a good exercise and eye-opening experience to practise under controlled circumstances. But as the training agencies also came to realise over time, it is also a drill so fiendishly difficult and stressful to perform under a real emergency situation that only quite experienced divers with good stress management can handle it.



*"Check your pressure gauge at least once every minute, during every dive"*

# Solo or not?

Text: Leigh Cunningham. Photos and graphics: Peter Symes

Solo or Not?





technical matters

Besides, if a skill is optional, most instructors will not practice it with students and few divers, whatsoever, will keep on practising the skill after training.

Usually mentioned in an open water course is the possible advantages of a pony bottle or a small spare air cylinder, but a mention is usually all it gets.

### Buddy check

The buddy check gets more than a mention, and is in fact mentioned and practiced every day during basic training. Buddy checks should be a standard procedure for novice divers only. Experienced divers at all levels should not need a buddy check. Why? Basically because you must always be the one responsible for your own life support systems. It should never be up to another diver/buddy to check your life support system (scuba unit) is functioning how it should be. It's your life on the line. All divers diving together should however be aware of their partner's

specific equipment configuration, especially where their alternate air sources are, which type of releases are on the BCD/harness and what type of weight system, integrated or weight belt, they use.

In my humble opinion, for the vast majority of divers the buddy system as we know it, is seriously flawed!

### What if...?

Here is a little reality check: If a diver runs out of gas and swims some distance to reach and share gas with their buddy and the buddy is unaware of the problem, what is most likely going to happen is that the diver who is out of gas is going to grab the first second stage they see and know is working, which is the one the buddy is already breathing from.

With this in mind, a better method of training and diving would be for divers to normally breathe from the longer of the two hoses (the one we would usually consider to be the alternate second stage, or octopus) and stow the other second stage (on the shorter of the two hoses) under the chin with a bungee cord around the neck.



Is this your buddy?

### Heard it before?

Does all this start to sound familiar? Well it should, if you have been reading my series. We are revisiting the "redundancy ethic", I wrote about a couple of issues back. In the world of technical training, this approach to diving is the standard procedure and has been for many years. Put simply, according to the "redundancy ethic", anything that could possibly malfunction with a risk to your life as the result, should be duplicated with an independent back up system. While you may share together with someone, pretend that you will be diving alone and prepare and kit up accordingly, and dive within your limits.

We don't call it "Solo" diver training however. A more accurate term would be "following the laws of common sense". The technical diver is taught during formal training that the possibility of being split from the dive group or buddy always has to be taken into consideration. A diver may even have to complete a lengthy decompression obligation alone after being split from the rest of the dive team, so back up sys-

What would then happen in the aforementioned scenario is that the diver who is out of gas would take the second stage from his buddy's mouth. The buddy would then replace this second stage with the alternate second stage, which is easily located just inches away right under the chin. The out of gas diver would then also be breathing from the longer of the two hoses, making gas sharing much more comfortable

But you are *still* dependent on your buddy. A different and bet-

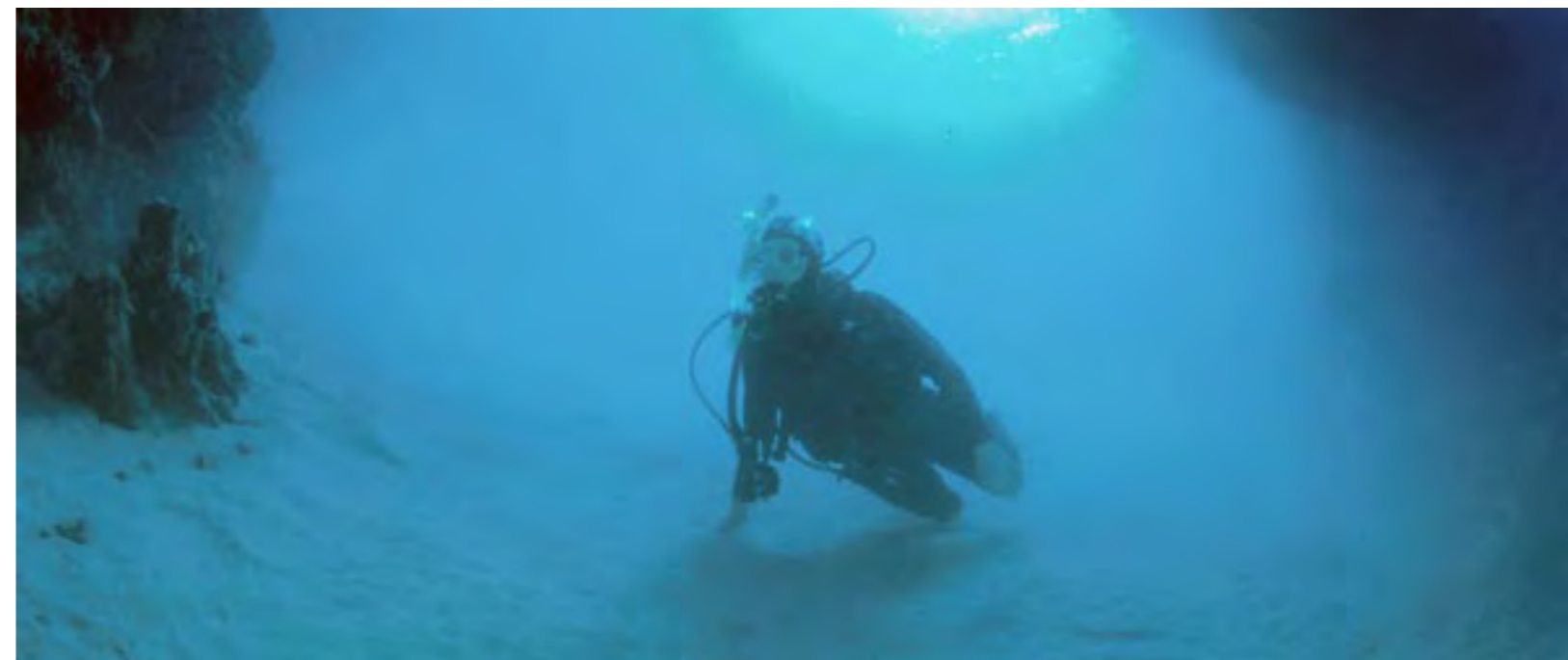
ter approach to prevent out of air situations is to have another air source on board yourself. Depending on your style of diving, it need not be a twin tank with manifold. A pony bottle or spare air cylinder would still be a great help for many recreational divers. A little spare air tank doesn't hold much but a couple of extra available breaths may make for just the essential difference. Also ask your buddy to carry some extra air supply of his own.

Solo or Not?



That good trusted old regulator. When was it again you had it serviced?

How far can you venture and still see yourself safely out of trouble in the unlikely event of a equipment malfunction?





and appropriate configuration for the type of dive along with "planning the dive and diving the plan". The technical diver does not have the option of a direct ascent to the surface after an equipment malfunction without getting seriously bent or even end up dead.

Ok, we are not all technical divers but the issues at hand applies to everyone. Even for the recreational diver in the 20-40 meter range, running out of gas due to a regulator malfunction or otherwise only to realise that the buddy is out in the distance swimming away from you, can have catastrophic affects. If you don't carry backup, a direct swim to the surface may then be your only option to prevent drowning, but at the same time more than likely lead to a series of recompression treatments and an abrupt end to your diving career. For all divers, whether adhering to the buddy system or not, if there was more emphasis on redundant systems during training, and their use after, less divers

The good buddy should always look out for you. But what if he/ she looks the other way?

tems, must be taken on the dive in order to resolve equipment related problems should they occur.

**Common sense**

No longer does the questionable buddy system apply. What does apply is a common sense, logical outlook on required equipment

would get bent or dead due to an out-of-gas situation.

**Diving solo**

Maybe it should also be stressed that "diving solo" in this context isn't the same as diving alone. Diving is a social undertaking, and we like to share experiences under water. It doesn't

mean either that the proximity of your diving partner can't add to your safety, because help or just an extra pair of hands can indeed come in handy. It is about a mindset. Are you prepared, equipped and capable to independently take care of your own safety and not to make someone else responsible? A little mental exercise can come in handy here: Ask yourself whether you would be comfortable assuming responsibility for your buddy and getting him/her safely out of the water in case he has an accident. Maybe he is panic-prone, who knows? This is for qualified and dive professionals only, who, when you come to think of it, always have to dive solo when doing classes as they can't rely on anyone else to rescue them.

Do you bring your family on a dive vacation and do you dive with your kids? They are most likely not physically strong, trained or mentally prepared or mature enough to deal with any incidences. They can't be expected to react as fully capable buddies. Here too, you are in reality diving solo even though you may not be aware of it.

Do the right thing and be safe. ■

Where is that buddy when you need him?



# Rainforest to Reef on a Tropical Island Paradise

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Enrico Cappelletti & Gianluca Mirto reports



*The incredible and neverending ballad of the*

# Polluce Wreck

Lost 1841

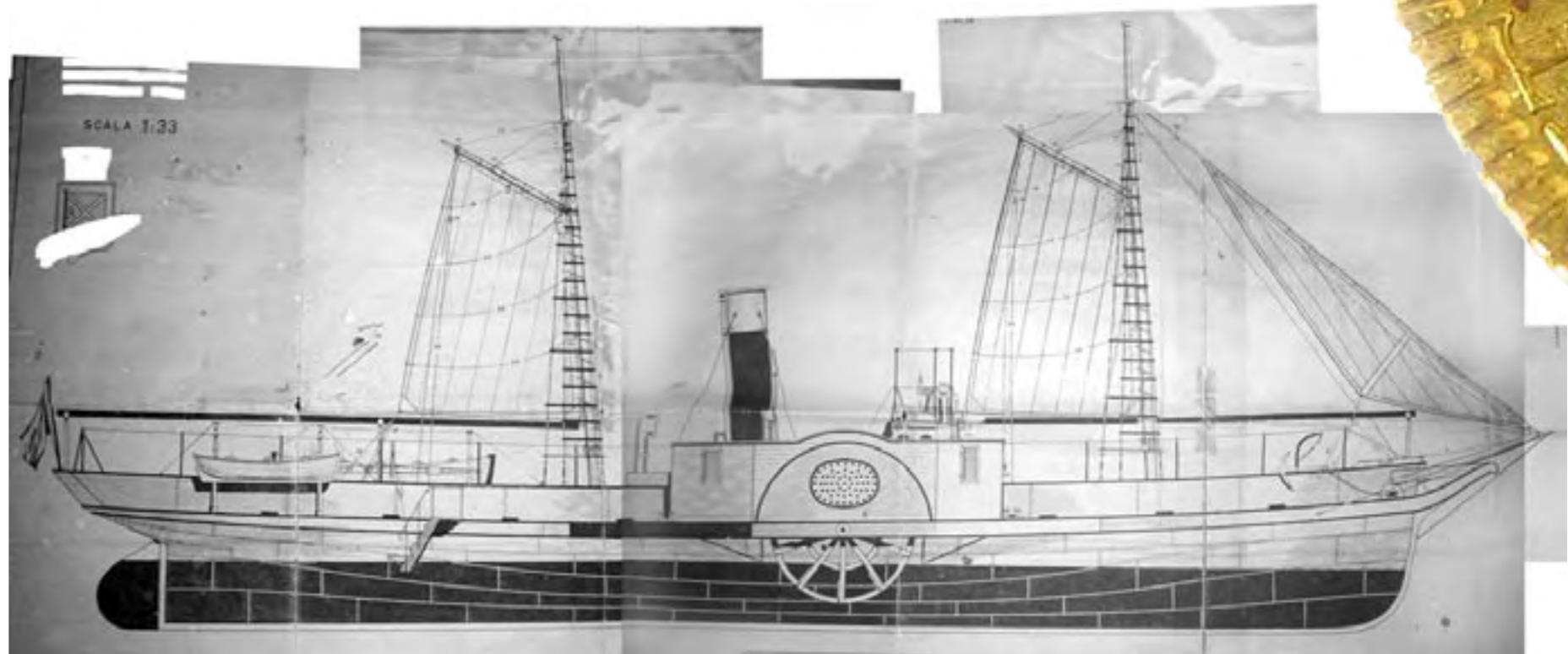


Like every grand tale of shipwreck and lost treasure, the story about the *Polluce* has it all. A paddlewheel steamboat shipwrecked in 1841, it is the centerpiece of a drama spanning more than one and a half centuries and has all the necessary ingredients: drama and tragedy, greed and crime, passion and politics. And it is still ongoing—*Polluce* is about to be excavated once more as this story goes to press.

This incredible tale is not just about a dramatic shipwreck in which one of the two colliding steamboats sinks in the matter of minutes off the island of Elba in the Mediterranean taking along with it to the bottom of the sea a huge treasure—although this aspect of the wreck alone would be dramatic story in its own right. The story isn't complete either by including the following inquiries and legal proceedings, which took place in

Livorno (Leghorn) in the years 1842 to 1846, right in the middle of a turbulent period of history when European nationalism flared up and new states were born or unified including modern Italy. We have spanned one and a half centuries to include a clandestine excavation of the wreck and illegal removal of the treasure in the 21st century as well as an international scandal and a police matter which reached into several European countries.

**Rise of nationalism**  
In 1841, every little kingdom, duchy or territory in the politically fragmented area around the Tyrrhenian Sea seemed to, maybe not surprisingly, have some stake or claim on this wreck and it's precious cargo. In that day and age, there were no such notions as territorial waters or international treaties govern-



# Polluce Wreck



An 18 ct gold mounted closed back emerald set. 18th century cross pendant with central square collet., emeralds set to eight arms and pear-shaped drop. Spanish c. 1759. Estimated value £2000-3000 at auction

ing legal matters pertaining to the seas. A ship's owner had little or no protection nor was there a supporting legal framework in regards to salvaging a lost ship or its cargo. Indeed, this was also the case of the *Polluce* and it's owner, one de Luchi Rubattino from Genoa.

## First attempts

Following the loss of his vessel, de Luchi Rubattino desperately staged several salvage attempts. However, the wreck was lying far deeper than any previous salvage work. Attempting to salvage the wreck of the *Polluce* was an unbelievable enterprise at the time—it was the first time anyone had tried to go so deep. After two failed attempts, de Luchi Rubattino predictably ran out of money a gave up. He spent 500,000 lire to buy a brand new boat and salvaging attempts cost up to 470,000 lire.

Also as an interested parties we have the king of Sardinia for whom it was its most important trading vessel and the king of France who supplied some of the equipment for the salvage attempts including some heavy lifting

chains which can now be found at the naval base of Toulon in southern France. A report of these recovery attempts, in the form of a 48-page booklet dated 1841, is then passed down history from a colonel serving the archduke of Tuscany.

## 21st century visitors

It is armed with these historical records, obtained from a Parisian investigator of historical documents named Pascal Kainic, a group of eight English divers from East Anglia (a county in eastern England also known as Norfolk) arrive in Genoa in the spring of 2000 - David Dixon, Jerry Sullivan, Kerr Sinclair and Nicholas Pearson and some others. None of them had any previous experience with salvage work and only two had previously worked at sea at all. They did, however, seem to know exactly where the wreck of *Polluce* is located and how to get there. One of them also seemed to be the manager of a salvage company, curiously enough.

In Genoa the group charters a supply vessel with a crane and an excavator bucket from the Genoese company Technospamec and hire in an Italian crew. The charter is for three weeks against a fee of €190,000.

They set sail and head right for the designated area where they set out their marker buoys. Using a ROV (Remotely Operated Vehicle) with a videolink they search the bottom and try to steer the excavating bucket onto the wreck. With this crude tool they break up the wreck to get to the cargo and the treasure. During their 21 days at sea they manage to bring up and onto the deck of their vessel 1400 tons of mud and scrap iron.

Meanwhile the Italian crew were kept completely in the dark. Their access were restricted to the foredeck and they were forbidden to see or interfere with what was going on with the excavation and what was loaded onto the aft deck.

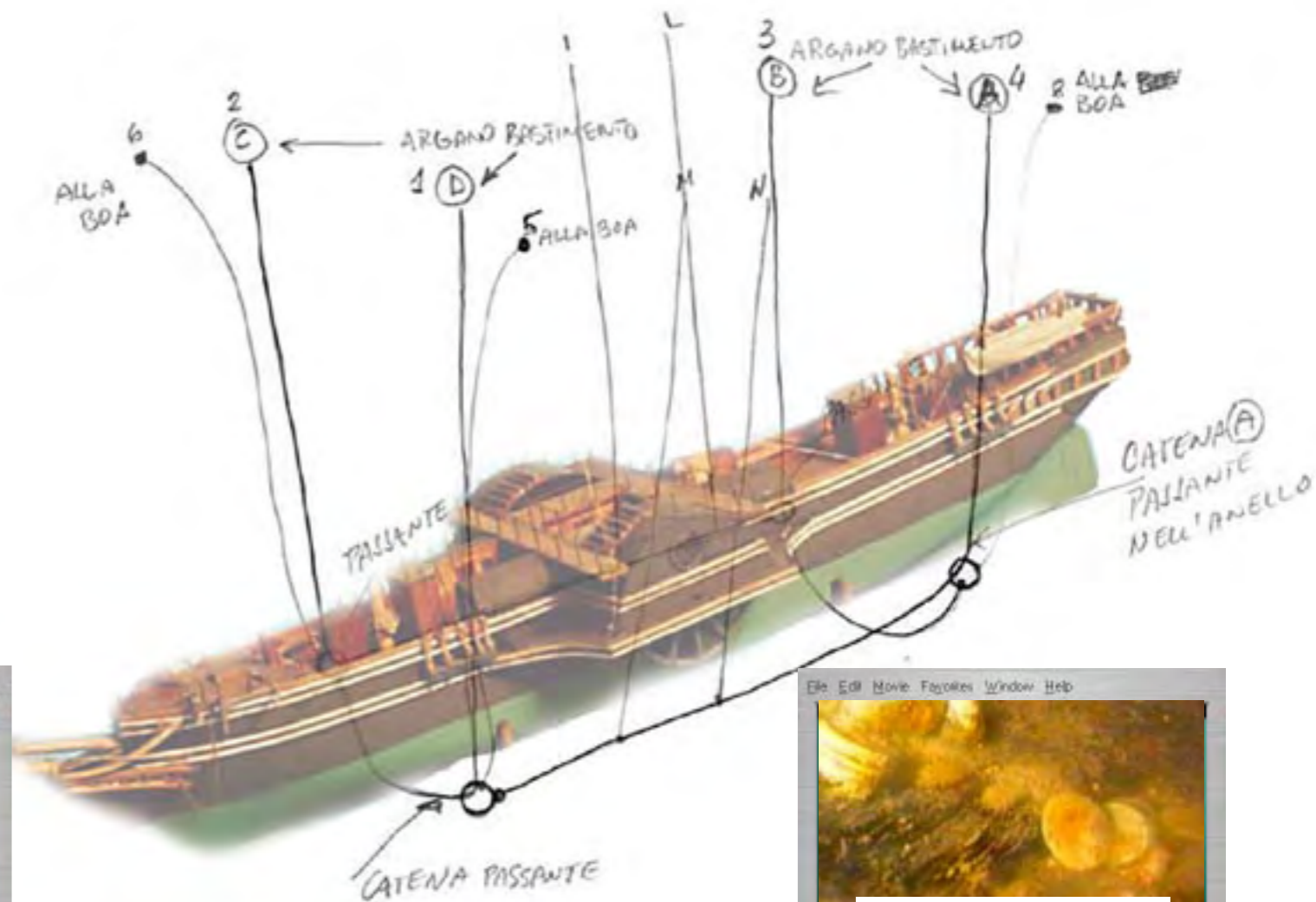
## 40 tons of Lead

On March 1. they returned to Genoa. Here they unloaded 40 tons of recovered lead, gave the crew some silver coins and disembarked to return to England without a hint about any treasure to anybody. Nobody knew what really happened.

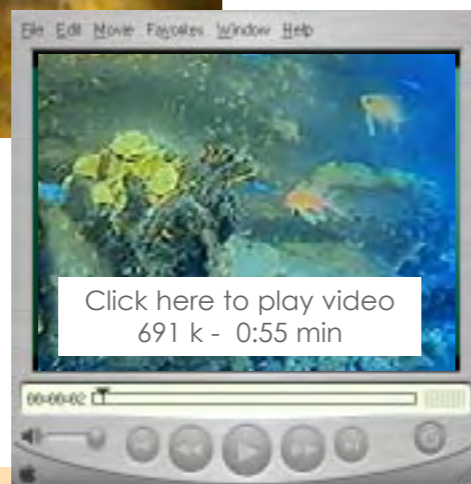
Back in England, however, the English divers celebrated their amazing adventure and gave interviews to the local daily paper of Great Yarmouth. Once in the headlines of the newspaper the cat was out of the sack as it would soon enough come back to haunt them. Another interesting chapter in the *Polluce* story was about to begin.



Gold or silver coins on what left of the ship



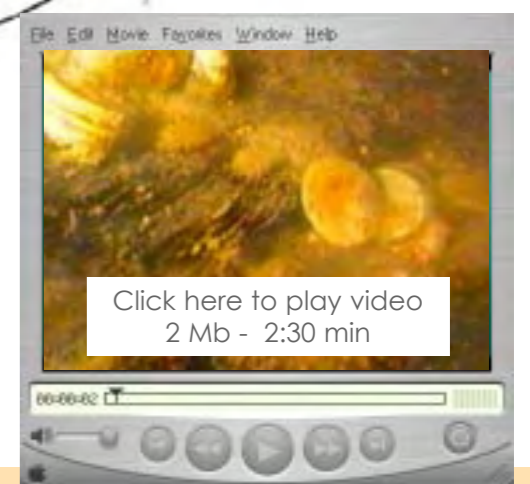
Lifting system of 1000 meter of chains - using 6 sailing ship to get her up. *Polluce* was lifted up in September 1841 about 3 meter and moved toward the island for less then 50 meters



Click here to play video  
691 k - 0:55 min



Click here to play video  
895 k - 1:10 min



Click here to play video  
2 Mb - 2:30 min

# Polluce Wreck

## Who and when?

But how did they know about the content of the Polluce in the first place? And who supplied the position coordinates?

Who made the necessary investigations in order to locate the wreck again after so long time – and when? Polluce was just a single wooden hull 50 meters long lying at a depth of 103 meters and there was no mention of this ship in the national and international nautical books or databases.

## The auction

The treasure was put up for sale at an auction held on June 21 2001. at the auction house of Noonan Webb in London. It was a precious collection of 2000 silver coins, 311 gold coins, diamonds and jewels and silverware as well as a cup from a cabinet were meant to be put up for sale. If they had sold all they would have realised more than €400,000.

A selection of the seized treasure from Polluce as they were about to be auctioned off

However, it did never come to anything of the sort. On the day before, on June 20, the Metropolitan Police's department of antiquities arrived on the premises and put a halt the auction after being informed by the Italian police. In the following statement to the press the police said they have received information that the artefacts has been illegally recovered from Italian waters and taken to England. The police seized the collection while the astounded producers insisted that their permission certificates from the Italian authorities were in order. In a sense they were.

The permissions were indeed issued to their company but as the policemen soon enough pointed out the permission referred to another wreck, the *Glen Logan*, and to the recovery of aluminium ingots. Furthermore as the *Glen Logan* was sunk in 1916 by a German u-boat off the island of Stromboli near Sicily no less than some 460 miles away this was certainly no small error. Everything was subsequently taken into custody and the four adventurers were first charged

and then released. According to Scotland Yard they have not paid a single fine at this point in time.

## Returning the treasure

On 10th October 2002, Vernon Rapley, the Scotland Yard detective who seized the treasure handed it over to police officers from the Protection Patrimony of Florence. But was it all of the treasure or was it only a small part of it? Subsequent attempts to locate the four for further questioning has been unsuccessful, their telephones were not answered and they no longer lived at their known addresses. The local press were convinced that the group had a financier as the divers were unskilled. One of them, David Dixon, has previously been associated with offshore jobs but the others, from what is known, have never carried out work with wrecks.

## Comex

May 8. 2003. The world renowned French salvage company Comex' vessel *Janus* arrives at Porto Azzurro on Elba to search for Polluce. The owner legendary Henri Delauze is aboard.

During searches in a darkened room behind the shoulders of the helmsman four men are seated along a wall of blue screens. Sophisticated equipment control the ship with millimetres' precision and enable the men to home in on the exact location where the Polluce is

found. It is on the opaque sonar screen the site is first visible. First small, then the location spreads across the monitor.

## On edge

Delauze stands up nervously. Takes a close look at the screen. Walks around agitated. Then sits down. The previous visitors have disintegrated and destroyed the wreck and left nothing it seems. The question springs mind: How could the English possibly know about the wreck? Backtracing events the first scan of the wreck was dated June 1995, when Delauze identified it for the first time. On this scan the classic silhouette emerges clearly. The

Auction catalogue. Notice that the treasure is referred to as coming from "Santa Lucia"



Italy and its neighbours in 1841. The line is Polluce's route

- a: Kindom of France
- b: Switzerland
- c: Empire of Austria-Hungary
- 1: Kingdom of Sardinia
- 2: Kingdom of Lombardi and Venetia
- 3: Duchy of Parma
- 4: Duchy of Modena
- 5: Vatican State
- 6: Kingdom of the Two Sicilies



Old map of Tuscany. The big island in the lower left corner is Elba and the strait separating it from mainland Italy is called Channel of Piombino. It was here Polluce collided with the steamer *Mongibello* and sank in 10 minutes on June 17 1841



Roll of coins. These are French silver coins kept inside a small metal tube to protect them from corrosion. This is the system they probably used to transfer money



# Polluce Wreck

hull are easily recognised and it is even possible to locate the deep gash in the flank produced by the bowsprit of the Neapolitan steamboat Mongibello which rapidly sent it to bottom. This scan and a report was sent to the Italian authorities, presumably the Coast Guard in 1995.

## Not on the records

After studying the case for many months, I now know nearly everything about this shipwreck and I have a good idea what might have happened. When Henri Delauze filed his report on the find with the Coast Guard 1995 it is not duly processed. Consequently there are never any information about Polluce on their record and it is as if it doesn't exist. How the English group is able to obtain this information is a question open to speculation.

## A wellplanned action

This is what I have been able to put together: David Dixon, Jerry Sullivan, Kerr Sinclair and Nicholas Pearson arrives from Norfolk, England, to Puerto Azurra on Elba to have the adventure of their lifetime. They knew perfectly well what they were doing and where they were heading even though they tried to give a different impression. They clearly knew that they were in the territorial waters of Italy carrying out an illegal excavation but they have prepared well.

Apparently all seemed to be clear and papers in order. The authorities just never checked them properly. Usually the Coast Guard takes months to evaluate documents and issue excavation permits. But in this case an excavation permit was issued within a couple of days. How was

this possible? Nor did they seem to wonder, as the local press pointed out afterwards, that the chartered supply vessel was anchored in a completely different position and was equipped for a completely different sort of excavation than the one they had permission to do.

## Possible explanations

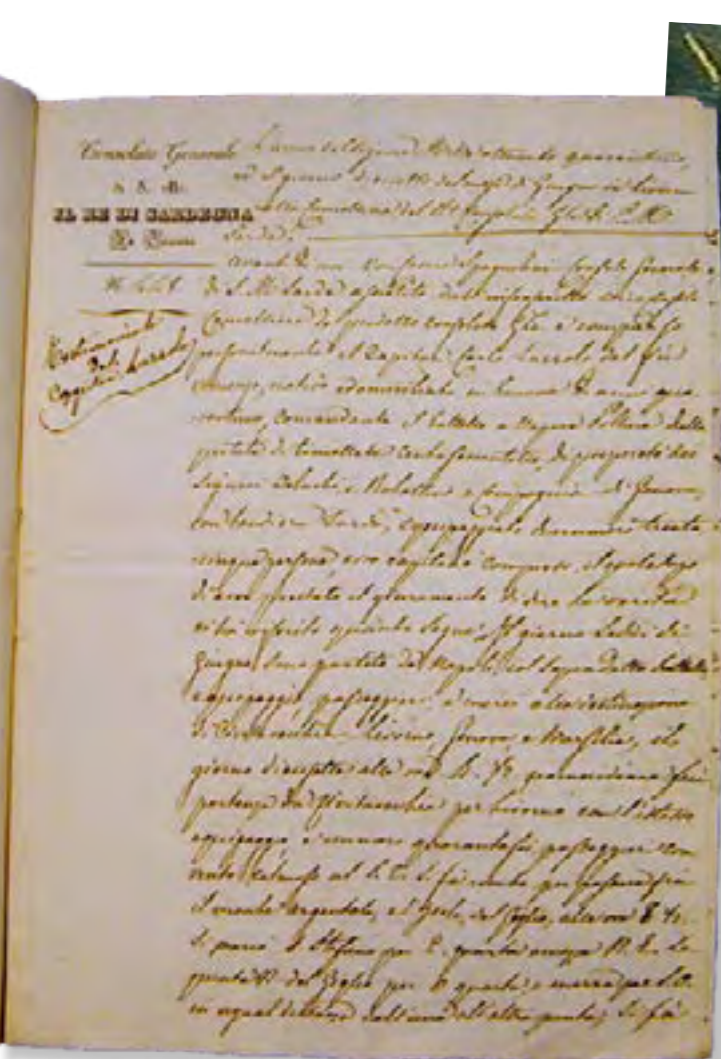
The Polluce was already a famous treasure wreck for many treasure hunters in Europe. But the authorities had no knowledge of it and for them it was a ship that did not exist. Nigel Pickford lists it as the treasure of Pollux in his authoritative Treasure Atlas, so it is well known. However there has been much confusion about the names Pollux and Polluce. Pollux has to a large extent been the one that got stuck in the minds of people but

wrongly so. The Pollux is a vessel that were lost in the beginning of the 1800's. One reference tells that Ferdinand IV, King of the Two Sicilies, fleeing Napoleon's advancing forces as they were invading Naples, loaded his treasures aboard an English sailing ship, and sent it northwards, towards a friendly port. But when the sailing ship passed Elba and was seized by French ships, it preferred to sink itself sending the gold of the king to the bottom. According to legend this is a shipwreck of great riches, gold and pearls and one carriage of gold. The legend also places the shipwreck between 1804 and 1806, but the dates are certainly mistaken as the king of the two Sicilies were not allied to Naples in those years.

This legend in combination with errors



An 18ct gold brooch of crescent shape with rectangular and triangular terminals, wire work clasped coral hand drop, snake manchette holding gold chain-Italian, c. 1835, 5,7 cm, 14,5 gr.



Letter from the King of Sardinia in Livorno announcing the Polluce incident to the Foreign Ministry in Turin

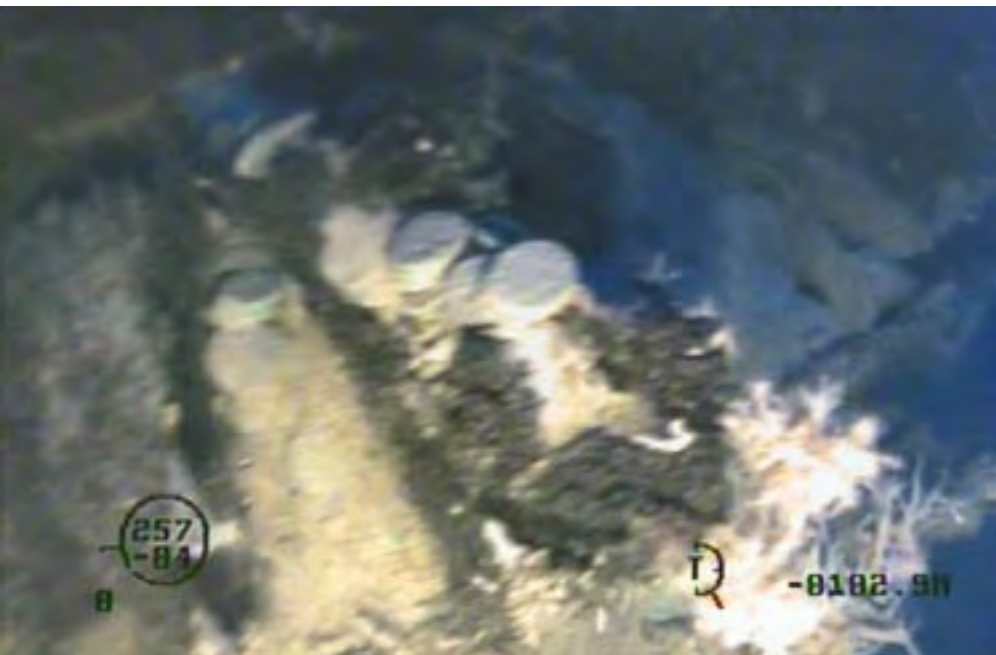


This is a model, not of the Polluce but of a sister ship very much like her





# Polluce Wreck



Coins on the rest of the ship

in dates and places is what upsets the searches that the Italian police carried out at sea after Scotland Yard had returned the precious material. After one long such search the police officers locate the remains of the wreck which they investigate with a ROV and hastily establish that it is a Spanish ship with sails.

## The treasure

A newsclip from the French daily paper Semaphore of Marseilles dated June 23rd 1841, five days after the shipwreck, which happened on the 17th at 11.30 pm, states quite specifically that onboard were 70,000 coins in silver and 100,000 coins in gold which was the property of four rich passengers. The contessa de la Rocca even brought a golden carriage. The French media covered the event quite intensely for more than 15 days whereas the Genoese daily hardly mentioned it – a 10 line note on the first day was about all the mention the Italian media cared for.

The head steward

aboard the Polluce was a gentleman by the name J. Jacques Thevenot. He was from Marseilles and together with others 8 sailors were repatriated with the help of the French Consul in Livorno. And this head steward knew very well what was on board as he had witnessed the turn of events firsthand and gave a detailed account that was entered into the records of the time.

## The preparations

The treasure hunters therefore knew that this wreck had an indeed precious cargo. All they had to do was obtaining the right documents from an historical investigator. But first the quartet made another operation. Thanks to a backer they first reconstructed Reasdom Beazley a once world famous salvage company which closed down in 1981.

Before they went out of business they had successfully performed over 80 challenging salvage operations retrieving commercially important materials. Their last job was retrieving aluminium from the holds of the Glenartney which were sunk by an u-boat in 1916 in the Channel of Sicily. Then the business was first sold to a Dutch then a German company before it finally was closed.



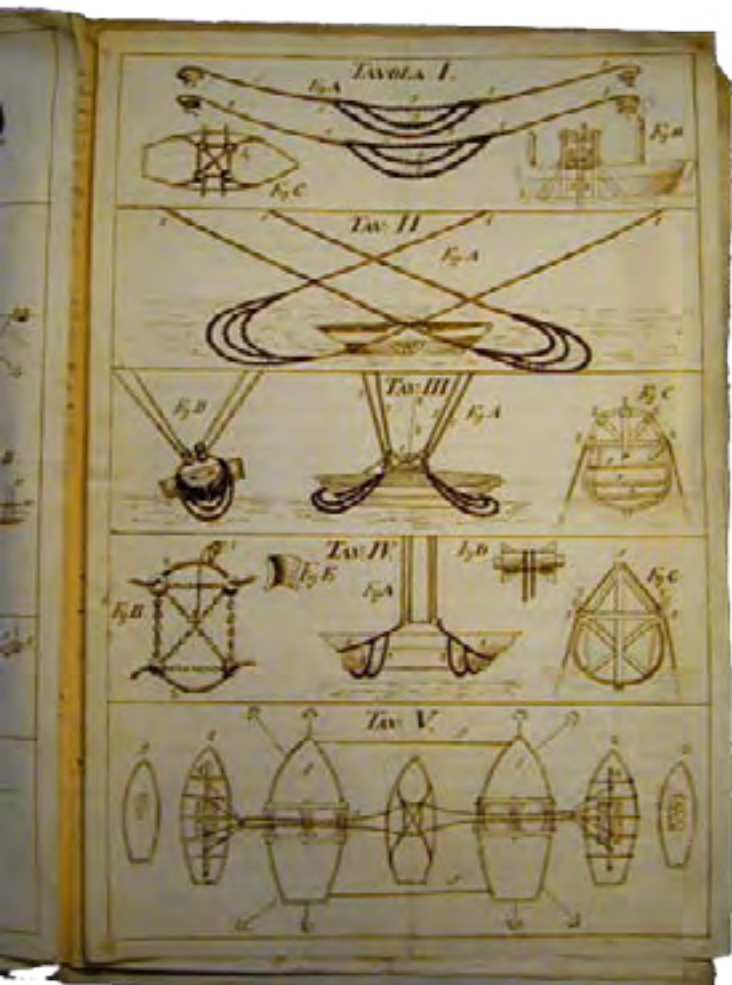
Picture of the German U-boat U21 which sunk the Glen Logan on Oct. 10 1916. The U21 was found by Clive Cussler, the American writer, in the English channel a few years ago



## Misidentification

But there are some details that doesn't ring true to me. Among the artefacts seen on bottom are for example a jar of mustard which raises a red flag. This particular jar of mustard was a very particular and expensive brand - one that would very unlikely have been aboard any Spanish sailing vessel at the time. But very possibly on a vessel fleeing with a treasure. Going over the other artefacts on the bottom including the large quantities of iron soon made it clear that this was no sailing ship. In addition, the list of artefacts given back from the Metropolitan police made it perfectly clear that the wreck had to be younger. Of the 2311 coins on that list, a few silver coins were from 1799, but the others were coined between 1800 and 1830, so the shipwreck must at least be younger than 1830

Different lifting systems that Rubattino thought to use for a future salvaging that never happened



**Sarawak - Malaysian Borneo**

**Miri Reef Map**

- ▬ Dive Site
- Oil Rigs
- ▬ Grouper Patch
- ▬ Tusan Reef
- ▬ Sri Gadong Reef
- ▬ Always Manu Wreck
- ▬ Tukau Oil Rigs
- ▬ Tukau Drop Off
- ▬ Santak Point
- ▬ Robert's Reef
- ▬ Seafan Garden
- ▬ Batu Belais
- ▬ Siwa Oil Rigs
- ▬ VHK Reef
- ▬ Azam's Place
- ▬ Eve's Garden
- ▬ Anemone Garden
- ▬ Sunday Reel
- ▬ Siwa Reef

Sarawak's ecological heritage is among the most distinctive in the world. Being part of the Indo-Australian Archipelago, the epicentre of marine biodiversity, the region comprises nearly 1,000,000 square kilometer of coral reefs or 34 percent of the world's total, housing 600-800 reef-building coral species in the world. It is home to more than 3,000 species of fishes and the richest concentration of invertebrate species.

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# Polluce Wreck

Proteste e domande dei Ricevitori degli oggetti caricati sul Polluce. per conto dei proprietari degli oggetti caricati sul Polluce. Ecco la

**NOTA**

Proprietari	Ricevitori	Giorni delle Proteste	Giorni delle domande	Oggetti reclamati	Rei Convenuti
1. Segre	Archivolti	21. Giug. 1841. a 32.	16. Lug. 1841. a 55.	Mille colonnati	I due Capitani e le due scute
2. Roschild	Arleb	21. Giug. 1841. a 33.	16. Lug. 1841. a 55.	Tremila colonnati	Idem
3. Casassa	Adami	21. Giug. 1841. a 34.	17. Lug. 1841. a 56.	Tre sacchi di monete	Idem
4. De la Rosiere e Dubois	Felù	22. Giug. 1841. a 37.	17. Lug. 1841. a 57.	Due casse di cotone e seta	Idem
5. Rubrinacci	Mollo	1. Lugl. 1841. a 49.	20. Lug. 1841. a 58.	Cassa di seta e filo	Idem

Short list of the money on board. There are 3000 silver coin due to Rotshild (Roschild) coming from Naples plus others

tions the position of the wreck – and the Glen Logan is located down in the central Mediterranean. Nobody notices that attached is a seachart of the waters off Elba with a mark that very clearly points to a location three miles from the coast. The island of Elba is found in the Tyrrhenean Sea and not in the central Mediterranean. And nobody connected the dots in so far that the supply ship was equipped with berthing chains only 250 meters long whereas the Glen Logan rests at a depth exceeding 1,500 meters.

Excavating Polluce with a heavy excavator bucket was not exactly a delicate operation and the wreck was badly damaged



## Buying the rights to a wreck

Nicholas Pearson resurrected Reasdon Beazley after which the group buys the cargo of the Glen Logan from Her Majesty's Treasure. The Glen Logan being another wreck in the Mediterranean. The cargo consists of tea, rubber and aluminium and is bought for £1,500. Subsequently the groups also acquires

the wreck itself who is owned by another salvaging company, the Blue Water Recovery, for £ 2,000. Now the group owns both the wreck and it's cargo.

Being the formal owners they now want to claim their right to salvage their possessions and they file an application for a salvaging permit referring to international maritime law. This is forwarded through the British consulate in Florence. The application is then forwarded through the various bureaucratic channels to the Coast Guard on Elba which then transfers it back to Florence this time to the Archeological Authority.

Nobody notices that the enclosed documents - which is about a salvage permit for the Glen Logan – never men-

The time tool to Coast Guard to process the papers was remarkably short, only a few days. In this short time it was not possible to check all facts and process the papers properly. We can only surmise that they didn't even read them but just rubberstamped the application.

Before founding their Society and acquiring the Glen Logan, Pearson and his associates purchased from Pascal Kainic - the historical investigator in Paris - the historical documentation about the wreck. The operation Columbia, as they called it, began the first days of February 2000. But things do not go according to plan. There are mechanical problems to the bucket that end up almost destroying the wreck smashing everything around the large motor to dust. There are days of bad weather and the ship had to returns to port in Genoa for some repairs. In a month they work perhaps seven to eight days.

## Destroying the wreck

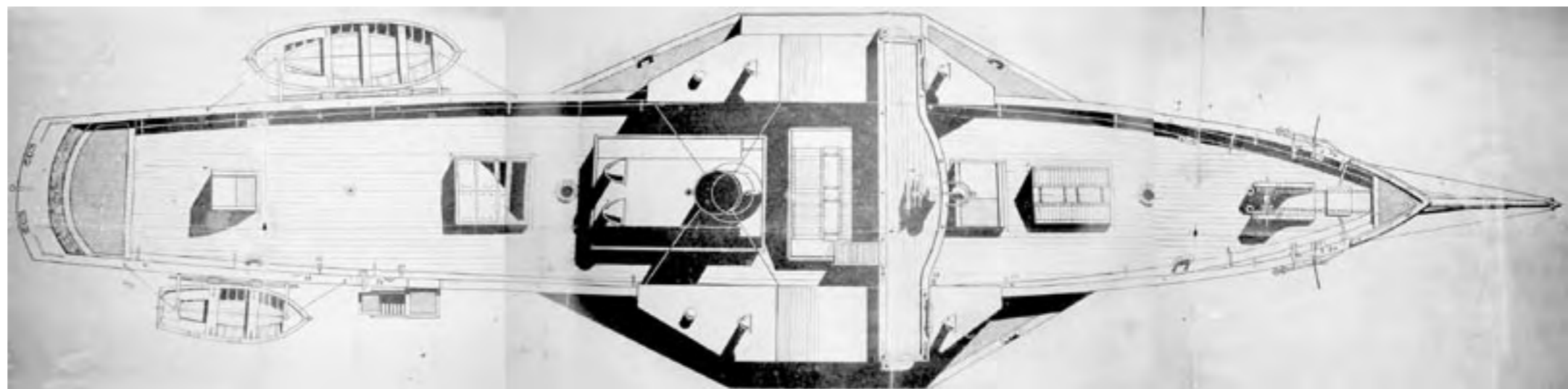
The excavator bucket is guided by their ROV. The Polluce, a steamboat of wood 49 meters long, 7,30 wide and 3,5 tall tied delicately laid out in the sandy bottom as a small and tender structure. They must have assumed that the bucket would simply be able to grab all the

valuables and haul them safely back to the surface. How wrong were they. In a excavator bucket the jaws can't close properly around objects so most of contents are spilt on the way up as the water run out and the objects just fall back to the bottom.



"The gold from Elba". The authors has also written a book about Polluce and fatal attraction of her treasures

From the drawings of the ship, the view from above



# Polluce Wreck



Seal of the Rubattino shipping company, to which Polluce belonged.

The booty was carefully logged in a booklet which reveals that the quantity of coins collected was less than 2500. This is in contrast to the 170,000 coins that the French newspaper claimed was brought aboard Polluce in Naples. However, a French diplomatic document from 1841 mentions the number 70,000 which indeed casts doubt where there was another 100,000.

## Paid in coins of gold

When the group returned to England in March 2000 they didn't settle the account with the off-shore company Tecnospamech of Genoa from which they chartered the supply vessel. They did not have any money and instead offered settling the balance with coins

of gold. By law the Technospamech was obligated to report to the authorities what they have recovered. Some plates, a couple of silver coins and some bottles were mentioned and the Technospamech also reported that they didn't find any gold on the *Glen Logan*.

Nobody ever seemed to question why they apparently recovered so little after seeing them working intensely for a month just 2.9 miles off the coast with an excavator bucket going constantly up and down.

Back in Great Yarmouth, the two Pearsons, father and son, boast about their fortunate adventure to the local daily paper. They explain that while they were searching for the *Glen Logan* (which is in fact located hundreds of miles further south of Polluce) when they came across another ship that turned out to be holding quite a treasure when they looked it over with a ROV.

Consequently they stopped, recovered the treasure and returned home rich - end of story, at least according to the divers. And at first their stories were to be believed at face value.

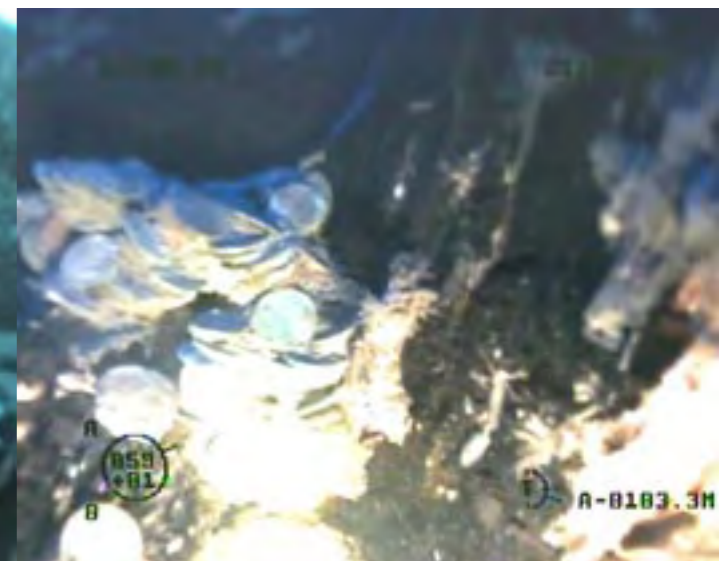
## Incredulous

But there is someone else out there who knows that this cannot be the full truth and informs the Receiver of Wreck in Southampton that this treasure must have been removed illegally. The Receiver of Wreck doesn't quite know what to make of the matter and passes on the information to the Italian embassy in London, which in turn informs the Italian foreign ministry in Rome.

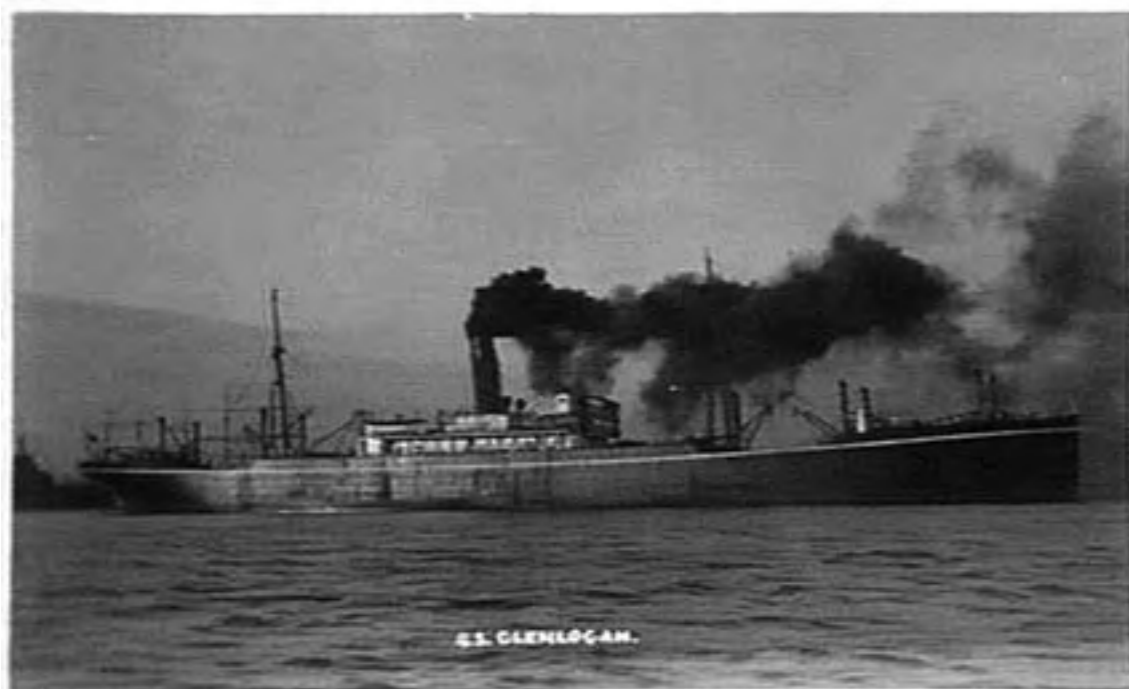
Ultimately it ends up on the desk of the police commander of the Protection Patrimony in Florence who takes interest in the case and initiates an investigation into the case. Appropriating archaeological artefacts in Italy and exporting them illegally is a very serious matter and one that usually comes with a jail sentence.

The police in Florence contacts the London police. The auction house Noonan Webb are then asked to produce documents authenticated by the Receiver of Wreck. Nicholas Pearson and associates do not have them. In the UK the law states that when something is found at sea it must be reported to the Receiver of Wreck. This is the authority dealing with all reports of wreck from around the UK. It is based within the Maritime and Coastguard Agency headquarters in Southampton, with assistance from Coastguard personnel around the coast.

Pearson protests - and with some reason - that the recovery hadn't taken place in UK waters and within the Receiver of Wreck's jurisdiction but in international waters. However, that doesn't stop the Metropolitan police from arresting the group.



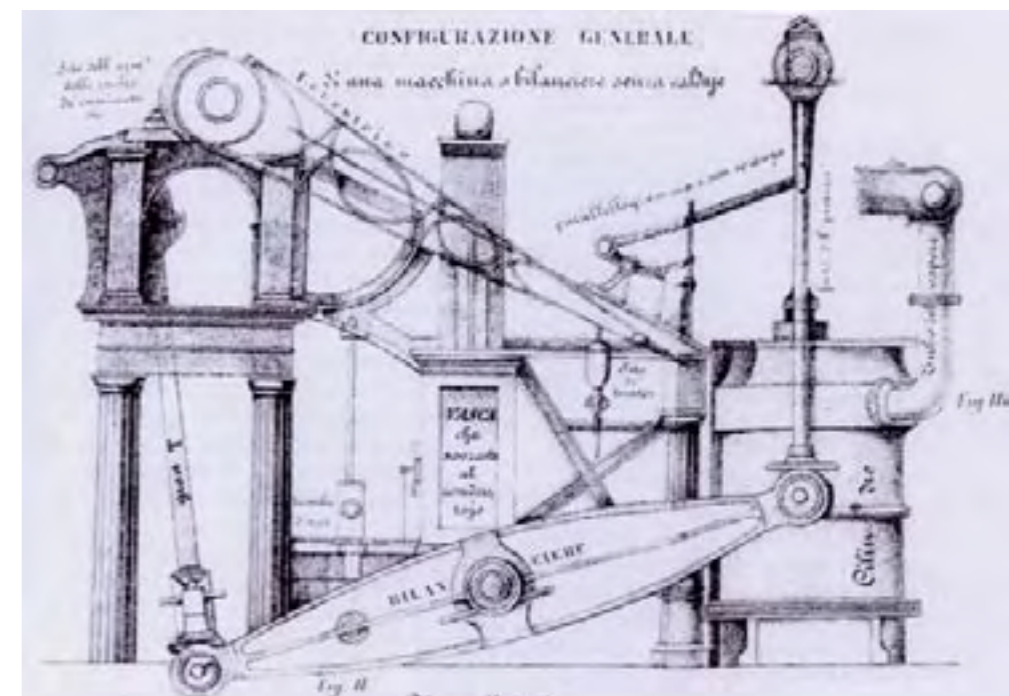
Screenshots from the video that the ROV took of the wreck. Gold coins are everywhere it seems



Mistaken identities? The *Glen Logan* was a big steelhulled wreck that in every aspect was different from *Polluce*, a woodenhulled paddlewheel steamer from the early 1800s

During the following interviews the divers claim that the vessel they had found was a ship they first called *Sea Lion*, then changes their explanation calling it the *Nostralino* - a wreck that possibly is fictitious.

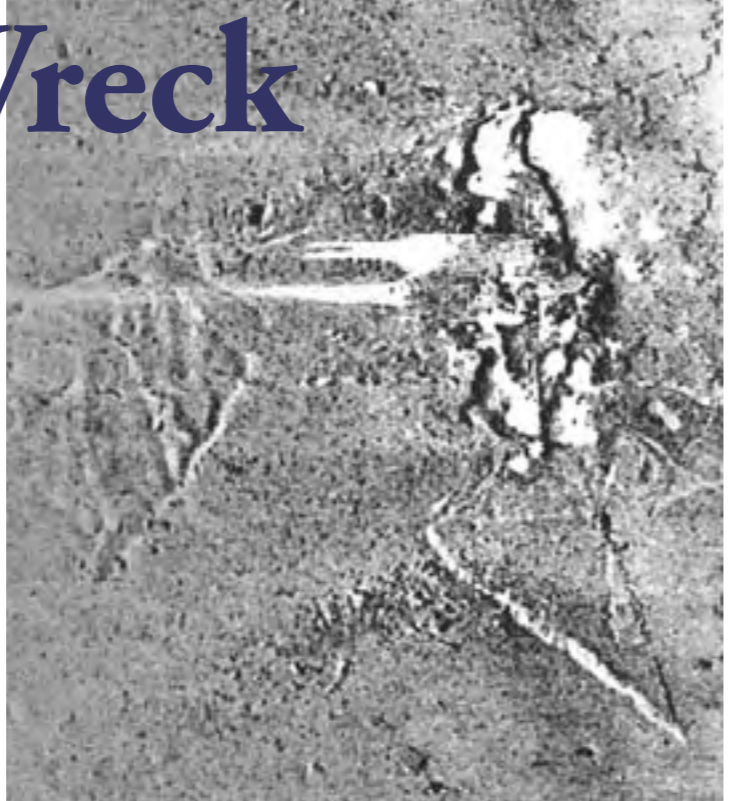
Curiously *Nostralino* was the also the name of the brand of wine aboard.



Blueprint of *Polluce's* engine



# Polluce Wreck



Sidescan sonar picture of the Polluce made from May 2004. Clearly visible on the wreck is the hole done by the crane.

## Conceding defeat

But rather than facing years of legal wrangle and even possible imprisonment, they decide to return the booty to Italy and to pay a fine of £2,500 for not having properly declared the finds to the Receiver of Wreck.

And that could have been the end of it. If only if we haven't uncovered that not all of the treasure were given back.

## Who backed it?

However the British authorities refused to reopen the case and when we asked the auction house, Noonan Webb of London, for a copy of their catalogue they refused too stating that this was now a police matter. In this auction catalogue was the full, but untrue, story as the divers had told the police along with pictures of the treasure. Also there were pictures and names of all those who had participated in shipping the treasure out of Italy. We then went to visit EDP24, the local newspaper in Norwich where we managed to find pictures of the group along with some others.

Also we corresponded with the daily paper of Great Yarmouth who related to us that it was probably a local who had financed the operation a person of such influence that the reporters could not speak openly about it. Collecting information in England was not easy. Not only did we meet with a lot of reluctance but we were also being deliberately put on false leads to wrong addresses and telephone numbers that didn't exist. But that is all part of the game.

## The Breakthrough

Then, in December 2004, the ship's bell from Polluce is found in Paris. In a joint operation between the Italian and French police parts of the treasure that are still missing are traced to a house owned by the very same Pascal Kainic who sold the English divers the historical documents about Polluce in the first place. Searching the premises the police also find other documents and inventory lists implicating both English and Italian citizens who will later have to stand trial. Their offences carries significant punishments but had they at least cooperated and returned the artefacts willingly they would most likely have gotten away with just a fine. But they refused and now have to face the consequences. The trials are set to take place next year.

## October 2005

As this magazine goes to press around October 1 another excavation of the Polluce is going to take place. This time a legal one conducted by the Italian off-shore company Marine Consulting Diving Contractor n Ravenna on behalf of The Historical Diving Society of Italy from its salvage what is left from those modern pirates. The excavation will take place in Archaeological Authority to which has offered

their consultancy for free. The operation will cost € 500,000.

*During the operation there will be videoclips from the excavation of Polluce on [www.xray-mag.com](http://www.xray-mag.com). ■*



Logo for the new Polluce excavation project



The supply vessel Surama used by the English to recover the gold on February 2000

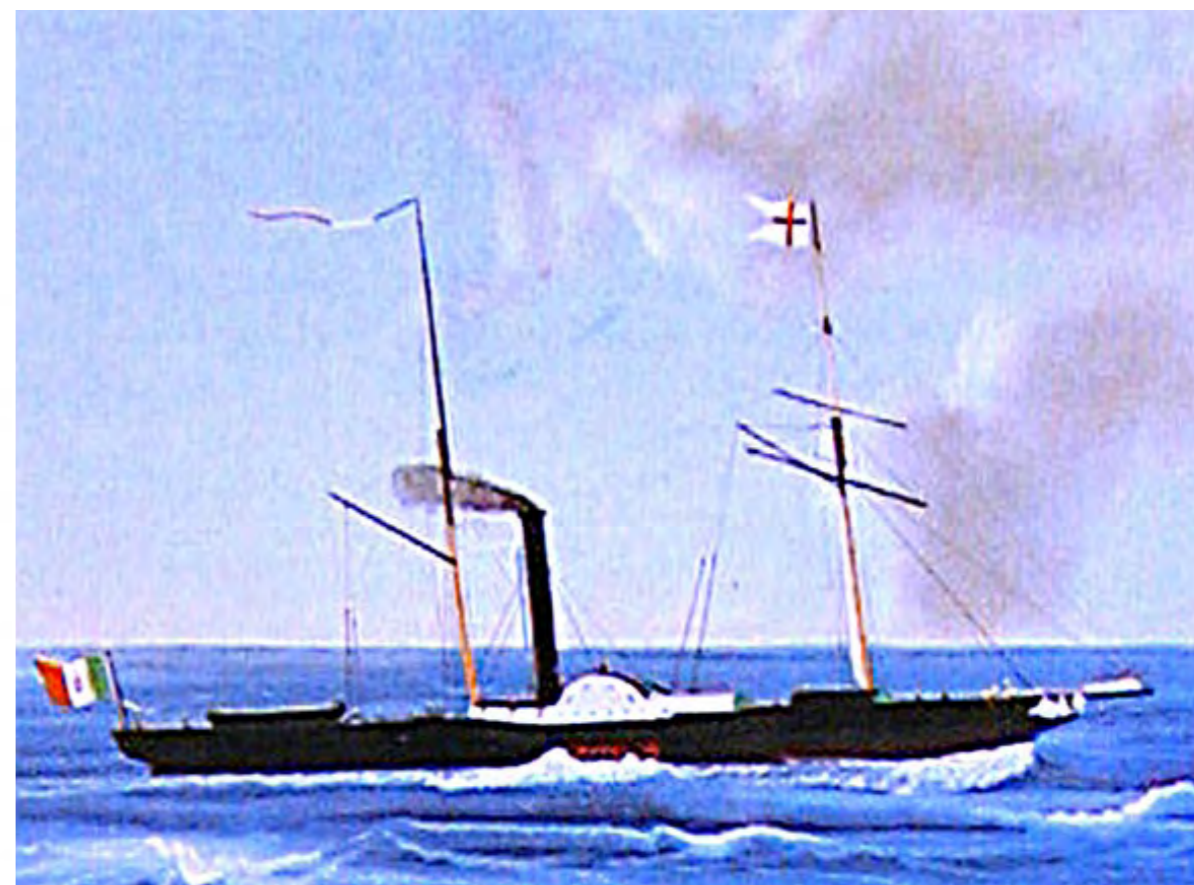
## An accord of what passed on that beautiful night of June 17, 1841



On June 17, 1841, the night was calm. The sea, which was smooth and beautiful, was surpassed only by a black sky that was punctuated by a swarm of stars. The *Polluce* steamed ahead at a cruising speed of over 10 knots, powered by the 160 horsepower engines that drove the two great paddlewheels. It left behind a luminescent wake, glow-

ing from the bio-phosphorescence that was typical of the spring season. The light afternoon breeze was pleasant as they passed the island of Montecristo. The shipping company Rubattino of Genoa had been informed that *Polluce* loaded its cargo in early afternoon in the port of Civitavecchia. At half past four, it had cast off and headed north towards Livorno from where it would have continued for Genoa and Marseilles following its usual route. Everything was fine.

At 11 pm, the island of Elba was sighted. The captain noted in the ship's log that everything was normal and the weather calm and clear. The coasts of the island were wrapped in fog, and its black silhouette stood out without a





Old chart of Elba showing where the collision happened (X)

The *Polluce* was cruising at a speed of 12 knots and the *Mongibello*, the steamboat coming in the opposite direction, was travelling at 10 knots. The distance between them quickly closed and the seamen on duty ran to the foredeck yelling "Stop, stop!" in English, Italian and French to the other vessel. Meanwhile, the captain tried to turn east but it was too late and the two ships collided violently.

### Panic

The prow of the *Mongibello* ploughed straight into the port side of *Polluce*, right behind the paddlewheel wounding her mortally. Scenes of confusion and panic ensued. The helmsman of the *Polluce* was the

first one to jump on the *Mongibello*, but panic broke out among the passengers. Other sailors and passengers were then guided by the captain and three other seamen to climb on board the *Mongibello*. Believing that they had saved all, they followed suit and abandoned *Polluce*, which was sinking fast. But then cries for help were heard, and the captain sailed back in a sloop to *Polluce*, which now had its stern and port side under water, to rescue seven passengers that had become trapped. Unfortunately, on the bridge, a person, an old captain, had been killed. The seven French sailors on board the *Polluce* did their duty. Jean Jacques Theveneau, the head steward, acted with great courage to save all lives onboard.

### Taken by the sea

*Polluce* sank in less than 10 minutes.

Everything on board was lost—personal letters, mail, effects and the documents. The maritime enquiry into the incident was held at the court of Livorno. It was ruled an accident and noted that nothing could possibly have been done to save the *Polluce* following the collision.

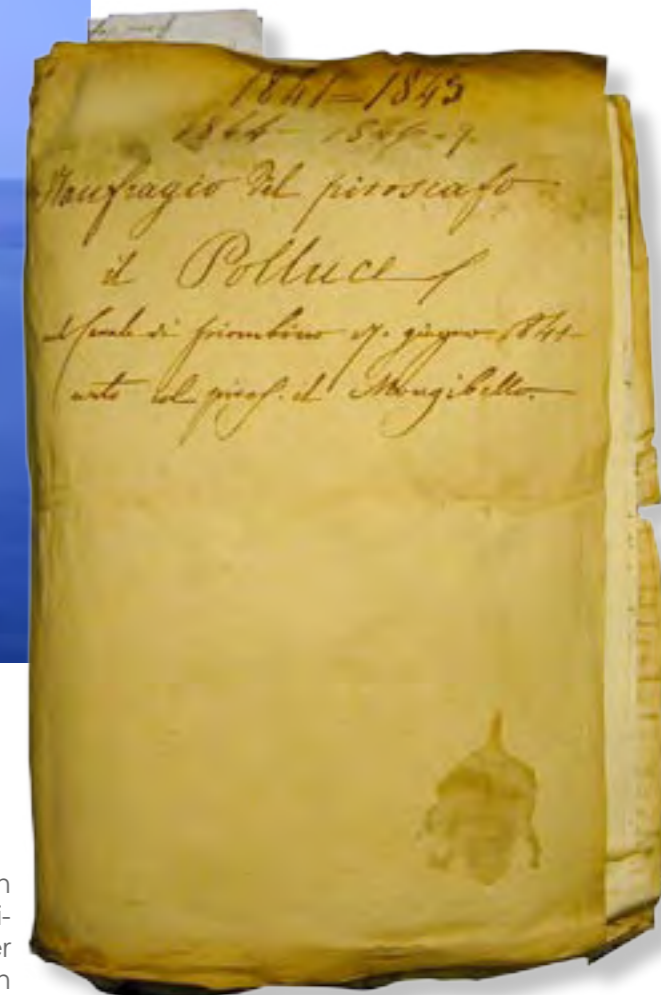
In other documents, Captain Lazzola of the *Polluce* explains that when he jumped onto the deck of the *Mongibello*, he only found a single sailor, completely paralysed with shock, at the helm. Everyone else onboard was asleep. One of the first people to rush up the staircase, was a finely dressed officer, which Captain Lazzola assumed was the captain of the *Mongibello* and started discussing the situation with him. Little did he realise that the gentlemen before him was not the captain, but the count of Canino, Napoleon's grandson.

On *Polluce*, the water now stood up to the bridge, and there was no time to even save the mail. The ship would soon succumb to the waves and become forever lost in the deep sea. All of the 52 survivors had by now been taken to the *Mongibello* by her sloops when Captain Lazzola found himself standing in water on the bridge. It was only a matter of moments then; there was nothing he could do to save his vessel, and in the last moment, he jumped aboard the *Mongibello* and watched the darkness and boiling phosphorescent foam close over his steamboat.

On June 17, 1841, shortly before midnight, the beautiful *Polluce* came to rest on the seabed at a depth of 63 fathoms (103m) awaiting her rediscovery on another day in another era. ■



Picturesque Porto Azzurro on Elba. It's old name was Porto Longone which can be found on the old map on the left.



Found after two years of research: A thorough documentation on the incident with all the trial papers. However the cargo list is still unknown

light in sight. *Polluce* had to stay a couple of miles clear of the coast to head straight down the dangerous strait, Channel of Piombino, that separates Elba from Tuscany on the Italian mainland. There are dangerous waters here with lots of rocks and currents.

### The Collision

What then transpired can be read out of the following account from the daily paper, the Gazette of France, in the issue of 28 June 1841.

At around eleven at night, the outlook observed two lights on starboard, and the course was changed to avoid a vessel under sail. In the same moment, another outlook shouted, "There is a light to port ahead!" The captain and the first officer rushed up from their quarters to the bridge where they immediately saw the lanterns from a steamer bearing right down on them. The captain ordered the first officer to port the helm.

# WORLD OCEAN ADVENTURES

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Text and photos by Peter Symes

# Photography

**Is it cheating? Once the conversation touches on restoring or manipulating images it seem to on something profound, namely our perception of reality. Can we trust what we see? Is a given image a truthful recording of what happened? And what is reality anyway if it depends on the eye of the beholder?**

What is real and what has been artificially created is a very important discussion as photos and videos are also used as documentation f.inst. in science and in legal matters not to mention something as mundane as the passport photo. On the other hand, inter-

pretations plays a big role too. Just think of the caricaturist with his canny ability to make a couple of casual pen strokes who everyone then instantly recognise as George Bush or Dalai Lama. So it is also quite obviously that by employing some very simple artistic effects can result in recognition and effect just by taking advantage of the way our brains and eyes deal with information.

### Artistic license

We accept artistic expression and interpretations and the pictorial arts from photography, graphics and painting covers the whole spectrum from absolute realism and documentarism to the completely abstract.

So what does all this theoretical babbling got to do with our holiday snapshots and underwater footage? A great deal. As digital



photography is now gradually taking over the whole arena, giving everyone a chance to ..erh.. take a shot at shooting pictures underwater it has also given everyone with a computer access to toy around with manipulating images at home using some

photo editing program of which some come free with the printer or scanner. Nowadays everyone can cut and paste images, move picture elements around like furniture in a room and paint mother-in-law green in her face. This is already yesterday's news.



And what a wonderful toy it is. So let's go back to that opening question. Is this cheating? No it is not. It is options and possibilities. Cheating in this context would be withholding from the audience essential information about how this picture came to be and claiming something else. We know that a drawing, a painting or a collage is an artistic expression and interpretation but we would also like to trust that the documentation is not fake and that the press photo hasn't been manipulated.

Likewise with your holiday snapshots and underwater photos. A pink dolphin with green eyes might be a fun picture – if not just lack of taste. But don't claim that you saw such a creature on your

morning dive unless you really did have a close encounter with a hitherto unknown species of the *Dolphinus* genus and are ready to substantiate your claim. You don't always have to state that your image is manipulated, however – sometimes it goes without saying.

I am a big proponent of image manipulation as it gives me so many possibilities to create impressions and to make use of the whole pallet of options. This doesn't mean that all pictures should be treated. Sometimes the natural picture is best, given or just appropriate. It depends on what we want to achieve and what we want to use the images for.

I discern between three "classes" or levels of treating images digitally.

1. Repairs and retouche.
2. Enhancements
3. Art

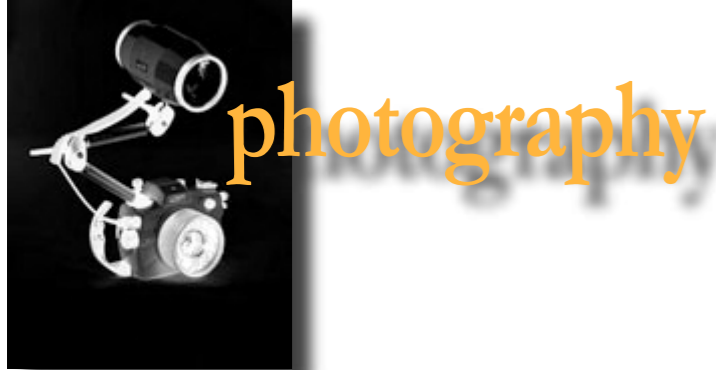
### 1.Repairs and Retouche

This is a very old discipline, probably as old photography itself. It just got easier, having computers at our disposal. Repairs and retouche is something that you



# Is it Manipulation?

the art of making pictures better



# photography



Figure 4 - The original is dull and grey



Figure 5 - mask



Figure 6 - Gently touched up image

Fig 2 and 3. Using the Rubberstamp tool to blot out blemishes



the scratches and blemishes so they blended into the background. Doing portrait photography one would often also enhance the looks, removing skin blemishes once you were at it anyway. And what do you know

– it seems that we are already enhancing reality and pretending it is something else.

## Cloning

Removing dust and scratches is not bettering reality, however. It is repairing the reproduction. On the computer we can either use a number of software filters, or by "cloning", which is the preferred method, although a bit more laborious. By cloning, we copy from area of the picture without blemishes. The big picture in the previous pages is the original scanning of our sample picture. There is a lot of dust on it. On

fig 2 and 3 are shown how the Rubberstamp is used – this is a tool in many software packages – by which colour is transferred from one area to another. In this case to overlap the dust particles. The main

issue with this technique is finding the right area (colour) to clone from, so the end result doesn't stand out as a dark or light spot.

"Remove dust & scratches" filters does come with many of the image-editing software packages, which offer a temptingly quick click-a-button solution to the problem. But there are no such thing as free lunch here either – these filters are not intelligent enough and will also soften and blur every other fine line and structure in the image. As always, it is the good old fashioned manual methods which give optimal control and hence the best results. It does, however, takes longer time but if the picture is going to be used in some kind of presentation the extra effort is just something that goes with it.

## How to...

Use the inbuilt magnifier function so you can see all the details and scroll through the image in a grid patters, and remove dust and scratches. The bane of all underwater photographers, backscatter and sand particles, can also be removed or reduced this way.

## 2. Enhancements

Moving into the transition zone. From our basic scuba training we know that we lose colour with depth and consequently the resulting pictures often look flat and monotonous – unless

we bring a light source of our own, such as a flash. We often also experience a haze stemming from particles in the water. In these instances a little toning up may be called for. Figures 4 and 6 shows the basic idea. On fig 4 we have the original scanning – and yeah, it is rather dull – and on fig 6 have touched the wee goatfish up to match my memory of the encounter.

## What did I do here?

First, as always, dust etc has been removed to clean up the image as describe above. Then I subdivided the image into three parts I treated differently. The three parts in question is the body of the fish, the eye and the background. To treat these areas separately we have to mask them off – like when we spray paint something, see figure 5. In your image-editing software there is various functions to create such masks. Their function is to delimit whatever controls and filters to a selected area of the image. Tracing the contour of the area with the mouse I outline the mask and save it as separate image layer

I first made a little mask for the eye (not shown). It is important that the eye stands out clearly and sharply. Cloudy areas in the iris was blotted out, the contrast enhanced and the lens made darker by reducing the mid

Figure 7 Channels (Red, Green and Blue) and a mask in Photoshop. Think of these as a stack of slides that can be combined and coupled in various ways



tones. This created a clear gaze. Activating the mask shown in fig 5 I then started working on the body. The yellows and reds were strengthened and the mid tones enhanced to produce better saturation of the most important colours. Inverting the mask to working on the background, by contrast, the blues and greens were enhanced to create depth and pull out the difference between the fish and the background. It is important to apply these adjustments very conservatively. A little too much and the whole scenario will look artificial – like old Technicolour movies

Finally, the whole image was artificially sharpened by applying the strangely named function "unsharp mask". Obviously we can't really make picture sharper



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Figure 8. First, we crop



Figure 9 - then we colour the details, by dodging or burning in the colour channels

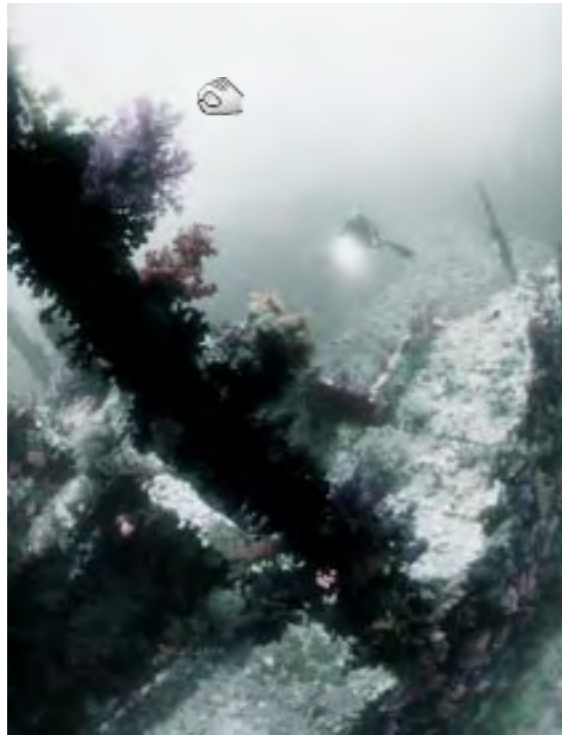


Figure 10 - tinting the background bluish by gently applying the filter Variations



Figure 11 - adding effect filters (lens flare etc) and touching up details.

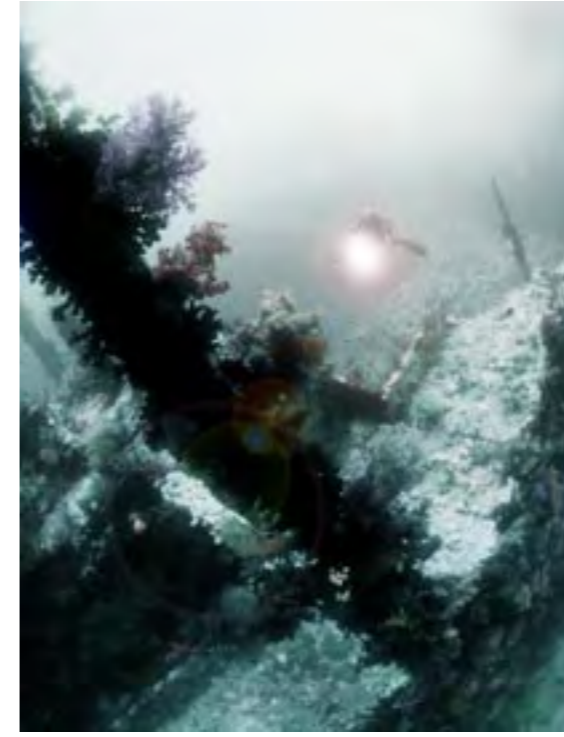


Figure 12 - A final cropping and Hey presto!



but we can create an effectful illusion by enhancing contrast along lines and edges, which makes the image stand out more crisply. Needless to say this is also something that can be overdone, and the filter needs to be applied gently.

### 3. Art

The category where everything goes. Let's continue with our black and white photograph. On fig 8, the picture has been

cropped a bit to improve the composition, by getting rid of a lot of empty water. But let us also take the fun a step further by applying some colours. One of my favourite techniques is to recreate the ambience from the early hand coloured paper prints. Taste is, needless to say, a subjective matter, so just take this as but one example of what is possible. As with many other techniques it has taken a while to hone, so the key is to

perform your own experiments and take inspiration from other sources.

First, the image is converted from greyscale to RGB colour. This doesn't make the picture a colour image to look at, but out of the one original greyscale channel, it creates three identical colour channels ("colour layers")—one for the Red, Green and Blue composite of a (RGB) colour picture. So far, each one is identical to the original grey

one but once we start making them differ the composite image also changes. See figure 7 for how the three channels look - the resulting composite picture on the top makes up the image.

### The trick

The trick is *not* to work in the composite image - as we usually do with our image-editors - but in the individual colour channels. By darkening or light-

ening areas in a colour channel, for example an object in the image, it changes colour in the composite image. That is how the colours on image 9 appear. The tools we use for this are *dodge, burn and sponge*. See figure 13 and 14)

Select an appropriate diameter for the tool and start carefully dabbing the area or object you wish to colour. Applying dodge, burn and sponge will respective-

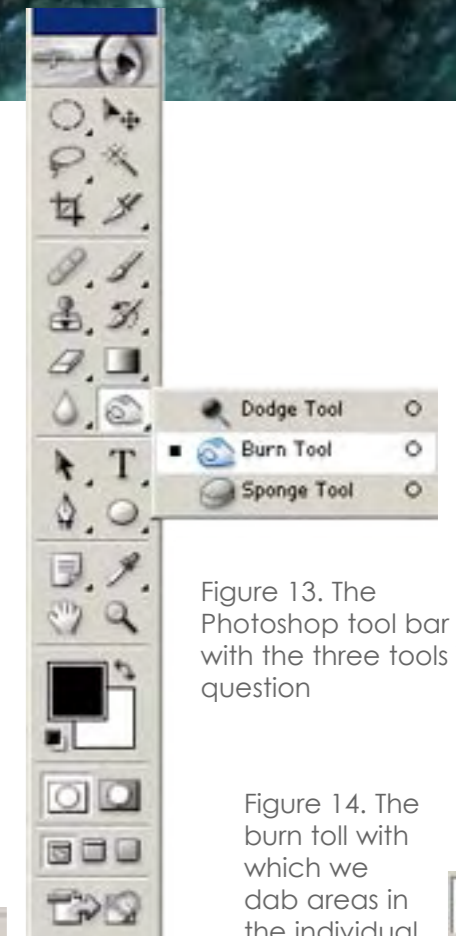


Figure 13. The Photoshop tool bar with the three tools in question

### Why not use Auto Contrast Auto Colour and Auto Levels?

Why bother correcting images manually when there are a number of automated functions that seems to do the trick? Because they often degrade the image in the proces. Below is greyscale. It is actually

not the entirely smooth gradual transition it looks like but 256 tones of grey. A greyscale image is represented by 256 tones and a (RGB) colour image is likewise composed of 256\*256\*256 - once for each colour giving ~1.7 million possible colour combinations. In a way, in Photoshopm a picture is nothing but a huge table in which each pixel is represented by these 256\*256\*256 values.

### The histogram

A histogram (see figure 15b) shows which values are represented in the greyscale image or, in the case of colour images, which values are represented in the Red, Green and Blue channels respectively.

Now, on a picture that is correctly exposed or scanned, most values should be represented along the scale, the values to

the left are the shadows and those on the right are the highlights. If the values are missing at the end it means that either the motif lacks shadows and/or highlights - or, more commonly, the reproduction does and it looks dull. What the

Auto levels or Auto contrast function do is just to stretch the histogram. Thereby all the values shift in a somewhat degrading process that does not ad any new info to the image. The result is the characteristic jagged histogram below. ▶

Figure 15a. Greyscale



Figure 15b +c. Histograms

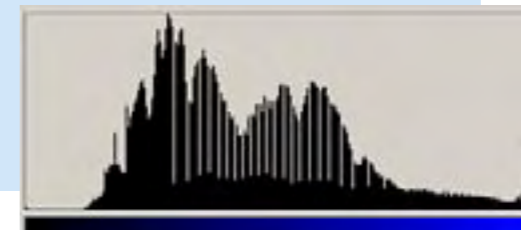
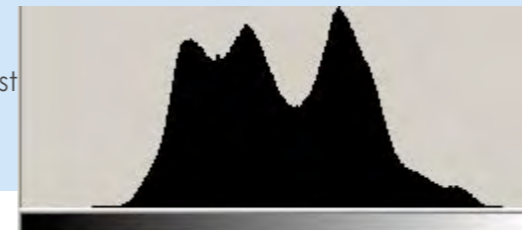


Figure 14. The burn toll with which we dab areas in the individual channels to produce the above effects



(By the way, the blue bar, under figure 15c shows that this histogram represents the Blue channel in a colour image)

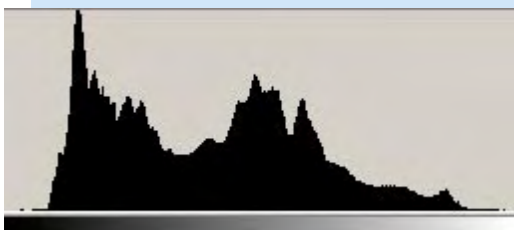


Figure 15e. A "healthy" histogram showing values across almost of the greyscale, typical of a correctly exposed picture of most "real-life" subjects.

### What to use instead

There are a number of options available, which all have that in common that they enhance what is already there or add something.

One good tool is *Curves* which can be used to enhance the spectrum in selected areas, yet in a smooth way. This method is non-destructive and, in principle, reversible.

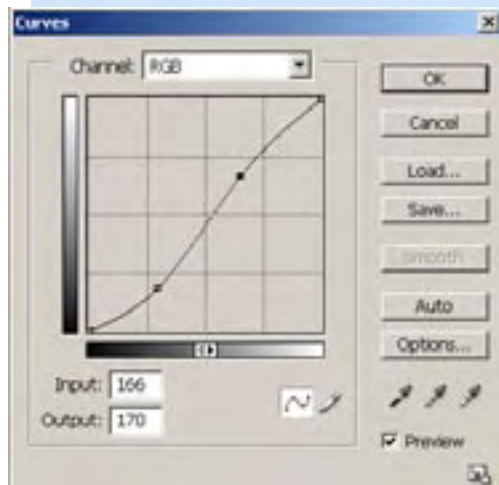


Figure 15d. The *Curves* menu. Drag the curve in the middle and see how certain parts of your image gets stronger or attenuated

Another good, and easy, tool to experiment with is *Variations* which tint the whole image gently—see the transition from figure 9 to 10.

Figure 16. RGB colours revealed. This is a close-up photo of a computer monitor. See how every colour is blend of Red, Green and Blue pixels lighting up at various intensities (256 for each colour)



ly lighten, darken or weaken the colour. Experiment! If you activate the little eye symbol at the composite channel you can follow the overall result while working in just one channel. Find another object, choose another channel and another tool and see what happens then. By applying this dabbing technique I turned the black and white picture on fig 8 into fig 9. So far, so good. But isn't the background a little dull too?

### Doing the background

To get to figure 10, I darkened the lower left corner by enhancing the midtones here but only in the blue channel whereby the overall ambience turned more blue and sea-like. On figure 11, I applied the "lens flare" filter to enhance the diver's torch. And finally, to get to the end result in figure 12, I cropped some more of the top to get rid of some light water. Voila!

The motif, by the way, is the wreck on Brothers Island (Red Sea) taken on Agfa Scala 200, the black and white slide film.

### And the conclusion is...

Image manipulation is definitely ok—as long as we honestly declared that we have done so and are not deceptive. It can often make an image much more exciting, though chasing effects for effects own sake is meaningless. Do it with a purpose. Use effects and style to convey a certain interpretation of reality. In essence say "try and look at this situation, subject or scenario this way". Think of what Vincent van Gogh did. His images are not realistic in a photographic-naturalistic sense. But what a punch they pack!



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“Viribus Unitis” An Austro-Hungarian battleship sunk by frogmen during WW1. Old Postcard, unknown source.

During the first years of World War II Italian frogmen demonstrated to the world how effective a weapon a frogman could be. Hidden by the water, these frogmen mined the Allies’ ships as they were moored ‘safely’ in their own waters.



in their harbours, surrounded by mine-fields and anti-submarine nets. This passivity was, in the main, due to the ongoing submarine war.

In 1915, after Italy had severed its connections with its German and Austrian allies, and joined the English-French Alliance, Italian naval officers had thought long and hard about how the Austro-Hungarian fleet could be attacked in the harbour.



# The First Frogmen

By Sven Erik Jørgensen - The Danish Society of Diving History



Even with quite small numbers, and using relatively small resources, the frogmen were a very powerful force. The English, especially, were quick to copy the equipment and train their own frogmen, and after the war many nations supplemented their armed forces with frogmen units.

The idea of such a weapon arose in World War I, when experiments were carried out using different vessels to carry mines into the Austro-Hungarian naval base in Pola. The weapon was developed during the inter-war years

## 1915

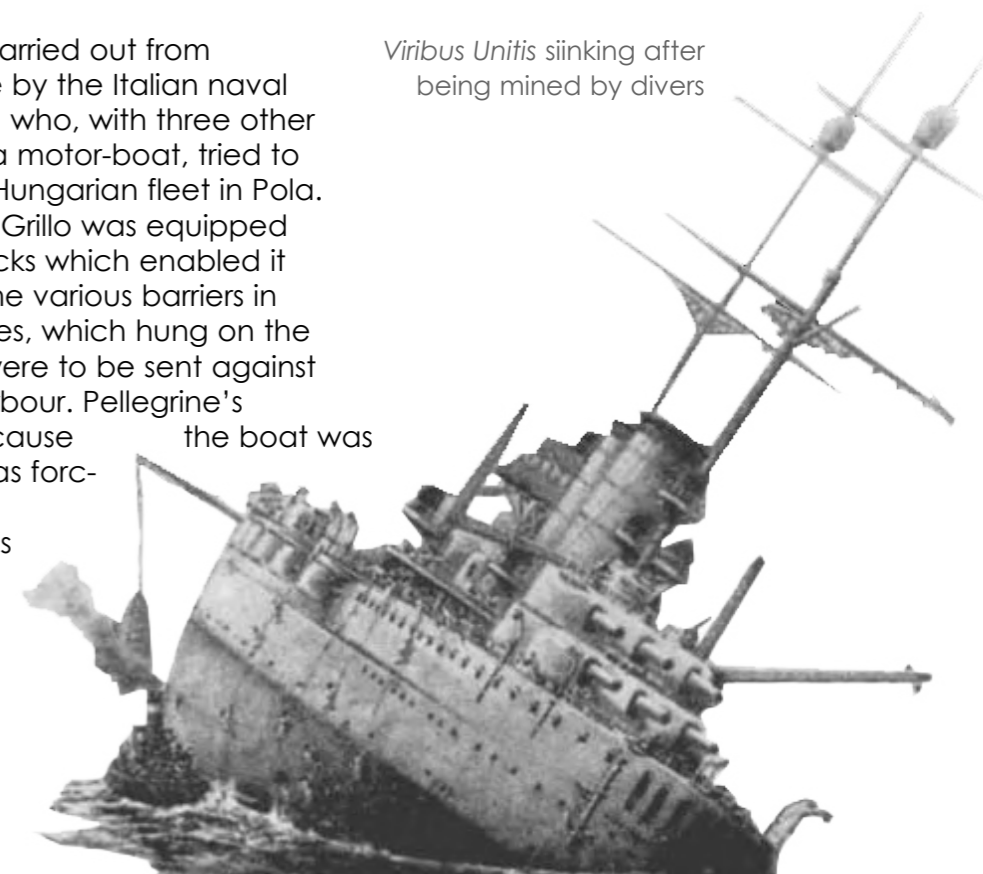
While the war was raging on the battlefields of Europe, and submarines were terrorising the ships on the high seas, the Austro-Hungarian fleet and Italian fleet lay mostly well protected

The first attempt, carried out from Venice, was made by the Italian naval captain Pellegrine, who, with three other crew members in a motor-boat, tried to attack the Austro-Hungarian fleet in Pola.

Pellegrine's boat Grillo was equipped with caterpillar tracks which enabled it to crawl up over the various barriers in Pola. Two torpedoes, which hung on the side of the boat, were to be sent against the ships in the harbour. Pellegrine's attempt failed because the boat was discovered as it was forcing a barrier.

Pellegrine and his crew spent the rest of the war in captivity.

Viribus Unitis sinking after being mined by divers



Two attack divers astride a SLC - Siluro a Lenta Corsa (slowly moving torpedo)



Naval-lieutenant  
Raffaele Paolucci

Pola, or Pula, lies at the tip of the peninsula of Istria, now in Croatia, at the top of the Adriatic sea

1918 whereby he was to be transported by motorboat to about a sea-mile out of Pola. From here he would swim into the harbour towing a mine.

Under one of the battleships he would tie a four meter-long rope to the mine and thereafter sink it by letting the air out of its two floatation tanks. The other end of the rope was to be fixed to the hull of the ship.

The mine, which contained about 100 kg of TNT, had an automatic timer, and would explode in about 4 meters of water close to the side of the ship. As soon as the mine was activated Paolucci would

swim out of the harbour towards the outer breakwater and wait for the explosion. He would then swim out to sea and, with his back to the enemy, signal to the motorboat to pick him up.

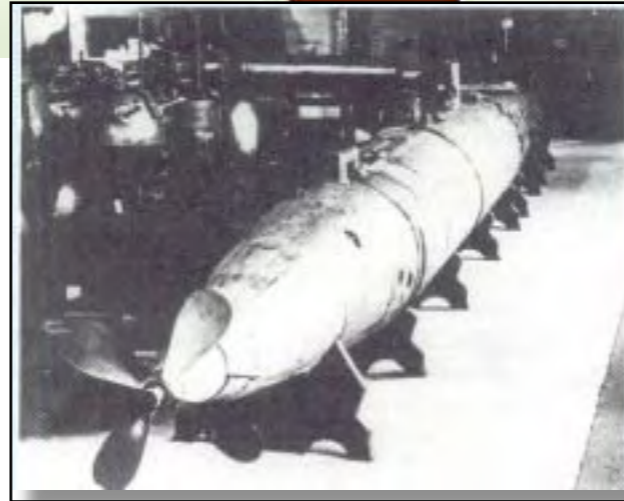
### Mignatta

After months of nocturnal swimming near Venice, towing a mock-up of the mine, he abandoned the project.

Simultaneously with the efforts of Paolucci, Italian engineer and naval officer Raffaele Rossetti was working on a modified com-



Mignatta, a compressed air minisub for carrying divers

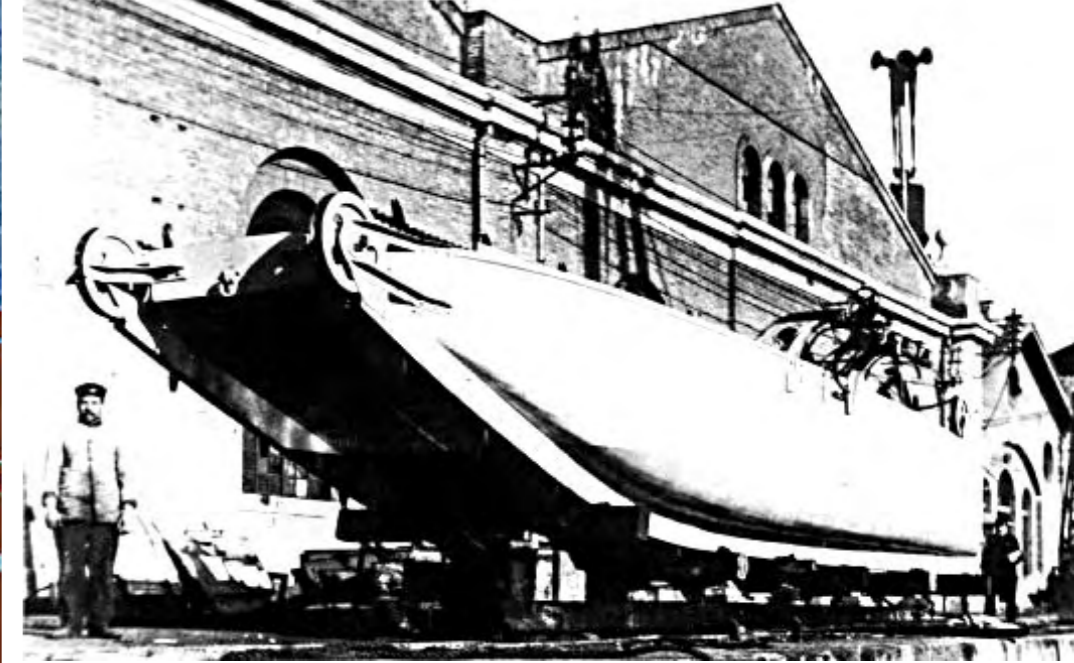


pressed-air torpedo, named *Mignatta*, which, half-submerged, would carry him and another crew member into Pola. The men, in diving suits, would sit astride the torpedo and steer it into the harbour and thereafter over to one of the battleships. Two mines, each of 170 kg TNT, were fixed to the head of the torpedo. The mines were to be hung in a 4 meter-long rope under one of the battleships. Rosetti had constructed a powerful magnet which should keep the rope fixed to the side of the ship.

ready for action. Two models of Mignatta were built, S1 and S2.

### Now or never

However, in October 1918, an armistice was in the offing, and it was obvious that it was now or never if the Mignatta was to see action. In the evening of 31 October, 1918, a motortorpedo boat from Venice set sail for Pola. On board were Paolucci and Rossetti and, on the deck, the S2 and a motorboat which would carry the two men and the



Pellegine's boat Grillo was equipped with caterpillar tracks which enabled it to crawl up over the various barriers in Pola

Captain Constanzo Ciano had been watching the efforts of the two men, and asked them to cooperate with him in completing the project with Mignatta. This cooperation soon proved to be effective, and after several tests and modifications Mignatta was

Mignatta close in to Pola. At 22.13 the S2 was released from the motorboat and sailed in to Pola, which was reached at 02.00 on 1 November, 1918. In the harbour the two men passed three anti-submarine nets by pulling the S2 over them.

Once inside the harbour they steered in between two illuminated battleships and directly towards the 21000 ton battleship *Viribus Unitis*. They fixed one of the mines and then rapidly sailed away – leaving a trail of silvery bubbles.

On their course away from the battleship they were discovered, but before being taken prisoner they had managed to arm the second mine, and then left the Mignatta to its own devices. It wandered around in the harbour, and when the compressed-air was exhausted it finally came to rest against one of the ships.

### War's over - well almost

That they were not discovered before was due to the fact that it was a day

### Targetting Pola

The desire to hit the Austro-Hungarian fleet in Pola was, however, undiminished, and much thought was put into possible solutions. Naval-lieutenant Raffaele Paolucci worked out a plan in

Limpret mine being fixed to the bottom of a vessel



Sideview of the Mignatta

## Dive History



The only known picture of the *Viribus Unitis* sinking

of festivity in the harbour, where they were celebrating the capitulation of the Austro-Hungarian fleet, which had been handed over to the South Slavic National Council. However, Paolucci and Rossetti had no knowledge of this, and, at 06.20, the mine that was placed four meters under the waterline of the *Viribus Unitis* exploded. A quarter of an hour later the battleship rolled over and sank.

That it could go so completely wrong was due to the fact that there was

thought to be no reason to keep the watertight doors closed. Immediately after this first explosion a second explosion was heard. It was the second mine, still attached to the *Mignatta*, that exploded directly against the side of the 7000 ton freighter *Wien*, and sent her to the bottom. Ten days after *Viribus Unitis* had been sunk Germany accepted the Armistice conditions, and World War I was brought to a close.

### New weaponry

The attack at Pola was a success – the Italian fleet had obtained insight into a new weapon. The weaknesses of the weapon were that the crew were visible above the surface of the water, and that the compressed-air torpedo sent out a stream of air-bubbles. These deficiencies would have to be corrected so that an attack could be carried out with the torpedo and crew completely submerged, and without air-bubbles giving evidence of the attack.

### The interwar years

In the inter-war years another alliance was formed, an alliance in which Italy was not allied with England. Italy felt itself squeezed between the English fleet in Alexandria and the French fleet in Toulon. That England could rapidly reinforce their Mediterranean fleet with units from their Atlantic fleet didn't make the Italian frustrations any the less. Italy needed a weapon that could reduce the scope of a possible blockade.

### The First Frogmen

It was two Italian divers and naval officers, Teseo Tesei and Elios Toschi, inspired by Rossetti's *Mignatta*, who would begin the development of the weapon that the world would come to know as "Frogmen". However, before this weapon could be brought into service, diving suits, breathing apparatus and 'torpedoes' had to be developed.

Divers preparing a limpet mine before a mission



### Further developments

Teschi and Tesei served as engineers for the submarines at the naval base at La Spezia. The development and construction of an improved *Mignetta* started in 1935, and in January two prototypes were tested. Later in the year the new weapon was demonstrated, under the strictest secrecy, for the Admiralty in a dock at the La Spezia basin.

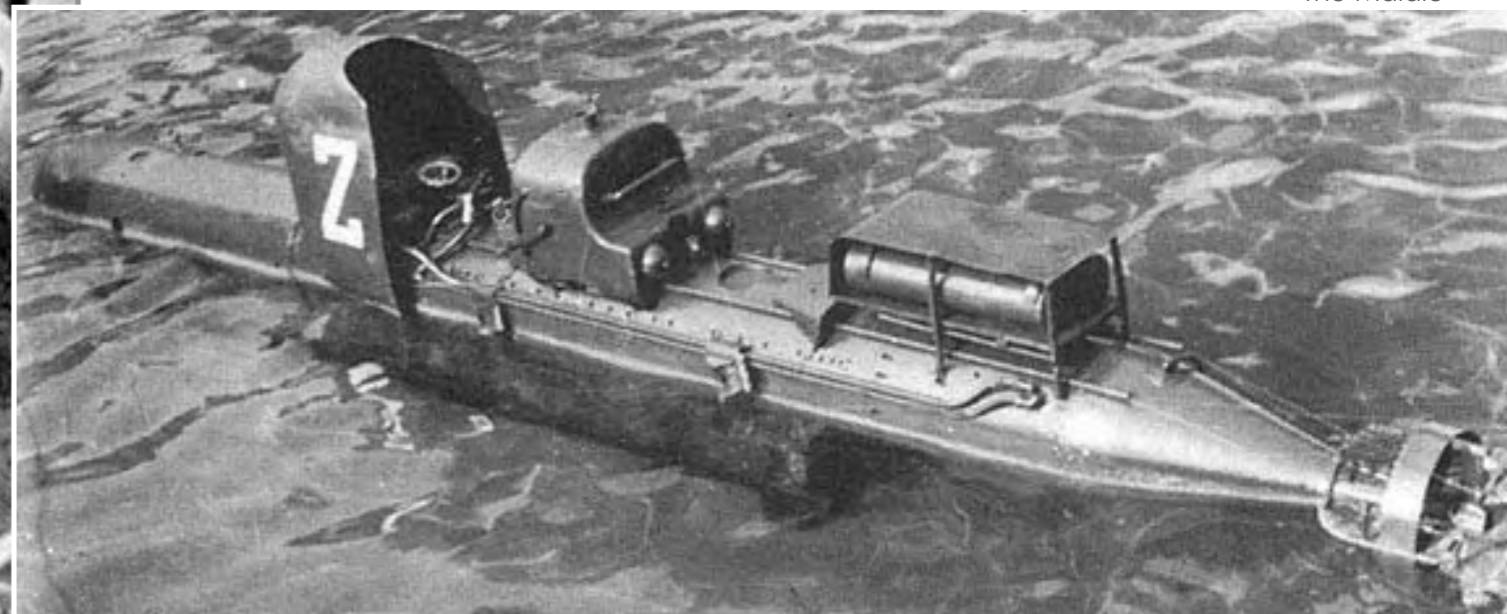
### The Maiale

The weapon mostly resembled a torpedo but was in fact a miniature submarine designated SLC (*Siluro a Lenta Corsa*) with the nickname *Maiale* (the pig). The torpedo was 7.3 m long, including the explosive head, the diameter was 0.53 m, and two frogmen could sit astride it. The compressed-air motor had been replaced by a 1.1 HP electric motor. The power of the motor was later increased to 1.6 HP. In 1935 the explosive weighed 220 kg, but was later increased to 250 kg and thereafter to two amounts of explosive, each of 150 kg. The capacity of the batteries allowed a voyage of 5 seamiles at 2.3 knots or 4 seamiles at 4.5 knots. The torpedo had diving tanks

which permitted the crew to increase or decrease the buoyancy. A separate compartment contained compressed-air tools to cut through a submarine net. A screen in front of the leading frogman protected the crew against the water flow. Behind the screen were the steering controls and the luminous navigation equipment. The maximum diving depth was 40 meters.

The crew wore waterproof Belloni suits (*Vestito Belloni*) constructed by Captain Belloni. The Belloni suit actually consisted of two suits, an inner suit of thin elastic rubber, and an outer suit of heavy can-

The *Maiale*



Italian naval officer Teseo Tesei was one of the developers of a new branch of underwater weapon





The Belloni suit. Picture electronically enhanced from bad original

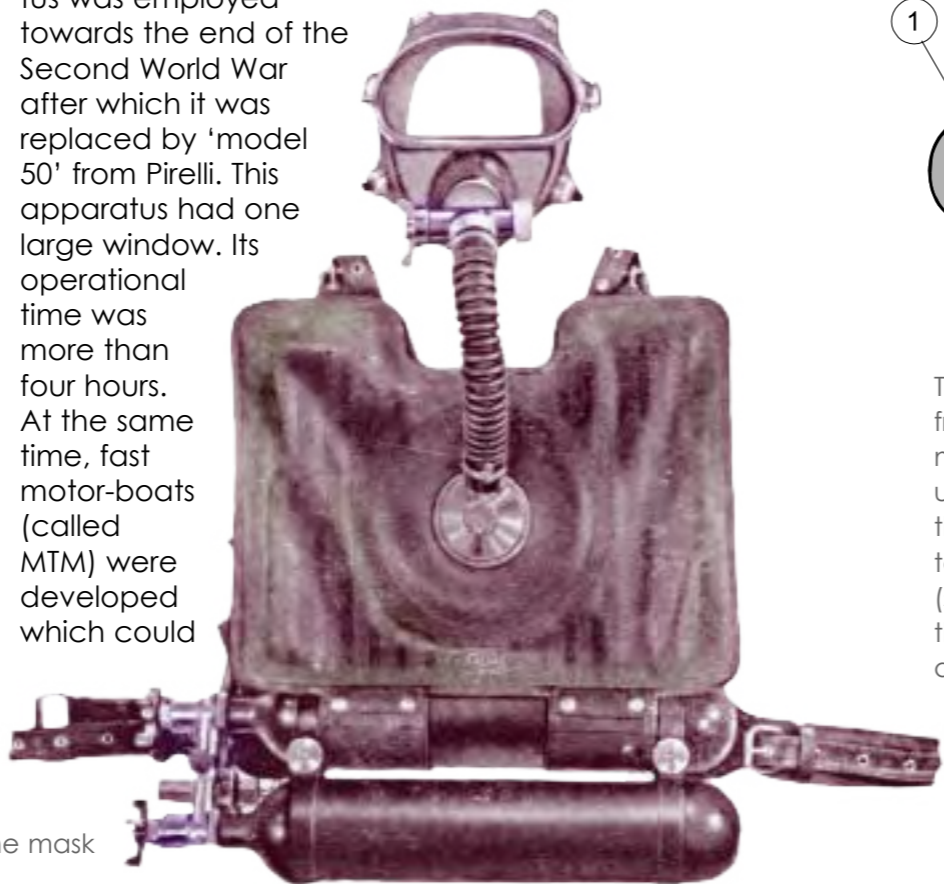
was. The suits collectively comprised a single unit. When worn, the inner suit could only be seen at the wrists of the frogman where the cuffs ensured a close watertight fit, and at the throat where there was also a close watertight fit. In the middle of the stomach there was a buttoned flap in the outer suit. This flap covered the opening to the inner suit. The opening was a round tube of thin rubber which emerged perpendicularly from the inner suit around the stomach of the frogman. This tube was nicknamed 'the kangaroo'. When the frogman was dressed the tube was twisted together to

a watertight closure and hidden behind the flap in the outer suit. This suit was used by the Italian frogmen throughout the whole war. The English made similar suits, and the principle was employed in the first suits that were produced after the war.

### Rebreathers

The breathing equipment that was required in order to sail completely submerged, was initially a modified Davis jacket – an ascent jacket designed for submarine crews. The equipment had a closed-circuit system with manual control of the oxygen, and a potassium cartridge to absorb the carbon-dioxide. Captain Belloni mounted a helmet with two windows onto the equipment and modified it with bigger chalk containers and a bigger oxygen supply, thereby obtaining a greater operational time. Later, a Pirelli daughter-company produced an oxygen apparatus 'model 49' for the unit. Dosing of the oxygen was now continuous, so that the frogmen did not have to keep filling oxygen into the breathing-bags. Model 49 was replaced in 1936 by Model 49/bis. This apparatus was employed

towards the end of the Second World War after which it was replaced by 'model 50' from Pirelli. This apparatus had one large window. Its operational time was more than four hours. At the same time, fast motor-boats (called MTM) were developed which could



The later version, Salvus, of the early adapted ascent jacket turned CCR rebreather. This version has only one window in the mask

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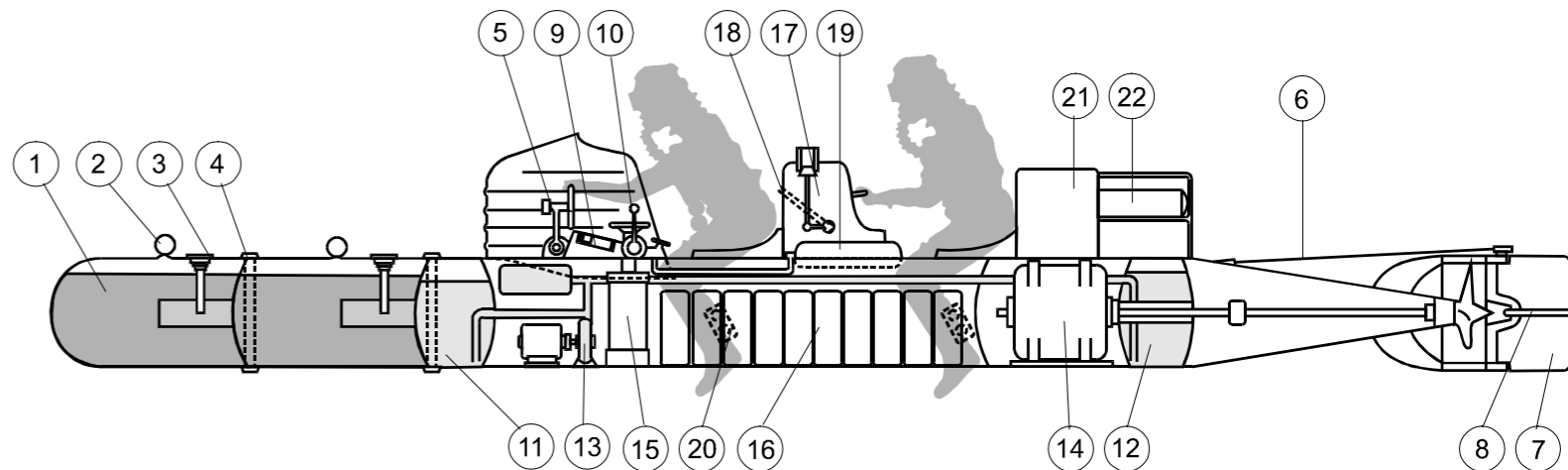
be steered towards enemy ships.

The boat carried a 300 kg explosive charge which detonated on contact with the objective. At an appropriate distance from the target the rudder was to be fixed and the crewman to abandon the boat, which would then continue at

a high speed towards the target.

The training of the crew started with great enthusiasm, but not everyone was convinced of the effectivity of the new weapon – what could two men accomplish against a battleship? Political

opinions regarding the weapons were so strongly diverse that it was necessary to terminate the project, and the torpedoes, equipment and boats at the naval base in La Spezia were hidden well away from curious eyes.



The two mines (1) are fixed to the front. They are held onto the SLC by metalbuckles (4). The mines are hung under enemy ships by wires through the screw eyes (2) and the detonator mechanism (3) activated. 5. Tiller (steering rod), which are connected through wires (6) to rudder (7) and stabiliser (8) controlling the SLC. Console (9) with compass, depth gauge and libelle (measuring angle) Also in same console there is a voltmeter and amperemeter

indicating the engines load and consumption.

10. Lever by which the pump 13 is operated controlling the buoyancy and trim by moving water between ballast tanks (11) and (12). The revolutions of the engine (14) can be controlled by a wheel over the regulator (15) which controls the supply from the batteries (16). Between the frogmen there is a container of air for buoyancy while sailing at the surface (17). In case a rapid descent is desired a valve

(18) is opened whereby the SLC dives. For surfacing the buoyancy can be restored with air from the tank of pressurised air (19).

The frogmen who are subject to a considerable force from the water while sailing are protected by a "windshield" and their legs are held into position by stirrups (20). At the rear there is another buoyancy tank (21) compensating for the weight of the engine and a toolbox (22) with wirecutters, clamps etc.

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### 1938

In 1938 commander Paolo Aloisi was promoted to head of the First Light Flotilla, which consisted of very fast boats. The Ministry also asked Aloisi to take over the torpedos as well as the MTM-boats. Aloisi quickly saw the possibilities in these weapons, and under his leadership both Maiale and the MTM-boats underwent several improvements.

In July 1939 the political situation in Europe was such that it was obvious that a war was imminent. As a consequence of this, the Naval authorities asked Aloisi to accelerate the development of the weapons and begin the training of the crews. The earlier pilots were transferred to the First Light Flotilla together with the new trainees. The carefully selected crew undertook a hard physical training as well as a thorough mental training.

### The elite

Only the absolutely most suitable were accepted. Those that were found not to be suitable were returned to their previous unit with a diving certificate.

The early breathing apparatus model 49/bis - this one with the two windows in the mask

Free-swimming frogmen were also trained, these being designed Gamma-men. Their equipment was modified in several ways in order to make it easier for them move under their own power. The suits were tight-fitting, and they had fins on their feet. The oxygen equipment had a smaller oxygen-cylinder with consequently a shorter operation time. The underwater operation time for the Gamma-men was about 40 minutes. The Gamma-men were trained to cover a distance of 6 – 7 km at a speed of more than 1.5 km per hour. The oxygen equipment was only to be used when they were close to the objective. As camouflage the Gamma-men had a net with seaweed over their heads. It was intended that the Gamma-men should be brought close to the objective by submarine or fast motorboat, or that they should operate from a neutral coast.

### Minelaying

Two types of mine were developed, which the Gamma-men could carry around their necks or in a belt. 'Leech' was a mine with 2 kg of explosive. The mine was held under the ship by means of an inflated rubber bladder which held the mine against the bottom of the ship. When the mine had been placed the Gamma-man activated a detonator which detonated the mine after a given interval.

The other type of mine, the 'Limpet', contained 4.5 kg of explosive, and was fixed to the keel by means of a clamp. The detonation of this mine was arranged so that it would sink the vessel out in the open sea. The point at which the mine would explode was controlled by a



Professor Luigi Ferraro, founder of Technisub, was one of the select Gamma-men and Italian hero.

propeller on the mine. The propeller first began to turn when the speed of the ship was above 4 knots. After a given number of revolutions, which corresponded to a given sailed distance, the mine exploded. The ship was thus sunk where salvaging of the



ship and its cargo was impossible or more complicated than in harbour, and the suspicion of a frogman attack probably did not arise.

It was originally intended that the torpedoes should be launched from amphibious aircraft, but it was the submarines that were given the job. Several submarines had airtight containers fixed to their decks, each of which could hold a torpedo. The containers were intended to protect the torpedoes from damage from depth-bombs and from damage if the submarines were forced down into deeper water.

### In containers on a sub

The submarine crew could either open the containers while the submarine lay awash at the surface, or they could exit from the submarine while it lay on the bottom and thereafter open the containers, pull the torpedoes out and start the operation. Both forms of launch were trained.

Attempts were made with short-wave radios with which the crew could find their way back to the submarine after the operation had been carried out. The trials were not successful and were thereafter dropped. It was realised that it would not be possible to bring the torpedoes and crew back with the submarine. The crew had to find a neutral coast and drop the torpedoes there. That the crew didn't have to worry about getting back to the submarine would give them greater motivation for the operation.

The first practice attacks were carried out at the begin-

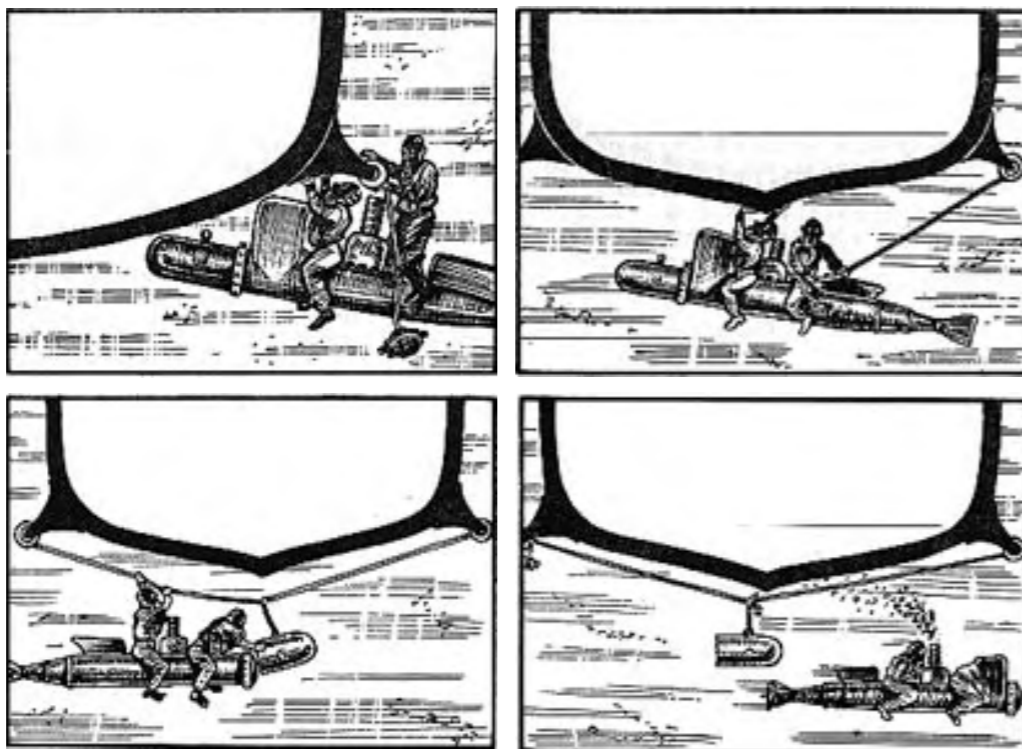


Illustration of laying a mine under an enemy ship. From the Italian Ministry of Defence. See maintext for explanation

ning of 1940. The objective was the cruiser Quarto which was anchored in the bay outside La Spezia. Three Maiales took part in the exercise, two of them broke down and couldn't complete the exercise, but the third managed to place a dummy mine under Quarto.

A two-year break in the work on the weapons and in the training of the crew meant that the weapons were not fully devel-

oped when Italy declared war on England on 10 June 1940. The first attack with Maiale should have taken place on the night between the 25 and 26 August 1940 against the English warships in the bay of Alexandria – but things turned out quite differently from what the Italians had hoped.

To be continued in our next issue



Italian Submarine Scire in the port of La Spezia with containers for two SLCs mounted on her deck

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Date: March 2002  
ISBN: 0340806303  
Price: GB£40.00

A clinically authoritative guide to all aspects of diving medicine, Diving and Subaquatic Medicine encompasses the full range of diving disorders suffered by both amateur and professional deep sea divers. The authors present each medical disorder from historical, etiological, clinical, pathological, therapeutic and preventive perspectives. Case histories are provided with accompanying illustrations, boxed summaries and key points for quick reference. Beginning divers and students of dive medicine will find the book invaluable reading with its introductory chapters on physiology, physics and equipment. The latest research and diving data as well as newly described dive diseases, current diving trends and equipment, free and indigenous diving, and comprehensive appendices with vital diving data are included in the new edition.

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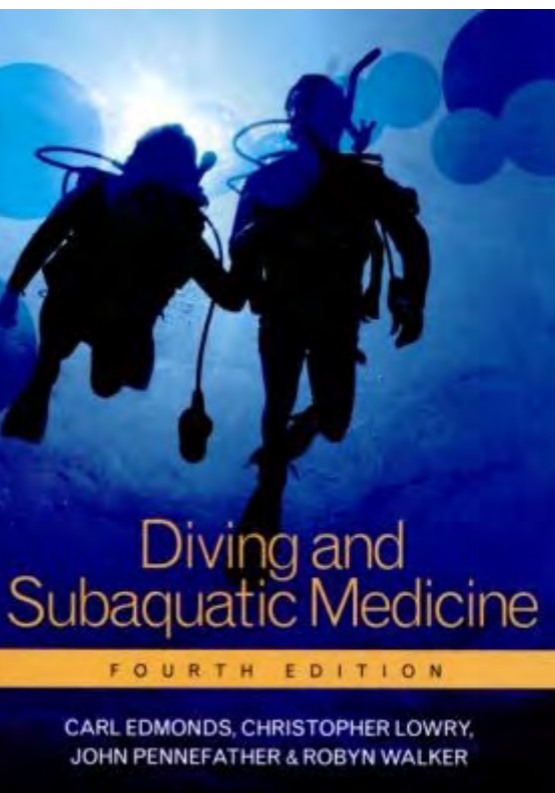


### The Devil's Teeth

A True Story of Obsession and Survival Among America's Great White Sharks

by Susan Casey  
Hardcover: 304 pages  
Publisher: Henry Holt and Co.  
Date: June 2005  
ISBN: 0-8050-7581-X  
Price: US\$25.00

Combining adventure, reflection, humour and natural history, author and former Time editor Susan Casey brings to life a story that takes the reader on a wild ride around dangerous islands near San Francisco that have resisted civilization for over two hundred years. At the centre of her story are the sharks of the Farallon Islands and her obsession to learn more



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## Movies



### The Cave

Director: Bruce Hunt

Writers: Michael Steinberg, Tegan West

Company: Columbia Pictures

Cast: Morris Chestnut, Eddie Cibrian, Kieran Darcy-Smith, Cole Hauser, Lena Headey, Marcel Iures, Daniel Dae Kim, Piper Perabo, Rick Ravanello

Length: 1 hour 37 minutes

Hired by a team of scientists who stumble upon the ruins of a 13th century abbey built over the entrance to a giant underground cave, a group of thrill-seeking professional cave divers travel to Romania with the latest equipment to investigate the depths of the cave system. Stranded in the cave when it suddenly collapses, the explorers find themselves not just in a new eco-system, but victims of a phenomenon that mysteriously mutates them into primeval beings.

[www.sonypictures.com](http://www.sonypictures.com)





Text and photos by Andrey Bizyukin, PhD

Italian Luigi Ferraro had already used his top secret military closed circuit rebreather for years when Jacques-Yves Cousteau performed his first dive with his new aqualung in 1943. Being

one of the first frogmen he had an intimate knowledge about cutting edge dive equipment. Applying his requirements and ideas to recreational diving, he then went on to create Technisub.

## The Story Technisub



### Underwater Technologies in Action

At the height of the Second World War, on a dark moonless night on a deserted beach in the Islanderun Bay in Turkey, a secret agent from the Italian special forces is preparing for a dive that has to take place under absolute illegal circumstances. The scenario could be a model for a future James Bond movie. All the necessary ingredients are there. The secret weapons, fins, mask and a black suit, a fancy underwater watch and compass. The diver is also wearing a face mask and diving a closed circuit rebreather carrying with him two mysterious metal containers each weighing 12 kg. In the background, the ghostly silhouettes of enemy ships are barely visible. They are awaiting permission to enter the port.

#### Mysterious explosions

The frogman slips into the water and submerges. The only sounds to be heard are the wind and waves breaking against the rocky shoreline. The moon comes out for a short moment from the clouds that shrouds it only to disappear in an instant. Some hours pass. The lonely diver comes back and emerges from the sea that is already turning gray from an approaching storm. On guard, he looks carefully around, exits the water, takes off his equipment, packs it and disappears into the night. The surf soon erases any telltale footprints left in the sand. The following day goes by and nothing happens. The ships come into port, one by one, to load their cargo of war supplies and go back out. One ship, which is loaded to the brim with enemy transports, is confidently departing the port when she suddenly

blows-up in an enormous explosion that sends her to an early grave in the open sea. The destroyer and mine-sweepers scan the sea in search of enemy submarines or mines but find nothing. Nobody can figure out what just happened, and the sea is good at hiding secrets.

The mysterious attack on the military transport will be published in newspapers in many countries. But the story does not end with this one incident—detonations do not stop, and the ships continue to sink. The port starts to get a bad reputation for being dangerous to approach and for being unpredictable to navigate. Surveillance and patrols around the harbour are increased but do not help.

#### A child of the war

It was on the battlefields of WWII where the story of the Technisub company began with a special group of frogmen, consisting of Italian, German and Japanese military underwater experts who carried out secret operations in neutral countries that didn't take part in the war. Turkey was one such country that didn't officially take part in the war action, but nonetheless was regularly delivering resources to all the warring parties such as iron, chromium and tita-

nium—raw materials of strategic influence on the outcome of the war. Ships from several countries visited Turkey's ports to load ore and metals for their military industry.

Luigi Ferraro, who later went on to found Technisub, was at that time officially an employee of the Italian embassy in Turkey. In his daily life, he used only civilian clothes and carried a diplomatic passport. But in reality, he was a highly trained diver with very special qualifications and a member of a top secret frogmen's group.

As such, he lead a very dangerous life. If the police forces or a military patrol had caught him with his diving equipment, he would certainly have been shot on sight or faced execution as a spy according to the war laws of the time. But he continued to gather military intelligence, and he paid frequent visits to the port. There were so many ships that he frequently spent days on a raid outside



The escorts sweep the sea



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Luigi Ferraro



the port. Luigi Ferraro waited until the weather was right and for an opportunity to swim from a deserted beach to an enemy transport ship with two twelve kilogram bombs. He had to swim one and a half kilometers at night to get to the enemy transport he had selected.

Using his rebreather, he dove in under the vessel to clamp two mines onto the ship's roll stabilizers. It was always an exciting procedure when he pulled out the strap that activated the detonator. But the mines did not go off any time soon. Vessels that were mined might then enter the port to take on cargo before heading out. The mines had a double activation system. The first level of activation was triggered by a high speed flow of water, which meant that the ship had to be moving at speed at sea. This then started a timer, which detonated the mines after a set time, and two powerful explosions would go off. At this time, the vessel would certainly be well out to sea.

### Italian hero

Luigi Ferraro was one of the most successful frogmen of the war and went on to become a legend and a hero awarded Italy's highest military medal for his valour. He had single-handedly mined four enemy transports of which three blew up and sank. After the war, he left the shadowy world of the secret services and returned to a homeland ravaged by war only to find himself unemployed and homeless.

Since he was perfectly trained and skilled for working underwater, he decided to go into the salvaging business clearing the harbour of Genoa, one of the largest in Italy, of wreckage and salvaging ships.

He soon found himself working round the clock as the supervisor of the salvaging operations in the harbour while spending his weekends spear fishing. During one such weekend, he met and became acquainted with another person who also loved the sea and was a keen underwater hunter. It was no other than Nanni Cressi, the future founder of Cressi-sub Empire.

At this time, Nanni used homemade fins crafted by hand from a simple piece of rubber, a mask which he cut from an inner tube of a car wheel, and a homemade underwater gun. Luigi, on the other hand, was already the happy owner of the real fins and the mask made for the navy. Both being avid underwater hunters, they ended up discussing the advantages and shortcomings of their equipment.

It seems unbelievable today, but fins were a top military secret in the Italian Special Forces between 1940 and 1944. When the group of frogmen gathered for their training, they were given their fins by the military police just before they went on a mission, and they had to hand them back immediately after returning from the mission.

### Cofounding Cressi-sub

Nanni Cressi had a completely different background. He came from the banking business, and as a such, he knew something about financing and economy.

Not surprisingly, the two came together and decided to make a joint company in which Mr. Cressi provided the financial means, and Luigi Ferraro was the man with the experience, knowledge and ideas. Their cooperation became so successful that it went on for sixteen years.

During his years working for the Cressi company, Luigi Ferraro invented the first mask ever to be created with a nose, then named "Pinocio", and first fins ever to made with a fullfoot pocket.

### First dive center

Luigi Ferraro realized already in 1948 that manufacturing and sales of equipment were closely tied with the general development and popularization of recreational diving and leisure. Therefore, he created one of the very first dive centers in Italy on Elba Island. His idea was to unite manufacturing, training, sales and marketing under one roof. He organized the first underwater ballet and the first underwater beauty competition. The numbers of scuba diving enthusiasts were growing day by day, and Luigi became very famous.

### Founding Technisub

In 1962, at the age of 48, Luigi Ferraro created his own company. The famous logo with the dividers over a fish is also from 1962. Today, many people are employed at Technisub working with new fin designs, but back then, every inventor was afraid that somebody else would copy their ideas and start producing similar fins. Luigi Ferraro never let any such petty concern stand in his way, and in 1963, he came out with a revolutionary new de-



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The groundbreaking fin *Caravelle* had a detachable blade



sign, the *Caravelle*, with a detachable polypropylene blade and foot pocket of rubber that essentially worked as galoshes. These rubber galoshes made it possible to walk to the shoreline, and then mount the blade onto the galoshes to continue diving. Jacques-Yves Cousteau was so impressed by these fins that he named Luigi the best fin designer in the world.

La Spirotechnique Company supported Technisub financially, and Luigi Ferraro created the Naso mask for them as well as new fins and a underwater harpoon gun named *Jaguar*.

**The James Bond gun**

*Jaguar* was very reliable and never misfired. In those times that was quite unusual. It's reliability was due to phenomenal simplicity—12 parts were all it was made of. It was safe, unproblematic and shot very, very well. That Sean Connery used the *Jaguar* to kill off the bad guys in the movie "Thunderball" didn't do any harm either. It soon became known as James Bond's harpoon gun. La Spirotechnique could not let this opportunity pass and bought a 20 percent stake in Technisub. Thus, since it's early days Technisub has essentially been an Italian-French company.

At the same time, Luigi Ferraro became the exclusive distributor of SPIRO (Aqua Lung) products in Italy. The French partners later increased their share in the business, and in 1982, Paolo Ferraro, Luigi Ferraro's son, became president of the company. Now the most famous Italian diver of all times, Professor Luigi Ferraro is 89 and still leads a very active life. He writes books, meets with friends and it is rarely possible to find him at home. Until only a few years ago, he was still diving.

On his 80th birthday, the Italian Navy honoured him with a grand parade and



From the James Bond movie *Thunderball*

the arrival of a destroyer in Genoa. There was a huge underwater cake, and Spiro-technique made a regulator in pure gold to his honour. But most importantly was the special pride the common Italian citizen took in their famous countryman. The main creation of his life, Luigi's innovative Technisub company, is still among the world's leading manufacturers of underwater equipment.

### Technisub Legends

The current president of the company is Paolo Ferraro. Just as his father, he is in love with the sea. At 22 years old, he became the youngest FIPSAS instructor awarded the highest rating of three stars. Some say, it compares to winning the Olympic gold medal and the Italian

chess championship at same time. For many years, he worked as a federation instructor alongside another Italian sports diving legend, Duilio Marcante. His almost encyclopedic knowledge backed by an immense practical experience achieved through many years of hard training and diving, equips him well to come up with new creative ideas for future products.

### Stratos fins

Paolo Ferraro explains: "The new laying technology combining two materials (rubbers and plastic) was first applied to the manufacture of these unique fins. The blade is made up of a very elastic plastic covered with a thin 1½ mm thick rubber layer giving the fin its unique elastic properties. Originally, it was the idea of our lead designer Gianni Beltrani. We made the first sample, and the result was simply awful. But we kept working at it and began

to combine various types of plastics and rubbers. Eventually, our special technique of rubber high pressure (200 Bar) mould injection was created. Maturing the technology took more than six months, and it was only after conducting thousands of experiments that we found what we were looking for. The most important factor appeared to be an exact ratio between the thickness of plastic and the rubber covering. It took three years from conception until we had the first real

prototype of the Stratos fin ready. At the time, these fins were completely novel. It was a new concept produced by a groundbreaking manufacturing process.

### Field testing

Paolo continues, "We made three types of experimental prototypes of the Stratos fin. One was very soft, one was average and one was very rigid. Each of them were very good fins. But how could we find out what the opinion was on these different models among various people from diving beginners, men and women, and different nationalities of athletes? To find out, we dispatched test samples to America, Germany, Japan, South Africa, New Zealand, France and all over Italy.

All the fins came in black and only differed by the presence of one, two or three small holes in the fin blade. The number of holes was code for the rigidity of the fin. Many people asked us what the meaning of these holes were, but we refused to explain. We just asked people to try the fins and tell us about their opinion and identify which of them they liked the best.

Most of them liked the fins with two holes—fins with medium stiffness. We then understood that this model would become a commercial success. But the most exciting result was a test published by a renowned American dive magazine which discovered Technisub Stratos, branded in America under the name Blade, and recognizing it as one of the best fins in the world. The Stratos and their mass production firmly put Technisub on a pedestal as one of the leading manufacturers of fins."

### Next generation: The Idea3

All sorts of creative ideas emerge in the minds of the designers at

Technisub, so one of the most important decisions is choosing which one to go with. The idea of creating the *Idea* came directly from Paolo Ferraro. Who hasn't been dreaming about moving underwater as freely as a dolphin, a shark or a seal, effortlessly and without too much physical effort? The *Idea3* is the physical manifestation of such an idea and the result of more than three years of scientific research and a rather large investment for such a product.

At Technisub, each prototype fin has to pass weeks of testing in a special apparatus, and only if a whole range of parameters are within an acceptable limits, will it pass for further testing under real conditions. Today, the *Idea3* fin is exhibited at the honorary exhibit of the Leonardo De Vinci museum of scientific and technological achievements in Milan. What is so special about this elegant fin?

### Injection moulding

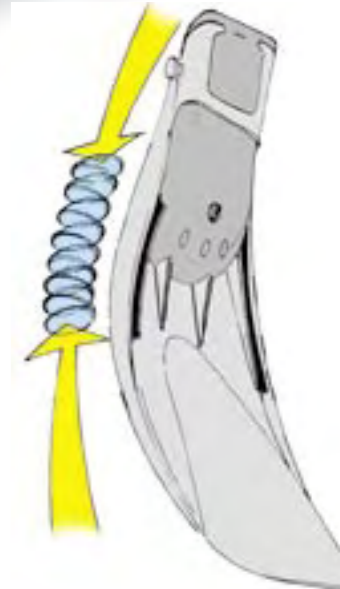
Again the answer lies in a unique injection moulding technology which allows simultaneously injection of three materials with different plastic properties. After polymerization, each material obtains the characteristics pertaining to their function. The thermoplastic soft rubber is responsible for creating the comfort of the foot pocket; the elastic technopolymer in the central section of the blade and the "heart" of the *Idea2* product

provides its variable geometry; and the

stronger and rigid material for the peripheral parts provides the rigidity and structural framework.

The philosophy behind *Idea3* is to provide the maximal effect from a downwards leg stroke with the least possible resistance during the upstroke. In other words, optimizing the ratio "effort demanded / thrust received". The fine performance is said to be down to three factors:

1. The polyelliptic overall geometry which increases the surface of the fin during the kicking phase and prevents turbulent flow over the blade that would produce water resistance.



Stratos



Luigi and Paolo Ferraro

(FIPSAS: Federazione Italiana Pesca Sportiva e Attivita' Subacquee - the Italian Underwater Federation)

# manufacturer

## Technisub masks

The flagship of the company is the *Look* mask, which is already a classic. Millions of these masks have been sold since they came onto the market in 1985. They have proven to be a popular choice all over the world due to their magnificent seals and suitability for all types of faces. The lenses are also very easily replaced by correcting lenses with diopters for the diver who needs glasses.

## Torches Vega and Lumen

VEGA has been a product name since 1965. Vega is the name of one of the brightest stars in the sky, and so Luigi Ferraro's wife thought it would be a suitable name for a dive lamp. The modern Vega is a bright powerful light with reliable nickel-cadmium battery and a tough ergonomic body. *Lumen*, the best known compact torch from Technisub, joins the *Idea* fin in exhibition at Milan's museum of scientific and technological achievements. The compact bright torch fits easily into a BCD pocket.

Annually, Technisub makes hundred thousand fins, masks and snorkels for the Aqualung group. These products seem to be the preferred choice by divers of various nationalities from all corners of blue planet. Technisub certainly does not compromise with their quality requirements. At Technisub, there is no production of the first, second or third class quality products. Only the top quality equipment leaves the premises, and Technisub remains committed to be on the cutting edge of development.

Every year, their engineers come up with new ideas.

Professor Luigi Ferraro with WWII memorabilia. The pins are those he pulled out of the detonators to activate the mines he planted



Sometimes they are small ideas, sometimes they are essential new concepts, but they are constantly introducing new materials and coming up with original technologies ensuring that in the future, we will find Technisub a leader at the forefront of the dive equipment manufacturing industry.

THE AUTHOR AND EDITOR WISHES TO EXPRESS HIS DEEP GRATITUDE TOWARDS MR. PAOLO AND LUIGI FERRARO FOR THEIR KIND ASSISTANCE IN A PREPARING THIS ARTICLE.



2. Lateral rigid edges are filled with rubber. Reduces weight in comparison with any other fin the same size, reduces loading on the legs during navigation and aids performance by working like a spring.

3. Variable geometry of *Idea3* works similarly to a duck's webbed feet. On the downwards stroke, the central part of the fins is curved and scoops a greater volume of water creating a powerful jet effect.

At the upstroke, the blade becomes more streamlined.



Join the cause and save the sharks  
SAY NO TO SHARK FINS  
Sponsored by Celebrate the Sea 2005 Singapore



Shark fin soup is considered a culinary delicacy in Asia. So, every year, millions of sharks are caught by fisherman who cut off their fins and drop the sharks' maimed bodies back into the water, often still alive, to sink to the bottom of the sea and drown a horrible death. Several shark species are approaching extinction. Stop the slaughter.

Say no to Shark Fins: [www.celebratehesea.com](http://www.celebratehesea.com)



# Happy 30th Birthday Jaws!

WWW.WILDWIND.COM

## White Shark sizes

Length at birth from 100– 120cm  
Maximum size around 700cm

Size at sexual maturity:  
Female: 400 – 470cm.  
Male 350 – 600cm

**30 years ago** audiences across the world, even those far removed from the ocean, screamed and jumped from their seats when the movie *Jaws* came to town. I have many fond memories of growing up in Cape Town, jumping into waves from cliff tops, spearfishing in large deep rock pools, and “playing” with baby sand sharks. As now, I then loved the sea, and all its inhabitants.

When *Jaws* was screened I loved this film, not for the gore, the blood, and on-screen loss of life, I just thought that this

shark, the Great White, was the most awesome animal I had ever seen. A combination of power, stealth, and sheer natural beauty. This love affair for this species has been with me since those formative days.

This film's legacy, is a mixed one of creating fear beyond rational thinking, “will I get bitten by a Great White Shark if I go in the water”. To the mass slaughter of all sharks across the globe.

I am pleased to say that today we live in more enlightened times!

## Giving birth to live young

Females taking between 12 and 14 years to reach sexual maturity, males only need 9 to 10 years. Great White sharks are **aplacental viviparous**, meaning that they bare live young without connection to the mother [aplacental] during pregnancy. To obtain enough nutrition whilst inside the womb, embryos feed on other eggs [oophagism]. The number of embryos carried during an average pregnancy is between 2 and 14. It is thought that the average pregnancy gestates between 12 to 14 months with the pregnant female leaving other sharks just before giving birth.

## External Markings

Great white sharks have a black or dark grey colour on their top surfaces and a white underside. The pectoral fins have black tips, on the underside and a black axillary spot where they join the body.

## In cool water

Great whites are found in most oceans between latitudes of 50° and 60° in both hemispheres, preferring cooler waters where they stay close to shore and shallow but they have also been found at depths exceeding 100m.

## Hot bodies

Semi-warm-blooded with their body temperatures, staying about 10-15° C above the ambient water temperature – gives the Great White Shark a tremendous advantage when hunting. With muscles warmed and full of blood

## Great White Sharktales facts

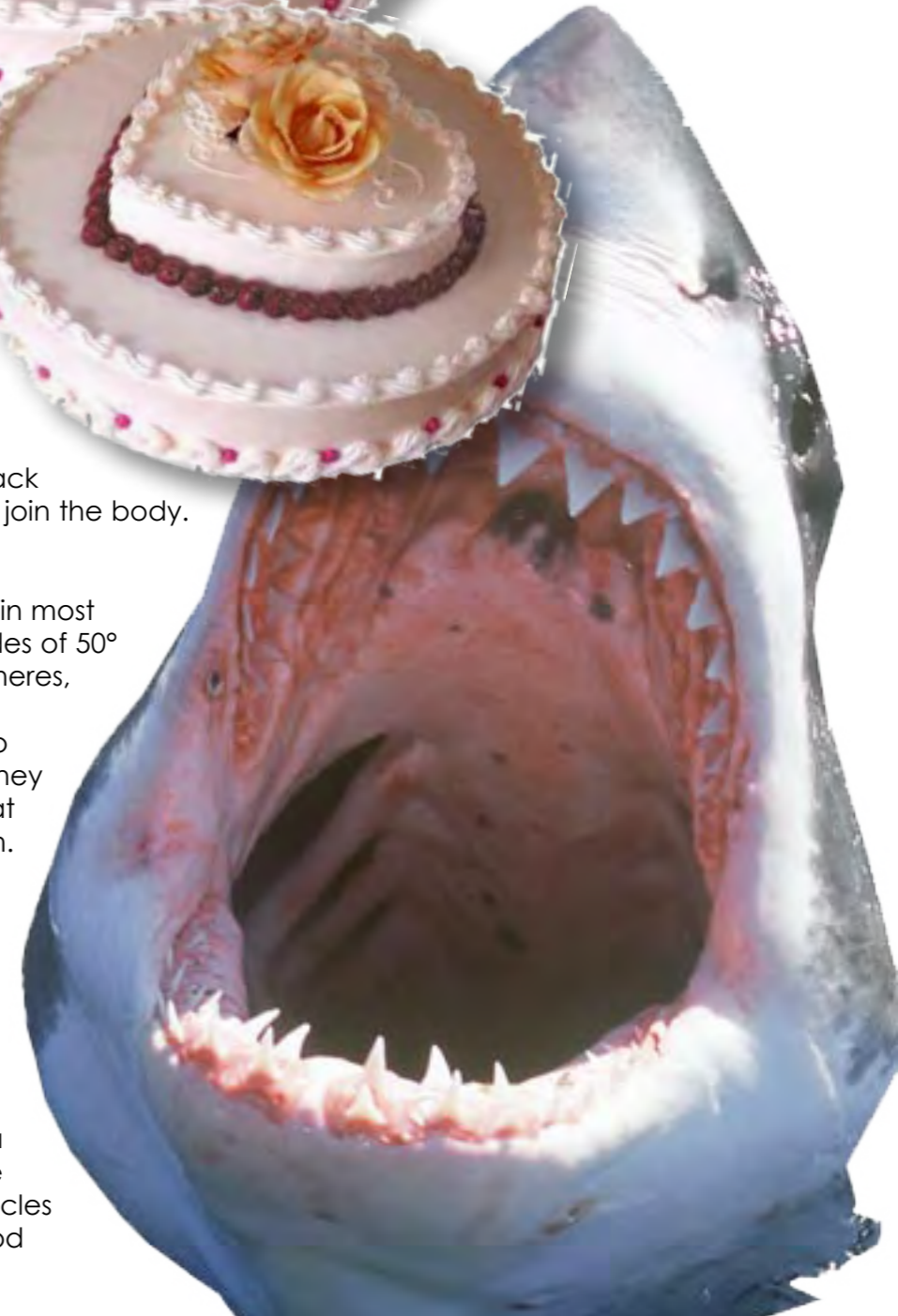
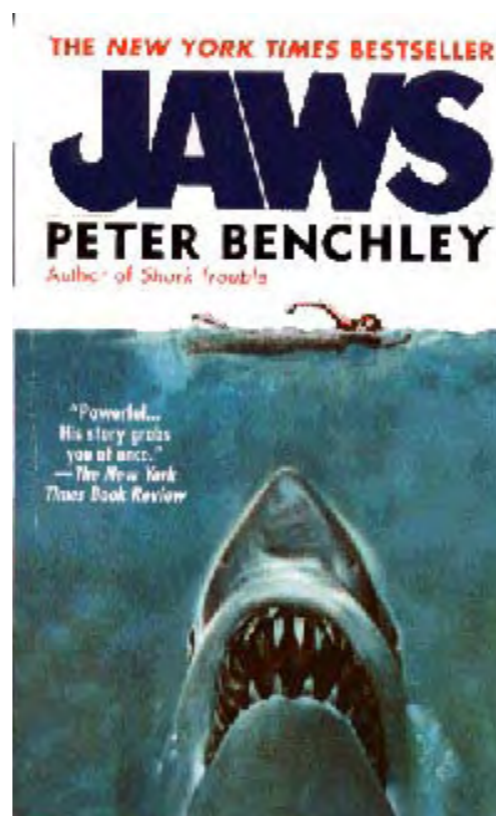
Great White's belong to the Lamnidae family [Mackerel Sharks]

Five species belong to this family Shortfin mako, Longfin mako, Salmon shark, Porbeagle shark, and the Great White. All sharks in this family have a conical snout, lateral keels [one or two] on the peduncle and homocercal tails – the tails upper and lower lower lobe are of equal length.

## Social creatures

Often portrayed as the “lonely hunter” Great Whites are social animals, swimming in groups of 10 or more animals.

Peter Benchley's novel *JAWS* was the beginning of the modern stigmatisation of sharks as evil predators that are better killed. Very much to his later regrets .



despite their large size they can accelerate quickly and reach and maintain for medium distances terrific speed and agility.

This incredible advantage of heat retention due to a special arrangements of blood vessels known as wonder nets or *rete mirabile*. These are found along their flanks, eyes, brain, and intestines. This heat retention and higher body temperature allows muscles to contract faster which results in increased speed and agility in colder waters.

### Hunting

Great Whites have developed hunting strategies that are perfectly adapted to suit their high agility, speed, but poor endurance. Preference for prey is dependent on the individuals, sharks size and season. Smaller great whites mainly feed on fishes, while larger sharks will feed on seals, small whales [infants], other sharks e.g. hammerheads, makos, grey sharks and will sometimes feed on carrion.

### Curious creatures

Great white sharks are very curious, and will often approach and investigate anything it comes across even boats. A great white shark has a personal space

just like people do – have you ever noticed how a loving couple will have mms between them but two guys drinking in a bar will have several inches between their bodies. Great whites also have intimacy zones and will investigate an object or prey gradually.

### Approaching

First they will swim past an object in a straight line keeping eye contact. Then they will do a “frontal checkout” where they will swim directly towards the subject turning and returning to original starting point. Purpose is to create a reaction. Next step is the “lateral checkout” where the shark approaches the subject diagonally and then turns. It appears that the shark knows what side it is on in relation to the subject

When the shark does a “Go Around” it approaches from any direction, swims toward subject at a slight angle, circles and returns to original point of appearance. It may also do what is called “patrolling” - swimming in different patterns [except straight up] mostly at or beyond outer circle.

Then there is “Straight Up – Breaching” where the shark virtually rams the object at high speed from beneath - sometimes clearing the water altogether

### Behaviour Patterns

If you are lucky enough, that a great white gets up close and personal to you, you may observe certain behaviour patterns that will enable you to read the shark’s intentions.

**Eye Roll** – With head and body remaining still, the eye moves and follows the subject.

**Eye Back Roll** – When a shark wants to protect its eye, usually just prior to an attack, or when the eyes passes the water/air barrier, it will roll its eye backwards so that the *sclera* - the protective outer layer - will be exposed protecting the eye itself.

**Jaw Protrusion** – The shark protrudes its upper jaw. This is part of the biting act, often noted when a shark wrangler touches the snout of a great white Shark.

**Repetitive Aerial Gaping [RAG]** – The shark will conduct at least two successive mouth openings and partially closing of the mouth in quick succession. The second opening and closure can occur submerged. This is anticipation behaviour, where the shark expects that there is something within reach of its mouth and

“will hit it” any second know.

**Gaping** – Partially opening its mouth without averting its upper jaw, whilst remaining in position. This can last between a fraction of a second and to several seconds.

*This is a threat behaviour and should be interpreted as a direct threat to oneself. I have on at least two occasions been open water (no cage) and have been on the receiving end of several gapes. Something that is guaranteed to make your life flash before your eyes!*

**Adopt A Shark!** To commemorate Jaws, what better way to give something back by adopting a shark whether it is a Great White or any other species, checkout [www.sharktrust.org](http://www.sharktrust.org) or support conservation charities such as [www.bite-back.com](http://www.bite-back.com).

Next time you jump, dive, swim or scuba in the ocean don’t forget that more people are killed every year by falling coconuts than by shark attacks. We are only visitors to another World governed by different rules enjoy the ocean for all it has to offer.



## RAJA AMPAT LIVEBOARD TOUR WITH THE SMY ONDINA

### PRICES

Sorong-Sorong Trips: *SMY Ondina* standard trip, 10 night trip, 2200 euro; City Seahorse special 11 night charter (limited participation, extra dives, special meals & guides): \$3245 / 2660 euro.

### TRAVEL

Reach Sorong to meet liveboards via Makassar (Ujung Pandang) or Manado in Sulawesi. There are several flights daily. Visitors can also connect from their International flights from Bali or Jakarta. Flights into Sorong require booking through an agent in Indonesia, or through your local dive travel agency who works with an agent in Indonesia. *SMY Ondina's* office in Bali or City Seahorse's agent can book your flight into Sorong.

### REFERENCES

Interesting reading about the culture, fauna and flora of Papua and the Raja Empat Islands:

*The Malay Archipelago* (1869)  
by Alfred Russel Wallace

Illustrated excerpts on the Papua chapters can be found at:

<http://www.papuaweb.org/dlib/bk/wallace/papuan.html>

CHAPTER XXXV: VOYAGE FROM CERAM TO WAIGIOU

CHAPTER XXXVI: WAIGIOU

CHAPTER XXXVII: VOYAGE FROM WAIGIOU TO TERNATE

ABOUT THE LIVEBOARD  
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# City Seahorse



## BLACK WATER DIVING

# Royal Tasmania

Text by Gary Myers  
Photos by Karen Gowlette-Holmes

Tasmania's Southwest National Park and World Heritage Area is the land that time forgot, and most of the civilized world has never heard of Bathurst Harbour. It is the home of the world's oldest living plant, Kings Holly (*Lomatia tasmanica*) discovered in 1934 by the late Deny King, an environmentalist and local legend who lived in the area most of his adult life earning his living mining tin. On the banks of the Old River, bushwalkers able to penetrate the closely guarded secret location can admire a 10,500-year-old Huon Pine Tree. From the bird hide near the Melaleuca airstrip, you can watch the mating dance of a pair of orange bellied parrots, a species which breeds only in this region and has been saved from extinction by volunteers and the Tasmanian Parks and Wildlife Service. Apart from the rare flora and fauna, the landscape is as rugged and spectacular as any wilderness on earth.



Yellow Polyps, *Parazoanthus*

Arial view of Bathurst



Bathurst, Tazmania







Biscuit star, *Tosia australis*

deepwater (100m +) are found in much shallower water due to the low light levels.

In the Bathurst Channel, this phenomenon is enhanced due to Breaksea Island in the mouth of the Channel sheltering the Channel from wave action, so that the seafloor in the Channel is not only dark, it is also relatively calm—mimicking conditions on the “shelf-break”, the edge of the continental shelf and upper slope in depths of 80-200m, and the marine life we find living in the Bathurst Channel is typical “shelf-break” species. The Bathurst Channel/Harbour area is unique in a world context, a

place where the unique southern Australian shelf-break species can be seen and studied in safe diving depths.

### The first expedition

On our first expedition in 2002 for a smaller Japanese television company, we spent ten days diving and filming in almost perfect conditions. All equipment and personal were flown into the remote Melaleuca airstrip. Seven Cessna flights transported the team of eight Japanese, two Eaglehawk Dive Centre staff and the two Southern Explorer crew. It was a logistical drudge with the weather playing a significant

part in delaying our departure from Hobart for the best part of two days. Flying conditions can change within minutes of locating the isolated airstrip adding unnecessary cost by returning to Hobart.

This expedition was different from many points of view: bigger budget, smaller crew, and most importantly, departing Hobart aboard the vessel we were to use for the duration of the stay in Bathurst Harbour. The abalone mother ship *ODALISQUE* was our chosen live aboard. She is a modern 18-metre aluminum vessel able to accommodate 12 passengers and crew in comfort, a large

## Tasmania

But having set the scene in this remote corner of Tasmania's world heritage area, we were not here for any of the above. We were on a mission for Japanese television, filming a documentary about the impact of the tannin-stained freshwater layer on the marine life that exists below it in Bathurst Harbour. Eaglehawk Dive Centre has conducted two successful underwater filming expeditions into this unique location. Both of these expeditions were adventures that most mere mortals only dream about. This story is of our most recent expedition with the Japanese national public broadcaster NHK / Science and Environment Division.

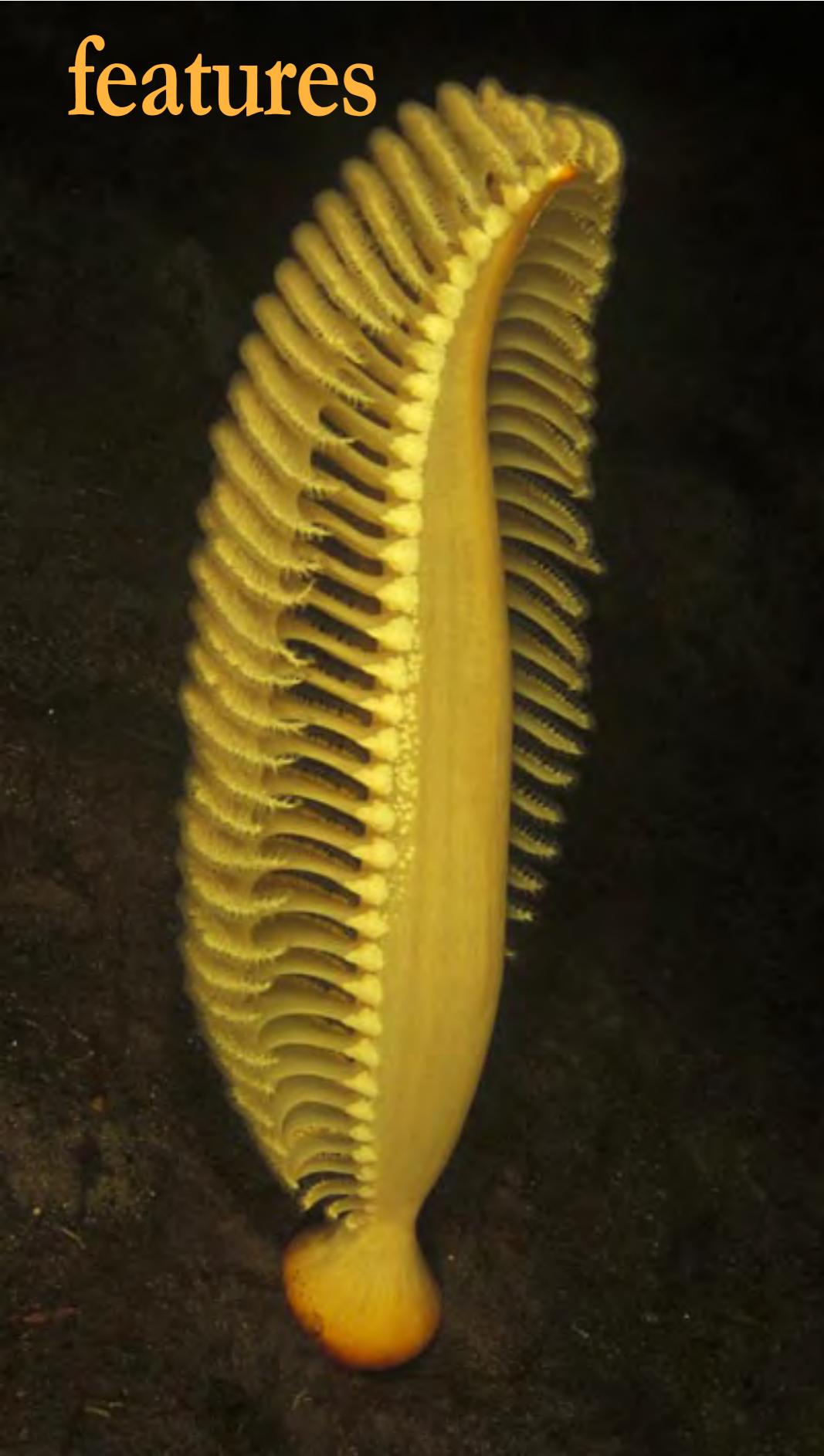
### The Territory

Port Davey and Bathurst Harbour makes up a large and ecologically significant part of the Tasmanian World Heritage

Area. The TWHA covers 20 percent of the Island State and encompasses a greater breadth of natural and cultural values than any other World Heritage Area on Earth, according to the Tasmanian Department Primary Industries Water and the Environment (DPIWE). The waterways were formed as the sea level rose after the last ice age flooding the river valleys with seawater, and the huge volume of black, tannin-stained freshwater flowing from the numerous rivers forming a dark freshwater layer over the top of the seawater. The freshwater layer, usually 2-6m thick, is so dark from the tannin that little light penetrates it. Below the tannin layer, the seawater is very clear but dark even on the sunniest of days, the light levels are so low that you cannot see without dive torches. This gives rise to a rare phenomenon called “deep water emergence”, where species usually found in



Basket star, *Conocladus australis*



ABOVE: Detail view of a sea pen, *Sarcoptilus grandis*  
TOP LEFT: Garden of sea pens with seastar



## Tasmania

back deck with cradles for 15ft and 17ft aluminum dinghies, and two holds that kept our equipment and extra provisions below deck out of the weather.

The expected duration of twenty days in the wilderness required extensive and careful planning. To cater for five Japanese, two marine biologists, myself as dive guide and the *ODALISQUE*'s crew of three (skipper, deckhand and cook) in a remote region that can only be reached by sea or light aircraft and is subject to extremes in weather, we had to be very well organized. We even took a washing machine. While the Japanese were over-equipped not knowing the isolation of the location, we managed to find a place to

stow everything and to sail from Hobart at the appointed time. We had advised the film crew that we might have to wait in Recherché Bay if the weather on the south coast was as bad as forecasted by the Bureau of Meteorology. It was a little lumpy rounding Whale Head, but the vessel handled it well, and only a couple of the film crew took to their bunks.

We made a brief stop at Maatsuyker Island to film the huge colony of between 1000-1500 Australian fur seals at The Needles on the south side of the majestic rock that is home to a couple of volunteers who look after the heritage-listed light house and buildings.

The whole expedition nearly finished on that

first day when Tomita, the cameraman, nearly drowned his digital beta-cam camera while traveling at dangerous speed in the dinghy in pursuit of a shot. Despite the conditions, Tom still managed to shoot some useable footage before the journey westward continued.

After a journey of about eight-hours from Hobart that included the stop at Maatsuyker Island, we entered beautiful Spain Bay near the entrance to the Bathurst Channel an hour before sunset and anchored for the night. Our chef, Johnno, knocked up a first class meal, and we were in bed reasonably early expectating an early start and a busy first day in Bathurst Harbour.

Karen Gowlett-Holmes, one of Eaglehawk



LEFT TO RIGHT:  
*Botrylloides leachii*;

Bryozoa  
*Adeonellopsis*;

Nudibranchs  
*Dermatobranchus*

BELOW: Bramble  
coral community

Dive Centre's marine biologists, and I were acting as guides for this expedition. Karen had done a number of scientific research field trips to the area with CSIRO prior to our last filming expedition the previous year. I had worked in the area on several occasions during my ten years as an abalone diver. So, we were well acquainted with the difficulties of extended diving in such a remote location.

### The Bathurst Channel

The Bathurst Channel has several heavily wooded islands that offer shallow water diving in beds of sea whips as shallow as 4m depth—these are usually at least 35m deep. We had a surprise when we entered the water—we found that the tannin layer was almost non-existent.

There had been a prolonged drought in the area, which usually has rain virtually every day, and the flow of tannin-stained water from the surrounding rivers had dropped to a trickle. Usually, this site has a four to five metre deep dense tannin layer (like very strong black coffee) that blocks out all daylight and makes each dive as dark as night, but this time the tannin layer had become very diluted (looked like weak tea) and at depth, it had the appearance of diving on a dull day.

We had a run of superb weather for

the next three or four days but this failed to impress the film crew as the tannin wasn't dark enough, wasn't thick enough and the animals were too few or too uncooperative. Having seen the finish documentary from the previous expedition they were under pressure to produce a superior product. It was difficult for them to cope with lack of tannin, and at times, the mood among the film crew became quite explosive.

But then the rain came, and came and kept coming for the next ten days. This created another set of problems, but it also gave the film crew a great example of how this bizarre ecosystem originates.

The falling rain soaks into the damp button grass plains that act as a big living sponge. The water has to flow through these marshy plains to reach the rivers and the sea. The decaying sponge-like peat below the living grass is in a constant state of decomposition. The rain saturates the damp plains and water starts to flow from every crack and crevice into every creek, river and eventually the harbour itself.

On its' journey through this giant tea bag, the water colour darkens. Within 24 hours, the surface of the harbour was as black as the night sky. The film crew's black mood lifted as if it was being transferred to the surrounding environment. The wind blew a gale and the

conditions were generally appalling, but we were here to dive, and dive we did!

### Diving in tannin

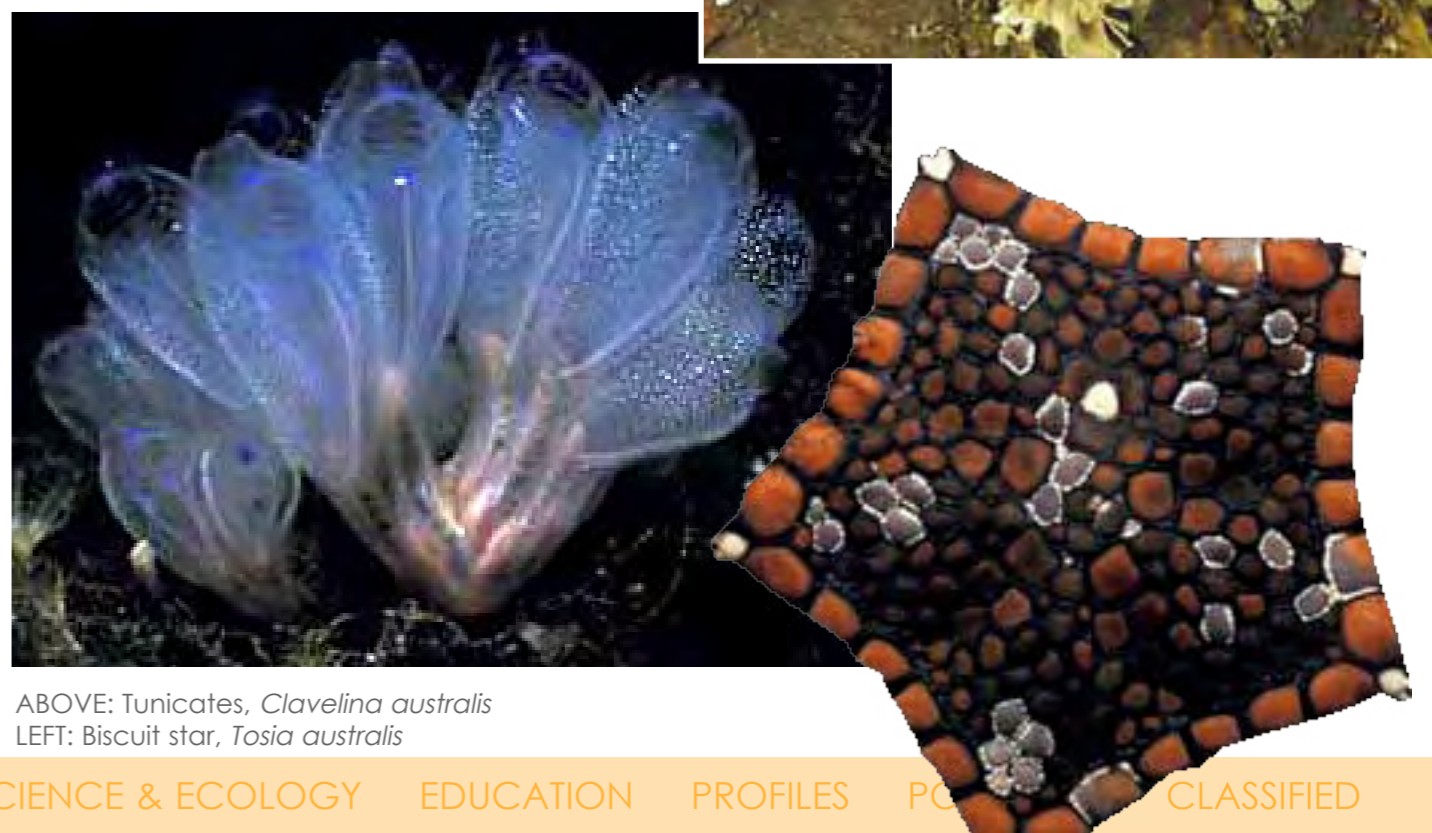
Dropping over the side of the dinghy into the dark tannin layer can be rather daunting for those who have never experienced it before. Karen was first away while I geared up the two Japanese divers and over the side they went with me following minutes later.

As I descended through the tannin, all sound had ceased except for that of my exhalation bubbles. Visibility seemed absolutely zero then at about three metres. I saw red lights below and off to my left. Then, I was into the clear salt water below the tannin layer. I flicked on my video light and circled the divers, watching them but avoiding the bottom silt, which I knew would lift like dust in wind if any part of my body or equipment touched it.

As I moved past the scene of silhouetted divers motionless behind the video lights, I imagined I was on the set of an X-Files movie. Dull red glow from the surface above contrasted with the bright scene in front of the stationary video lights on Tomita's camera. Hand held by the divers, roving torch lights flashed this way and that around the dark-as-night perimeter as they each

searched for subjects to study or photograph.

I moved away from them to seek out my own creatures, and as I headed down the slope into the dark, I was amazed to see the scene behind me only grew smaller rather than disappeared. Visibility horizontally was at least 30 metres, but the red surface glow faded away to black above me as I reached a depth of 12 metres. The slope leveled out and sea pens (*Sarcoptilus grandis*) started appearing on the silty bottom.



ABOVE: Tunicates, *Clavelina australis*

LEFT: Biscuit star, *Tosia australis*



## Tasmania



LEFT TO RIGHT:  
*Primnoella grandisquamis*; Ascidian, *Sycozoa pulchra*; Kenya Tree Coral, *Capnella*

rock lobster wandered about as though it was night secure from the threat of predators that would normally be evident in clear sunlit conditions.

### Seapen beds

One of my favorite sites on my previous visit was the seapens beds near Beebey Point. Here, the 6-13 metre bottom was not in total darkness and the ambient light allowed divers to see several metres beyond the range of their lights.

The sea pens, some nearly half a metre tall, stand like sentinels to the ancient world that had existed here in the Precambrian Period more than 700 million years ago. I shot some of my best footage at this location. The Japanese cameraman looked at one sequence of nearly ten minutes following a skate through the forest of seapens with envy, as his subjects that day had not been as co-operative.

The mood at day's end when things went well was nothing short of buoyant. The bar opened, and goodwill and friendly banter made the evening meal a very festive occasion. After several bottles of excellent red wine, we saw some of the results of the day's shooting.

### Forrester Point

The dive teams' first dive at

I saw a light moving away from the main group, so I headed parallel with it towards the seaward side of the island. Here, the current increased, and it was difficult to stay stationary while videoing. The wall and boulders above me were covered with bramble coral, large lace bryzoans and numerous ascidians some of which I hadn't seen before. Below on the silty bottom, the occasional sea pen appeared like something from the "Day of the Triffids".

The day after, we moved from site to site looking for any subject that was worthy, mostly keeping an eye out for the most elusive of marine animals found in the region—the Port Davey Skate—not seen in this area since 1990.

One of the team who had accompanied us on this expedition was CSIRO marine biologist Michelle Treloar who was gathering vital information on this poorly known species. Her research aims to discover their abundance and distribution, whether there is a decline in the area of usable habitat, how vulnerable the species is to fishing pressure and whether populations are stable or declining.

The Maugean, or Port Davey, skate is listed as endangered on both Tasmanian and Commonwealth legislation. It is the world's only entirely estuarine skate and the only Australian skate listed as endangered. It has only been found in two areas, Port Davey-Bathurst Harbour and Macquarie Harbour. This unique skate is easily recognised by its elongated snout. So, filming it in this habitat was one of the main aims of the film crew. Michelle and crewman Dave Denison were spending hours each day searching the inner harbour for this elusive beast.

Diving in a seawhip garden at only 6-8 metres deep, we find scores of basket stars living amongst them and clinging to their whips. They were in various stages of feeding with their arms outstretched. Basket stars usually react to any light by rapidly folding their arms and retreating, but here, having never seen light under the tannin layer, they just continued to feed unless we disturbed them, even when brightly lit with video lights.

Draughtboard sharks, large decorator crabs and southern



TOP TO BOTTOM:  
Southern basketstar, *Conocladus-australis*  
Star polyps, *Clavularia*  
Southern bobtail squid, *Euprymna tasmanica*

BOTTOM LEFT: Australian swellshark, *Cephaloscyllium laticeps*

# features



Tasmania



LEFT TO RIGHT: Colored Tube Anemone, *Cerianthus*; Nudibranch, *Marionia*; Australian swellshark egg; *Sabellastarte australiensis*; The Pot Bellied Seahorse, *Hippocampus bleekeri*  
INSET: Nudibranch, *Janolus*

Forrester Point was in very strong current as the wall drops down to about 25+ metres. This site has a small quantity of sea whips—including one species normally found in 200m+ in the open sea—feathery seafans, soft corals and other creatures that thrive in high current areas. As evidence that others had lived and worked in this region, I picked up a couple of old bottles that appeared to be discarded rubbish from the 1950's.

The diving progressed with the channel giving us good results and interesting subjects. Some areas were off limits for future trips due to their extreme fragility. Beds of soft corals and delicate, fragile lace bryozoans that one lazy fin kick would obliterate exist in the inky black water down the Channel.

Captain Pete decided to tie up at Clayton's Corner inside Kings Point. The Tasmanian Parks and Wildlife Service have upgraded the jetty that had originally been built by a local legend, Clyde Clayton, brother-in-law to Denny King. Clydie's house is still in use and fresh water is available from new tanks installed by volunteers to collect rain water from the roof of the house. This gave the whole crew a chance to go ashore and take in the wildlife and fantastic view from Henry's Folly, the hill behind Clayton's house.

After reviewing the day and another hearty meal, we planned our dives for the next day, then crawled into our

bunks total exhausted.

The first dive of the new day was a bit of a failure as we went searching for the Port Davey Skate. We searched in an area north of the Celery Top Islands. The water here is only about 4-5 metres deep with a flat, silty bottom. We had planned to do a line search from north to south. I found it impossible to navigate, video and keep station with the divers to the left and right. The end result was no skates.



We had several night dives during the wild weather. As a result of the conditions, we nearly lost Karen when she was carried by the current the length of one of the islands in the Bathurst Channel.

The night was black as pitch and visibility reduced to less than 50 metres due to horizontal rain. I was driving the boat and

trying to track the three divers in the shallow black water. I recovered the two Japanese divers and their camera gear, but they hadn't seen Karen since very early in the dive.

Karen is famous for economical air consumption, and I started searching for her around the area she had entered the water down to where I had picked up the other two. Each time I did a pass I extended the run, and after what seemed like hours, I saw a strobe flashing weakly through the squally black night.

Karen was only metres from being swept around the end of the island and down into the main channel when I reached her. The marine area of Port Davey and Bathurst Harbour comprises some 17,000ha. It was lucky we found her when we did as it would have been very unhealthy to have spent the night bobbing about in the extreme conditions, and trying to get ashore over the jagged knife edged rocks would have been dangerous if not foolhardy.

## Wrapping it up

After 13 days, my diving was finished, and I traveled up to the bush airstrip at Melaleuca to meet the aircraft bringing in my replacement, Mick Baron, another of the Eaglehawk team. Michelle and

Johno were also flying out with me, and well-known Tasmanian marine biologist, Graham Edgar, and a new chef were replacing them. The strip was very busy, as there hadn't been any flights for nearly a week due to the evil weather. Many of the bushwalkers, waiting for their flights back to civilization, had been living on a handful of boiled rice and water.

When my flight landed, Mick had all the little luxuries such as newspapers, fresh bread, fruit and vegetables, and beer to keep the Japanese happy.

This was Mick's first trip to the region and a chance for him to gain the skills and dive site knowledge for future expeditions. This area is so environmentally sensitive that eventually only approved guides will be allowed to lead dive trips into this region. Inexperienced divers should not be encouraged to dive in Bathurst Harbour without

additional training. Even experienced divers should refresh their night diving and buoyancy skills. Some of the locations have been listed, as off limits to divers as any disturbance to the delicate marine ecosystem could have long-term consequences.

Seven days later, I met the *ODALISQUE* as she returned to Hobart, again having extraordinary luck with the weather on the return trip. The tonnes of equipment were unloaded and returned to the dive center, and we all adjourned to the local sushi bar for a debriefing, dinner and drinks. We have seen the finished documentary (unfortunately only

released in Japanese), which brings the scorecard up to 100% success for our two trips into the land that time forgot. My next trip is already in the planning stages and with luck, will be even better than the previous two. ■



Ocellate Seastar, *Nectria ocellata*



# fact file



## Port Davis, Tasmania



**History** Aboriginal settlers arrived on the continent from Southeast Asia about 40,000 years before the first Europeans began exploration in the 17th century. No formal claims were made until 1770, when Capt. James COOK took possession in the name of Great Britain. Six colonies were created in the late 18th and 19th centuries; they federated and became the Commonwealth of Australia in 1901. The new country was able to take advantage of its natural resources in order to rapidly develop its agricultural and manufacturing industries and to make a major contribution to the British effort in World Wars I and II. Long-term concerns include pollution, particularly depletion of the ozone layer, and management and conservation of coastal areas, especially the Great Barrier Reef. A referendum to change Australia's status, from a commonwealth headed by the British monarch to a republic, was defeated in 1999. Government: democratic, federal-state system recognizing the British monarch as sovereign

**Geography** Tasmania covers a land area of 68,332 sq km (26,383 sq. miles). Its terrain ranges from mountains, lakes, rivers and waterfalls to dense rain forest. Tasmania has over 2000 km of walking tracks and 18 national parks. The Tasmanian Wilderness World Heritage Area covers 1.38 million hectares. Natural

resources: bauxite, coal, iron ore, copper, tin, gold, silver, uranium, nickel, tungsten, mineral sands, lead, zinc, diamonds, natural gas, petroleum; Agriculture: wheat, barley, sugarcane, fruits; cattle, sheep, poultry; Industry: mining, industrial and transportation equipment, food processing, chemicals, steel; Exports: coal, gold, meat, wool, alumina, iron ore, wheat, machinery and transport equipment

**Climate** Of all the Australian capital cities, Hobart has the nation's second-lowest rainfall (626 mm or 24 inches). The average summer temperature is 21°C (70°F). Winter's average is 12°C (52°F). Natural hazards: cyclones along the coast; severe droughts; forest fires

**Population** The population of Tasmania is 472,000. Main centers are Hobart (the capital city with 195,500 people) Launceston (98,500) Burnie (18,000) and Devonport (25,000). Ethnicity: Caucasian 92%, Asian 7%, aboriginal and other 1%; Religions: Anglican 26.1%, Roman Catholic 26%, other Christian 24.3%, non-Christian 11%, other 12.6%

**Currency** Australian Dollar (AUD\$)

**Language** English

**Diving** Colorful sponges,



anemones, lots of seaweed including giant kelp forests. Dive comfortably all year in a 7mm wet suit.

**Electricity** 220-240V AC, 50 Hz. Plugs have three flat pins. A socket converter can be bought for approximately \$8-10 AUD.

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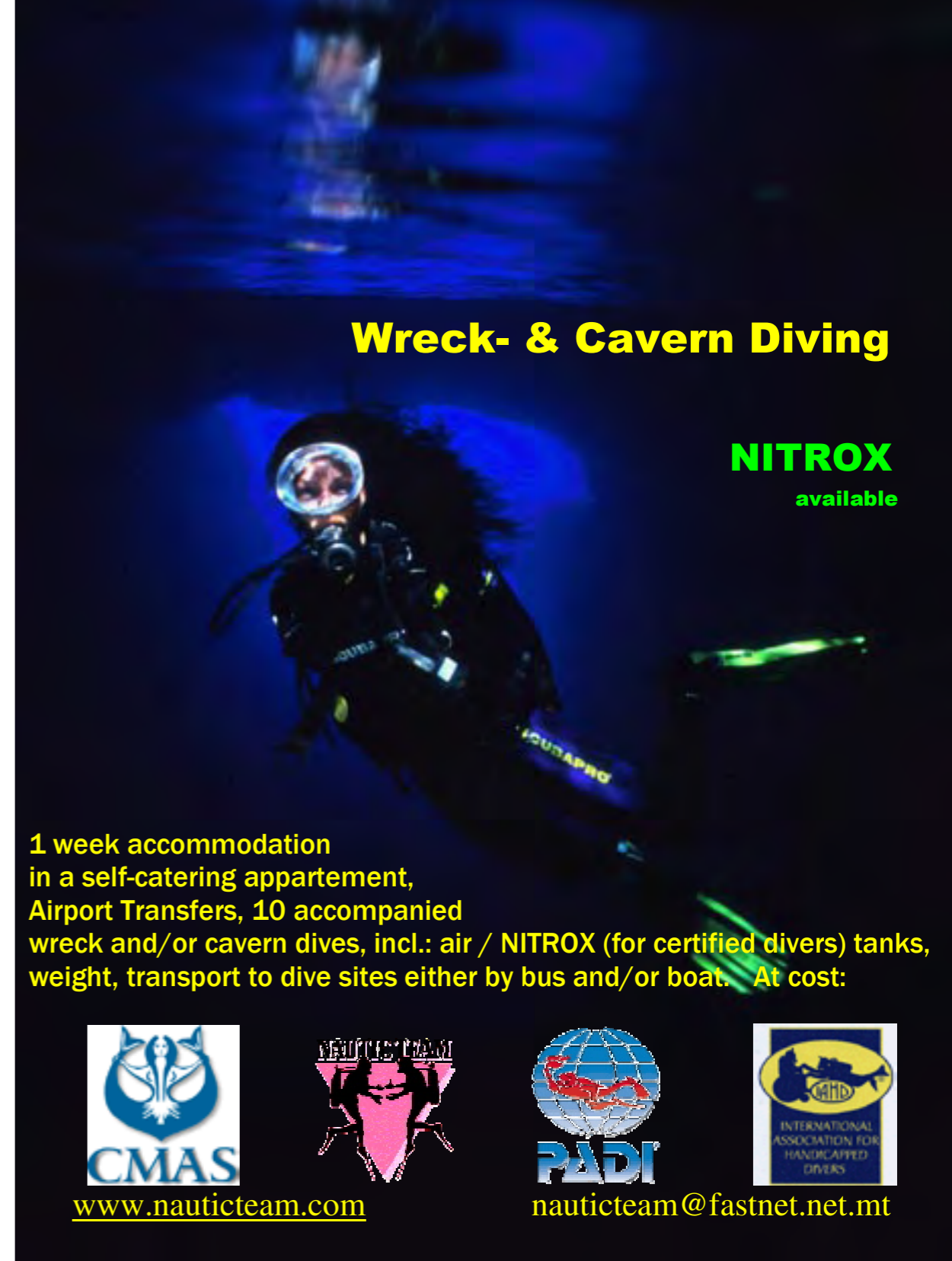
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Edited by  
Michael Arvedlund, PhD  
and Peter Symes

ILLUSTRATIONS BY GUNILD AND PETER SYMES

**Clownfish sea anemones usually live solitary lives. On many coral reefs there will normally be only one individual for each 50 to 100 meters, perhaps 10 to 20 meters of reef. But occasionally groups of up to several hundreds of clownfish sea anemones are found together within a small area in an assemblage we call anemone cities.**



PETER SYMES

An anemone city off Japan. We see the characteristic mix of many red clownfish (*Amphiprion frenatus*) and blue damselfish. The many sea anemones belong to the species *Entacmaea quadricolor*

Anemone cities are not unusual in some places. However, these large assemblages are rare compared to the high abundance of solitary giant sea anemones you may find snorkeling or diving on most tropical shallow coral reefs. There are only two known such assemblages in the bay of Aqaba in the Red Sea.

One is at Ras Muhammad close to the popular dive resort Sharm el Sheikh where it is but one of the many popular dive sites in the area and well visited by many divers being completely oblivious to the fact that they are diving on a rather unique and fragile structure.

They are also found in some parts of Southern Japan, in the eastern area of the Pacific and certain parts of the Indian Ocean. Perhaps the largest tropical sea anemone assemblage in the world covering about 2 km<sup>2</sup> of sea bottom lives in central Indonesia. This anemone city was recently described by the renowned German underwater photographer Helmut Debelius in his Asian underwater guide.

### Super structures

Anemone cities are not well understood, but clearly something very different goes on here. Little is known about the

structure and distribution of these dense sea anemone assemblages and what kind of impact the unusually high concentration of host anemones have on the local ecology—especially the settlement, reproduction and behavior of the symbiotic fishes and crustaceans. Most research studies have, so far, only studied the biology of solitary host sea anemones

simply because the necessary resources, manpower and funding are still not readily available in coral reef research.

This is rather unfortunate as unusually large “super-structures” in nature, such as the anemone city at Ras Mohammed at the tip of Sinai peninsula, may provide us with a much better understanding of both fish and sea anemone biology.

### Microhabitat

The point is that whatever regulates or limits the abundance of a species and their reproductive success is highly related to the extent of its microhabitat. In this case, the microhabitat for a clownfish is its host anemone and the few meters of coral reef surrounding the sea anemone. Usually a single anemone. So, when

The Danish scientist Ms Thea Marie Brolund assisted by Anders Tychsen and Michael Arvedlund recently conducted the first comprehensive scientific examination of the popular dive spot in South Sinai, called “anemone city”, a dive site often described and recommended as an excellent dive experience in most popular Red Sea dive guides.



NAOKO MORIMOTO - RYUKYU UNIVERSITY, SESOKO STATION, OKINAWA, JAPAN

## *The Mysterious Life and Territories in* **Anemone City**



MICHAEL ARVEDLUND

Image of the Red Sea anemonefish *Amphiprion bicinctus* in a solitary host sea anemone *Entacmaea quadricolor*. This type of sea anemones and the fish is what most snorkelers and divers are likely to encounter during a visit to the Red Sea. Raz Bob, 10 m. depth, Sharm El Sheikh

and behavioral patterns. These characteristics can be quite obvious to the observant visiting diver.

Exactly which patterns, how, when and why this complexity and infrastructure is put together is something we know practically nothing about.

This gives cause for great concern as these rare structures are at great risk of disappearing in front of our very eyes due to heavy loads of ignorant visiting scuba divers.

### At risk

The popular Aqaba anemone

Closeup of an unusual pink variety (*H. crispata* is normally grey in color) of the clownfish sea anemone *Heteractis crispata*, from a shallow coral reef in the southern Japan



MICHAEL ARVEDLUND

city assemblage of the magnificent sea anemones (*Heteractis magnifica*) is, for example, found at the southernmost point of the Sinai Peninsula, northern Red Sea. It is situated on a reef approximately 150 meters east of the popular Shark and Yolanda Reef. At present, about 20-30 large diveboats with up to 300 divers and 1500 snorkellers visit this magnificent superstructure every day. Most of these visitors have absolutely no education in proper behavior on coral reefs.

And the carrying capacity of daily visitors to any one anemone city may only be only 1/10 of the present load. Consequently, the risk of this anemone city disappearing forever within the next decade or two is very real. Despite these facts, the first scientific study ever of Sinai's "anemone city" did not take place until the summer of 2002 when a Danish research team visited the site. This article is the summary of that study.\*

Anemone city at Ras Muhammad consists of massive amounts of the clownfish sea anemones and consequently also the local two-banded anemonefish (*Amphiprion bicinctus*)

The popular dive sites around Sinai get visited by dozens of dive boats every day

and the three spot damsel fish (*Dascyllus trimaculatus*). The former are obligate symbionts in host sea anemones and the latter are facultative symbionts as juvenile in host sea anemones. (See explanation in sidebar.)

### Location

More precisely, anemone city is situated on an underwater plateau of approximately 100 x 75 meters stretching down to an approximate 20-meter depth. It begins at a depth of about 2 meters beneath a short vertical coral wall from there it drops down to 7-9 meters at an angle of 30-45°. From this depth to approximately 20 meters, the plateau is relatively horizontal, sloping only 5-15°. At approximately 20 meters, it ends in a rather sharply defined drop-off which plunges to a depth of about 800 meters. This is clearly not the place to drop

your camera. A total of 190 large clownfish sea anemones were counted here. Some were solitary, and some were clusters of presumably clonal morphs (offspring produced from "buds").

### Record

The anemones were distributed from a depth of 3 meters down to about 40 meters, which is a new record for the species magnificent sea anemone.

### Symbiosis

Means "life-together". It exists in several forms. In **mutualism**, both species are benefitting from their association. In **commensalism**, one species gains an advantage while the other is neither benefitted nor harmed. In **parasitism**, one species gains at the expense of the other.

An **obligant symbiont** is one who can't live without its associated species, whereas a **facultative symbiont** may benefit from the association but also live without.

\* THE OPINIONS ABOUT THE BEHAVIOR OF DIVERS IN THE RED SEA AND THE POSSIBLE FUTURE FATE OF ANEMONE CITY AS EXPRESSED IN THIS ARTICLE ARE, HOWEVER, THE SOLE RESPONSIBILITY OF THE EDITOR MICHAEL ARVEDLUND



PETER SYMES



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# ecology

## Why here?

Perhaps this is because of the very clear water almost devoid of terrestrial and freshwater input. Simultaneously, the location of this anemone assemblage renders it subject to unusual and sometimes strong currents. The major currents pass in the surface waters up the Gulf of Suez and the Gulf of Aqaba (the latter primarily via the Strait of Tiran) resulting in upwelling of nutrition-rich waters especially from the deep waters of the Gulf of Aqaba.

## Currents matter

These nutrition-rich currents pass right by the anemone assemblage at Ras Mohammed. At 22-24 meters of depth, approximately at the edge of the plateau where it dropped to vertical the reef was devoid of anemones. Perhaps their absence was caused by the stronger currents here. In the same manner, there were few anemones above 9 meters depth, where there was heavy wave-induced surges. However, the solitary anemone exposed to the surges at 3 meters depth seemed to cope well with it; it was one of the largest anemones of the entire assembly.

## Are the fish the cause or result?

Factors contributing to the existence of these superstructures of sea anemones may be the relatively large schools of the three spot damselfish.

Recently, Israeli experiments have shown that the giant sea anemone *E. quadricolor* are benefiting from their mutualistic symbiosis with the fishes, to such a degree



Three-spotted damselfish

WWW.WIKIPEDIA.COM

that the growth rate is significantly hampered, if the anemonefish are removed from the host anemone.

This result may lead to the speculation that the large shoals of three spot damselfish increase the assemblage in a mutualistic positive feedback between anemone and fish. This could perhaps be based on increased amounts of ammonium, nitrate and phosphate, which are likely to be found here. This is merely speculation, however.

## Feedback

What are the ecological feedback mechanisms between these fish and anemones? Do

more fish lead to more anemones, which in turn, lead to more fish? If the above thoughts seem to be true, how are they related to the question of clonality in *H. magnifica* and its distribution pattern? Do the abundance of anemones and anemonefish result in unusual odour plumes to the surrounding waters? Since anemonefish depend on olfactory cues to finding their host anemones at settlement, might one expect altered settlement patterns of anemonefish on reefs with anemone assemblages?

## What do we know?

The distribution and abundance of the species magnificent sea anemone, which is the "anemone city" species in the Gulf of Aqaba, was quite different from most other giant sea anemone species in Aqaba.

Magnificent sea anemones (*H. magnifica*) are found in only two relatively large assemblages in the southern part, Anemone City, and a few solitary individuals at Raz Ghazlani a few kilometers north of Ras Mohamed.



MICHAEL ARVEDLUND

A closeup of the Red Sea anemonefish *Amphiprion bicinctus* in an anemone city anemone *Heteractis magnifica*

Usually magnificent sea anemones are only found above 20 meters of depth. *H. magnifica* is distributed from the eastern Pacific to the western Indian Ocean and the Red Sea. However, it reproduces asexually only in the rim areas of its distribution i.e. the Red Sea and the eastern Pacific Ocean. Incidentally, this distribution seems also to apply to magnificent sea anemones assemblages. Thus, the origin of the large aggregations of magnificent sea anemones is probably the asexual reproduction rather than settling of young sexually reproduced anemone polyps.

## Lots of fish to see

At this particular anemone city, the researchers counted nearly 2000 individual three spot damselfish hovering above the sea anemones. *That is a lot of fish.* The largest specimens of three spot damselfish were never seen among the anemone tentacles, but adult three spot damselfish will sometimes stay in groups

in the vicinity of the host anemone, however they do not associate with them, and are not protected from the anemone nematocysts.

## "Gangs and territories"

The total number of recorded two-banded anemonefish was 243, of which 91 were dominant. A fish territory could consist of any combination of solitary and clustering host sea anemones. Usually, it consisted of a cluster and some nearby solitary sea anemones.

Usually, territories of dominant and sub-dominant two-banded anemonefish covered the same area. The territories of two-banded anemonefish and three spot damselfish were often overlapping as the group of three spot damselfish would

## Dominance

Dominant: number one, or a high number, in the ever-existing pecking order among anemonefishes

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MICHAEL ARVEDLUND

Two banded anemone fish peeks out of a magnificent sea anemone in Sinai's Anemone city

the biggest fish swimming the furthest. Small sub-dominant two-banded anemonefish were rarely observed more than 1/2 meters from the host anemones.

In Anemone City, these adults intermingled with the groups of juvenile three spot damselfish. The territory borders seemed well-defined though no aggressive displays were observed between territories. The fish just did not cross certain borders.

The territorial behaviour of anemonefish seem to be highly plastic; the intra- and interspecific territorial behaviour may depend more on the local distribution pattern, number and size of the host anemones, than perhaps on the anemonefish species.

### The significance

The unusual large structure and many inhabitants of Sinai's Anemone City may be the source for new generations of clownfish and sea anemones in most of the Gulf of Aqaba due to its size and placement in string currents from southern Red Sea leading into the straits of Tiran.

Therefore, further protection of Anemone City is most likely an urgent matter. Unfortunately, the environment of the Ras Mohammed National Park is under increasing stress from pollution largely generated by the local tourist industry. Although impressive, the anemones of the assemblage were fewer and the surrounding corals more stressed than just a few years back. ■

swim from one two-banded anemonefish territory to another.

The three spot damselfish territories had less defined borders than those of two-banded anemonefish. In areas with many host anemones close to one another, the groups of three spot damselfish could become very large with one large shared territory.

### Hovering groups

Apart from the smallest specimens, the three spot damselfish all

behaved almost alike in hovering in larger or smaller groups 1/2-2 meters above the anemones, forming some very large groups below 10 meters. When disturbed the three spot damselfish groups would perform a synchronized rapid descent towards the host anemones.

### The anemonefish

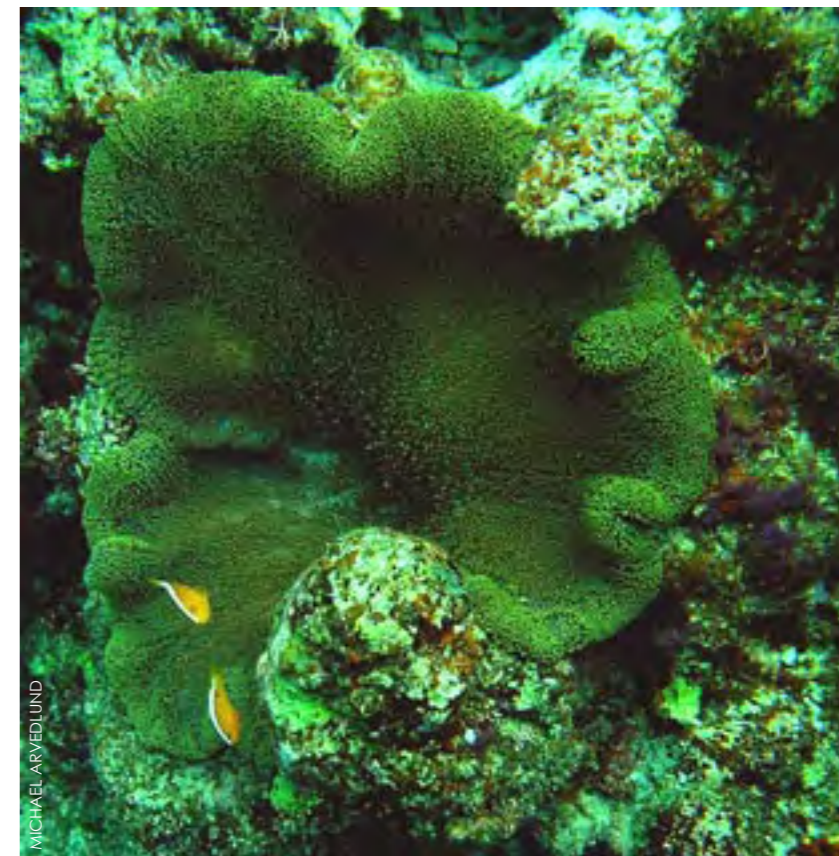
The two-banded anemonefish usually swam closer to the host anemones than the three spot damselfish.

Usually, the large sub-dominant two-banded anemonefish were farthest away; they usually covered the whole territory with

Two-banded anemonefish

*Remaining question:  
Why do only  
some species form  
anemone cities?*

From an anemone city in Southern Japan, Ryukyus Arhipelago Hizushi Beach. Sea anemones of the species *Stichodactyla mertensii* and two clownfish of the species *Amphiprion sandaracinos*. Depth 5.7 meters. This species of anemones do not form anemone cities



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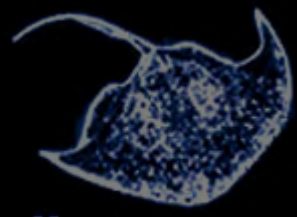
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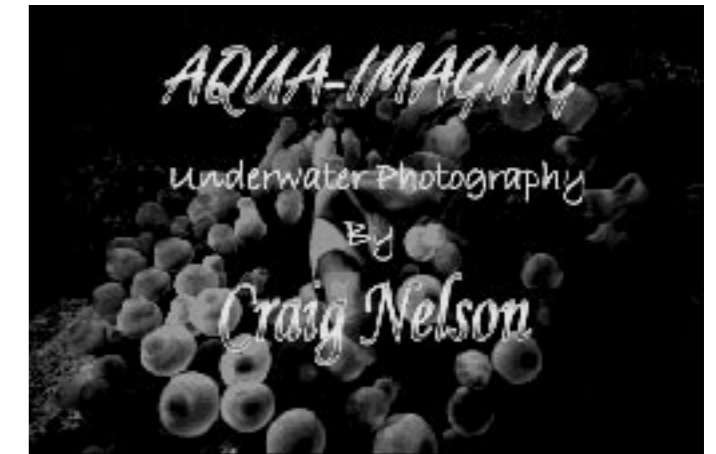
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## Loch Ness Muenster?

### 800kg of underwater cheese gets away

*Search for sunken Cheddar treasure continues*

A man who dumped 800 kg of cheese into the depths of a Canadian lake in hopes of making a better Cheddar has lost his cache. Divers who searched up to 40m depths in the suspected area several times came up empty-handed. Luc Boivin, a fourth-generation owner of a dairy in northeastern Canada, said he was sure the cheese would turn up eventually.

Regardless of whether Boivin finds his cheddar or not, the Canadian Food Inspection Agency said he could not sell it to consumers since his experiment in aging the cheese was not conducted under controllable and verifiable conditions. According to local reporters, the agency said the cheese production had to be carried out in licensed, fully hygienic



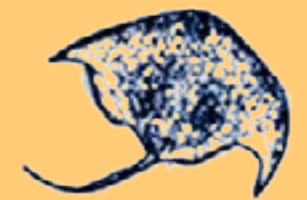
facilities in order to be considered for commercial sale. That pretty much rules out cheese aged at the bottom of a lake.

The entire cheddar affair started a few years ago when a fisherman approached Boivin and convinced him that stowing his cheese at 40m in a lake would help make a good cheese great. Boivin looked into the matter and concluded that the

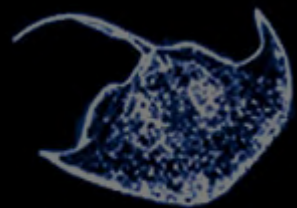
water pressure would accelerate the ageing process of the cheddar while keeping the cheese in perfectly cool temperatures.

Last year, Boivin tossed 10 barrels of his family business' cheese overboard into the Baie des Ha! Ha! on the Saguenay River about 200 km north of Quebec. It appears the bay has had the last laugh. Boivin said he expected to lose some of the cheese during the course of the experiment, but not the whole ton of cheddar. ■

### Wet & Weird



News edited by  
Gunild Symes



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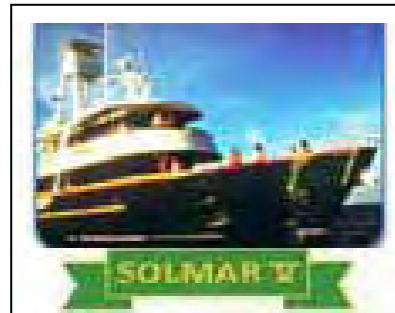
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**Wet & Weird**

News edited by  
Gunild Symes

## Navy acquires mine-sniffing sea robots

Ten battery-powered Remote Environmental Monitoring Units, or Remus, have been bought by the Royal Navy in the UK. They will be employed to hunt down sea mines. It is the first time the Navy will use unmanned vehicles capable of detecting mines in shallow water.



REMUS. COURTESY OF HYDROID INC

Manufactured by Hydroid Inc as part of a £2.75m programme, the robots are expected to stay in service until 2011. The 1.6m long torpedo-shaped vehicles using advanced detectors to pin-point locations of mines at up to 100m

depths will take over very dangerous work that used to be done by divers.

Sea mines are a great menace to naval forces because they are easy to plant and cheap to build, but very difficult to find. The mine-sniffing robots will also be used in search and salvage operations as well as protecting harbours and ports against terrorist attacks according to Defence Procurement Minister Lord Drayson. However, the task of clearing mines still falls upon the shoulders of human divers. ■



Thousands of juvenile fish were saved by five text messages when a team of Maritime Police apprehended a boat fishing illegally in the city waters of Glan in the Philippines. Local fishermen in the area overheard a conversation between the poachers that

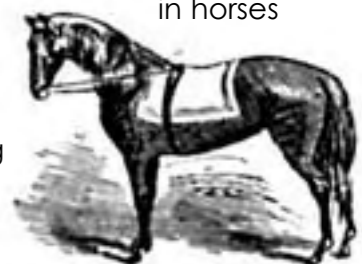
## Texting nets 7 illegal fishermen

spurred them to forward a warning to the provincial capital. Sarangani Bay Governor Miguel Dominguez and police authorities received the message and directed Glan police to take action. The illegal fishermen were using a banned fishnet known locally as *Likos* or *Tapsay*. Seven persons aboard the M/B Beverly 8 were caught operating within restricted waters. According to a police spokesperson, the maritime police are enforcing local regulations in order to protect small fishermen. ■

## Deco chamber for Horses?

Hyperbaric oxygen therapy is now available for horses. Long known for its healing benefits to human beings, veterinarian researchers are now applying decompression treatments to injured horses. According to medical experts, HBOT helps salvage and heal injured tissues, shortening recovery time and saving functional tissues around an injury. It has been shown to help boost the immune system to counter bacterial infection and enhance the effects of certain antibiotics. While wounds are the most common ailment treated with HBOT in humans, bone infections, brain and spinal cord injuries have also

seen improvement with the treatment. Now horses are receiving the benefits of HBOT in cases involving traumatic injuries, bone and joint infections common in foals, and muscle infections from Clostridial infections, which are secondary to injection reactions. Further research in the use of HBOT technology is expected to transform how veterinary medicine approaches the treatment of injuries in horses through the optimization of the healing process. ■





*Journey Beneath a Coral Sea*

Twentyfive years ago I made a film called the *Ocean's Daughter*, that tried, in my own small way, to add a voice to the growing calls to protect our planetary future. It was a film that tried to express the sacredness of life and the magical beauty of nature and the fact that we, as humans, were in danger of destroying ourselves, before we had the chance to evolve into mature adulthood as a species.

It would be tragic indeed, if future genera-

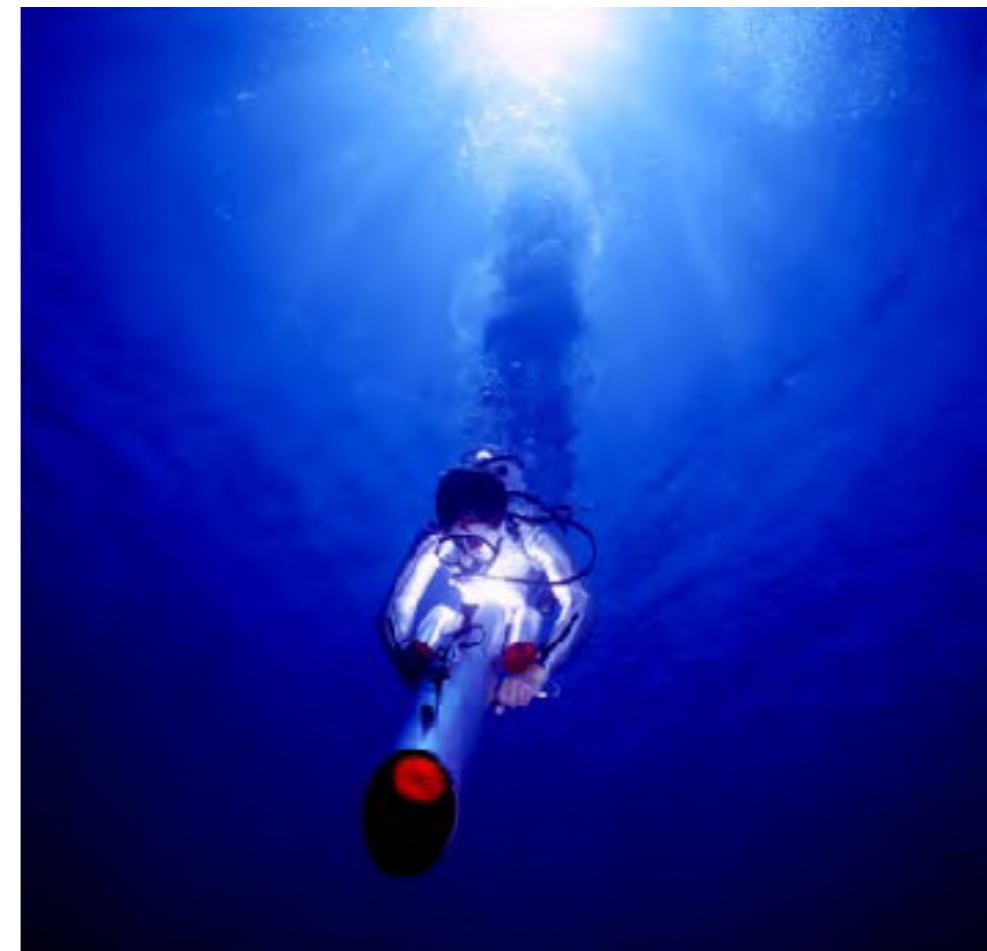
tions were forced to live under inhospitable planetary conditions and never witness the wonders of nature we have experienced, except by watching the films from our era. They would be like the visual fossil record of what once was but is forever gone.

If we look at the big picture, all across the world, development and environmental organizations are underfunded. In a world where on the same day we celebrate record highs in the stock market, 40,000 chil-

Text and Photos by Michael Portelly

I have been an underwater photographer and filmmaker for more than 25 years. I share the grave concerns of many who fear that our generation will bequeath future generations the legacy of a planet, poisoned and stripped of its assets and its beauty.

# Michael Portelly



*Deep Ocean*



*Womb of the World*

dren die from hunger, at a time when governments do not have the resources to meet the urgent needs in their own country much less the rest of the world. Species extinction is reaching epidemic proportions as ecosystems are rapidly disappearing from insensitive development and pollution. We are caught in the clutches of an economic system that operates beyond the control of even the president of the United States, and is at the present time crushing life from us and from this planet.

I once looked out at the world with despair, until one day, quite by chance I woke up to an idea that makes it financially viable for

business to help fund solutions to global problems, in a way that will reward their investors, increase their profit and liberate new resources for the task of global regeneration. As one who has made a living from the ocean, I feel a deep sense of responsibility to do everything I can to make a difference. Though the hour is late, there is still time for us to turn things around.

In Antibes, three years ago, I voiced an idea to marine architect Jacques Rougerie and Andre Laban, the famous diving legend, about an idea that could really make a difference.

It is called the Blu Revolution and is designed to breath life back into



*Dreamscape*

the ocean, create new habitats, and revitalize fishing communities around the globe, in an attempt to preserve our ocean heritage and restore it as a source of food to feed the hungry.

As things stand, many fish species are becoming toxic with pollutants, fish stocks are declining from overfishing and destructive industrial fishing techniques, and across the planet spawning grounds and habitats are being destroyed by trawl nets. This is turning the ecosystems on the continental shelf into a desert.

Imagine the public response if the United Nations, or other such body, guided by a scientific council, were to initiate a global program to restore life to the ocean; Imagine that we were to construct artificial reefs in suitable

materials that could provide work for idle fishing fleets, and create a new global industry designed to reverse the destruction and provide a haven for wildlife to flourish.

Imagine business leaders got involved as they realized that to do so would be rewarded with public recognition, respect and an increase in profit.

Imagine too, that plastic manufacturers were to recognize that they could take responsibility for their plastic, at present is either buried in rapidly filling landfill sites or being burned, and instead recycle it in an exciting and life-creating way.

Plastic manufacturers could work alongside marine architects to develop the technology to convert waste plastic into nontoxic re-moldable forms. These could be created as large

structures of great intrinsic beauty that would soon become covered in marine life, and the nonbiodegradable quality of the plastic would become an asset. It could support the habitat indefinitely, instead of rusting away as ships do when they are sunk for the same purpose.

It would mobilize fishing fleets and breathe new life into fishing communities around the world, as they set to the task of restoring the ecosystems of the continental shelf, where each year an area the size of the United States is destroyed by trawl nets dragging the bottom, crushing the marine habitat.

It the creation of floating architecture might even augur a new epoch of oceanic exploration where



*Place of the Great Secret*



*Ocean's Daughter*

## Michael Portelly



Samantha



Sacred Pool

the concerns raised by Jacques Yves Cousteau are finally addressed and the visions of great men, like Commander Phillippe Taillez's Archipelago, become a reality.

For this to occur, a new level of international cooperation will have to be forged, where people set aside their differences and work together for the common good. I know that across all nations of the world, divers are united by their love of life and the ocean. They work in corporations and government and come from every walk of life. It is to them that I now speak because they have within them the power to make a positive difference for the

benefit of everybody.

I ask you to go to [www.BluRevolution.com](http://www.BluRevolution.com) and hear about The Genesis Project in a talk I gave at the open university in the United Kingdom. I ask you to listen to the idea with an open mind.

This strategy makes it viable for companies to save lives, protect nature, initiate necessary technology to end pollution and cancel their carbon dioxide debt to the world. The Genesis Project involves funding global reforestation or preserving huge tracts of rainforest to prevent it being cut down. I am informed that 90% of the coral reefs are dying from rising sea temperatures. This strategy

can at least slow that process down and give us all a chance to breathe again. It can create the space for a coordinated global effort that will bring us all closer together as we heal this world before we destroy it and ourselves along with it.

Research shows that people will support companies willing to help the world when they witness the good that is being achieved. The involvement of business leaders will help focus political will where it is needed. Perhaps we might even discover that we need a new concept for what constitutes global security in the 21<sup>st</sup> century, in the form of a world that works together for the

common good, and the concept of the family of Man can then become a practical working reality.

If you agree with what is said please share The Genesis Project and the Blu Revolution with everyone you know, so that a focussed dialogue can finally be opened that will result in the implementation of the necessary remedial measures before we go past the point of no return. Once that point is reached it is over!

*Portelly will be honoured at this year's Festival of Underwater Images in Antibes, France, to mark 25 years since his ground-breaking film hit the silver screen. ■*

## IN OUR NEXT ISSUE

*Diving in South Africa*



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