

*Holiday Gifts & Stocking Stuffers for Divers*



GLOBAL EDITION  
December 2008  
Number 27

NORTH COAST  
EAST COAST  
LIBERTY WRECK

**Bali**

Indonesia  
**Mimic Octopus**

White Sea  
**White Whales**

Profile  
**The Taylors**

Rebreather Divers'  
**Seven  
Deadly Sins**

Underwater  
Photography  
**No Flash**

Portfolio  
**Pierre Sentjens**

COVER PHOTO BY LAWSON WOODS



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COVER PHOTO: *Liberty Wreck, Bali, Indonesia*, by Lawson Woods

(CONTINUED ON PAGE 4)



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# Contents

Goby. Photo by Andrea Ferrari



**24**  
BALI REVISITED  
INDONESIA  
BY SCOTT BENNETT

**36**  
LIBERTY WRECK  
TULAMBEN - PHOTOS  
BY LAWRENCE WOODS

**39**  
BALI'S EAST COAST  
INDONESIA  
BY DAVID SILCOCK

**47**  
MIMIC OCTOPUS  
BALI - PHOTOS  
BY ANDREAS FERRARI

**49**  
HOLIDAY GIFTS  
FOR DIVERS  
EDITED BY CATHERINE GS LIM  
& GUNILD SYMES

**plus...**  
EDITORIAL 3  
NEWS 5  
WRECK RAP 16  
TRAVEL NEWS 21  
JELLY TALES 52  
TURTLE TALES 54  
EQUIPMENT 62  
BOOKS & MEDIA 65  
WHALE TALES 72  
BUSINESS DIRECTORY 82

**55**  
PROFILE:  
THE TAYLORS  
BY MATHIAS CARVALHO

**68**  
BELUGA WHALES  
WHITE SEA, RUSSIA  
BY ANDREY BIZYUKIN, PhD

**83**  
PORTFOLIO:  
PIERRE SENTJENS  
EDITED BY GUNILD SYMES

## columns...

**60**  
REBREATHER DIVERS'  
SEVEN DEADLY SINS  
BY CEDRIC VERDIER

**66**  
SHARK TALES:  
BITS & BITES  
EDITED BY PETER SYMES

**77**  
UW PHOTO & VIDEO:  
NO FLASH  
BY KURT AMSLER

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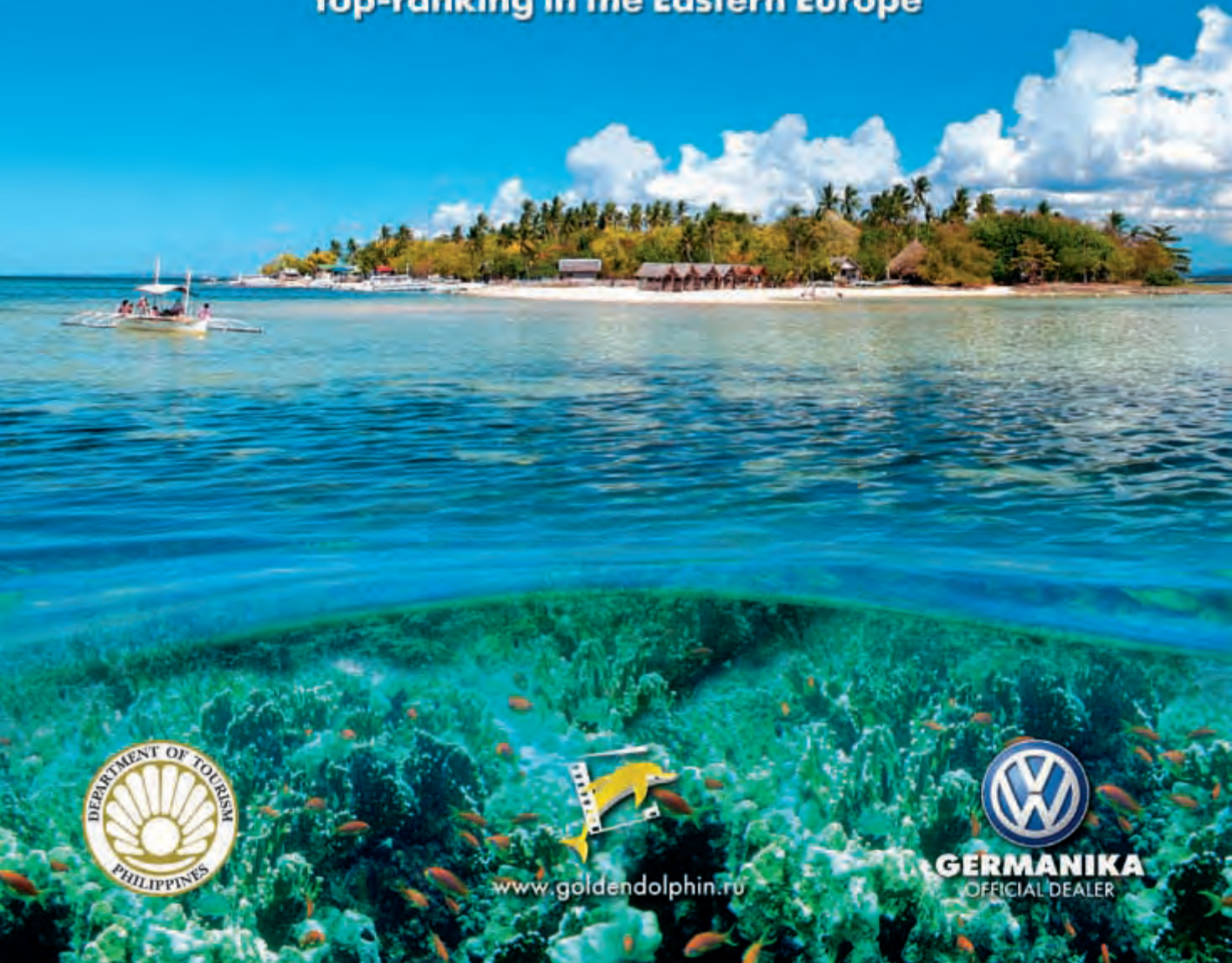
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# Be Blessed

What a year it has been. The US elections, a sudden flip-flop in the global economy and a growing sense of urgency that we have to act now, if we are to save the coral reefs, the sharks, tunas and what else.

There can be little doubt that we live in exciting yet challenging times. But it is in such times that we should reflect and count our blessings.

Diving and all the experiences it has given me certainly count as mine. Among the highlights are some incredible close encounters and interactions with wildlife, adventures to some of the most beautiful spots on the planet, archaeological finds and meeting a lot of very interesting people.

It is not about having a lot of money, so we can go jet-setting to another continent. It is about treasuring all those small simple pleasures that playing around with water and in water can give us. I live in a European capital, and while it is a

port and I have not far to the seaside, the local coastline is a far cry from a dive destination full of colourful corals and exotic wildlife. But I can take the metro to the beach, so sometimes we go there in our lunch-break and watch the ships go by and the seagulls fish while contemplating how people in times now forgotten lived on the same spot eking out a livelihood from the ocean. It was not long ago that researcher found the remains of a Stone Age settlement on that same spot. Some 10,000 years ago somebody else had their lunch there, too.

I can also go diving there. It is mostly coarse sand with some patches of kelp and beds of seaweed. It is certainly not a spot that will be featured on National Geographic or BBC Wildlife. Some would call it boring. But I always see something new. And even the

most ordinary dive makes me feel much better than before I went in.

It only takes a short while, once I submerge, before I have left all the worries and everyday stress behind. Then and there I rebuild a connection with nature that is so easily lost when you live in a bustling city. That is where I regain a perspective of what really matters. It is not things, but the living world around us and the people we love.

— Peter Symes  
Editor-In-Chief



In the ocean you never know what you will come across. This little fella was discovered by researchers working with the Census of Marine Life. It turns out that many deep-sea octopuses evolved from a common ancestor, whose closest living relative still exists in the Southern Ocean. What do you know?





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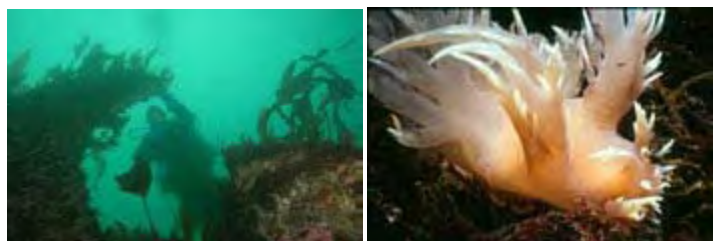
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X-ray mag

News edited by Peter Symes & Arnold Weisz

# NEWS

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## This sea slug is solar powered A hybrid plant-animal?



***Elysia chlorotica* is a green sea slug, with a gelatinous leaf-shaped body, that lives along the Atlantic seaboard of the US. What sets it apart from most other sea slugs is its ability to run on solar power.**

This sea slug resembles a nudibranch, but does not belong to that suborder of gastropods. It is instead a member of the closely-related suborder *sacoglossa*

The slug feeds by sucking the cell contents from the intertidal algae *Vaucheria*. Most of the cell contents are simply digested by the slug. But the slug is also able to keep the chloroplasts—the photosynthesising “factories” from the algae—alive and operating and functioning within its own body by storing them in the cells that line its gut.

But that is not all. Here is the really interesting twist: Young *E. chlorotica*, which were fed with algae for only two weeks, have been shown to survive for the rest of their year-long lives without eating, apparently surviving on the photosynthetic production from the assimilated chloroplasts. But how can that be possible when the isolated chloroplasts only contain enough DNA to encode about ten percent of the proteins needed to keep themselves running? The other necessary genes are found in the algae’s nuclear DNA.

“So, the question has always been, how do they continue to function in an animal cell missing all of these proteins,” says Dr Mary Rumpho of the University of Maine and an expert on *E. chlorotica*. The answer she found is as simple as it is stunning. The sea slug has acquired its photosynthetic capabilities thanks to

genes it has “stolen” from the algae it eats. (SOURCE: PUBMED CENTRAL)

### “Stolen” genes

In their latest experiments, Rumpho and colleagues sequenced the chloroplast genes of *Vaucheria litorea*, the algae that the sea slug feed on. They succeeded in demonstrating that if the sea slug used the algal chloroplasts alone, it would not have all the genes needed to photosynthesize.

They then turned their attention to the sea slug’s own DNA and discovered it contained one of the vital algal genes. Its sequence was identical to the algal version, indicating that the slug had probably acquired the gene from its food.

“We do not know how this is possible and can only postulate on it,” says Rumpho, who told New Scientist that the phenomenon of stealing is known as kleptoplasty.

One possibility is that, as the algae are processed in the sea slug’s gut, the gene is taken into its cells along with the chloroplasts. The genes are then incorporated into the sea slug’s own DNA, allowing the animal to produce the necessary proteins for the stolen chloroplasts to continue working.

Another explanation is that a virus

found in the sea slug carries the DNA from the algal cells to the sea slug’s cells. However, Rumpho says her team does not have any evidence for this yet. In another surprising twist with far reaching implications, the researchers also found the algal gene in *E. chlorotica*’s sex cells, meaning the ability to maintain functional chloroplasts could be passed to the next generation. The researchers believe many more photosynthesis genes are acquired by *E. chlorotica* from their food, but still need to understand how the plant genes are activated inside sea slug cells.

Further reading: **Solar-Powered Sea Slugs**

There are two major groups of solar-powered slugs. One group, the sacoglossans, are essentially herbivores who remove intact plastids from the plants and keep them alive and functioning in their own bodies.

The second group are essentially carnivores, or related to carnivores, and they nurture single-celled plants [*zooxanthellae*] in their bodies. In most cases they have ‘stolen’ the zooxanthellae from their original cnidarian hosts, such as sea anemones or soft corals. SOURCE: SEA SLUG FORUM







Dr Furu Mienis with Lophelia colony

# Atlantic Deep Water Coral Reefs revealed

Imagine descending in a submarine to the ice-cold, ink-black depths of the ocean, 800 meters under the surface of the Atlantic. Here, the tops of the hills are covered in large coral reefs. Dr Furu Mienis, a researcher with the Netherlands Organisation for Scientific Research, studied the formation of these unknown cold-water relatives of the better-known tropical corals.

Mienis studied the development of carbonate mounds dominated by cold-water corals in the Atlantic Ocean at depths of six hundred to a thousand meters. These reefs can be found along the eastern continental slope from Morocco to Norway, on the Mid-Atlantic Ridge and on the western continental slope along the east coast of Canada and the United States. Mienis studied the area to the west of Ireland along the edges of the Rockall Trough.

In her research, Mienis analysed environmental factors like temperature, current speed and flow direction of seawater, as these determine

the growth of cold-water corals and the carbonate mounds. The measurements were made using bottom landers, observatories placed on the seabed from the NIOZ oceanographic research vessel, *Pelagia*, and brought back to the surface a year later.

## Food highways

Cold-water corals are mainly found on the tops of carbonate mounds in areas where the current is high due to strong internal waves. These waves are caused by tidal currents and lead to an increase in local turbulence that results in the seawater being strongly mixed in a vertical direction. The out-

come is the creation of a kind of highway between the nutrient-rich, sunlit zone at the sea surface and the deep, dark strata where the 380-meter high tops of the mounds are found. This allows the cold-water corals to feed on algae and zooplankton that live in the upper layers of the sea. *Lophelia pertusa* and *Madrepora oculata* are the most important coral species found on the European continental slopes.

## Carbonate mounds

How the carbonate mounds were formed was investigated by using a piston core from the research vessel to





Rose fish are found off the coast at depths of 100 to 1000 metres; juveniles may be found in coastal waters such as fiords. The adults are slow moving, gregarious fish, of some commercial importance

take samples of up to 4.5 meters of sediment. These cores were then cut into thin slices that were analysed separately—the deeper the layer, the older the sediment. The samples studied were aged up to 200,000 years old.

Large hiatuses found in the core were possibly caused by major changes in tidal currents. The groups of carbonate mounds develop in the direction of the strongest current and their tops are of equal height.

The mounds were found to be built up from carbonate debris and sediment particles caught in between coral branches. These cold-water coral reefs have, therefore, not developed as a result of leakage of natural gas from the sea bed.

However, that may well be the case in the Gulf of Mexico. This area is currently being studied from the American research vessel, *Nancy Foster*, by

Mienis, her supervisor Tjeerd van Weering and NIOZ associate researcher, Gerard Duineveld.

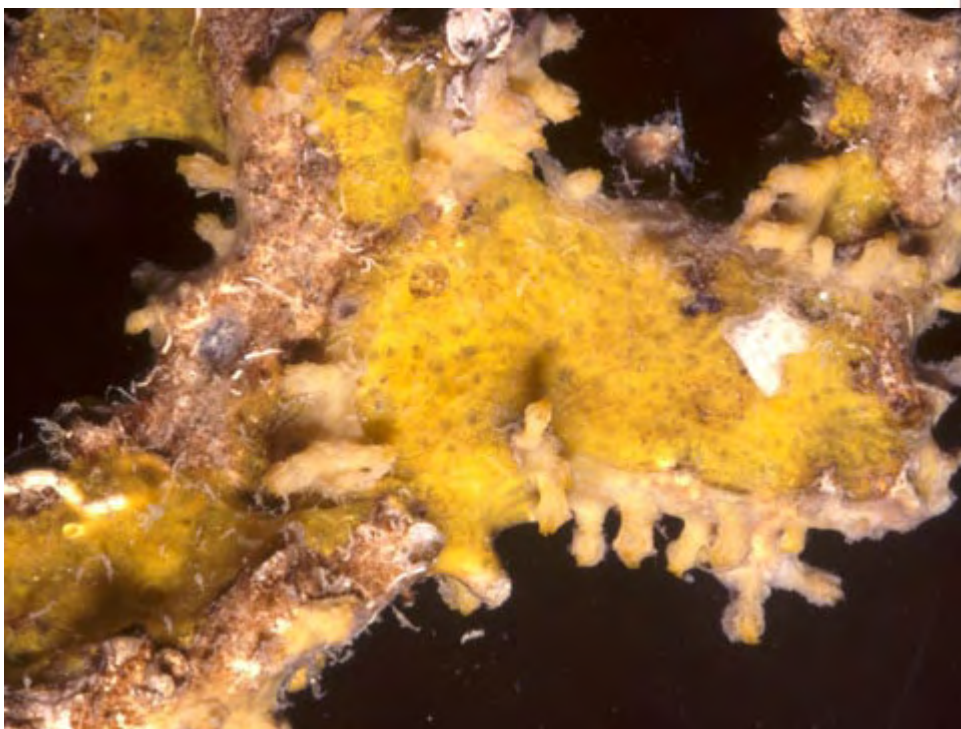
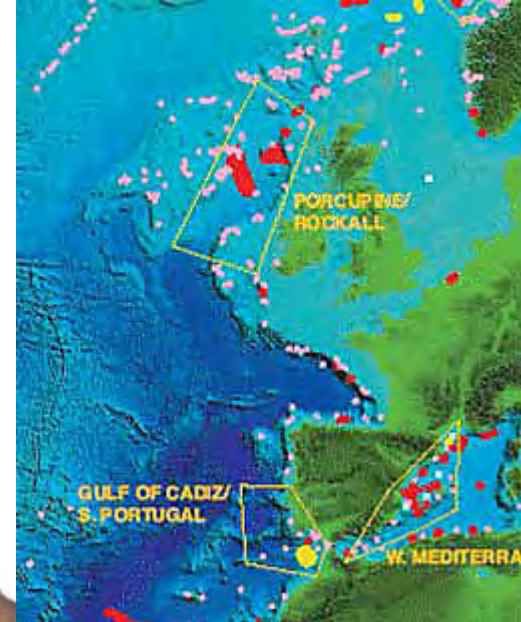
warming and the resulting acidification of the oceans also pose a threat: organisms are less effective at taking up carbonate from seawater that is too acidic. This is true not only for corals but also for some species of algae that are a source of food for the corals.

Other activities on the seabed that can cause damage to the coral reefs are

offshore industries and bottom trawlers. A number of European areas containing cold-water coral reefs have thankfully already obtained protected status.

This research was funded by the Netherlands Organisation for Scientific Research (NWO) and the European Science Foundation (ESF). ■

Cold-water corals reefs can be found along the eastern continental slope from Morocco to Norway, on the Mid-Atlantic Ridge and on the western continental slope along the east coast of Canada and the United States

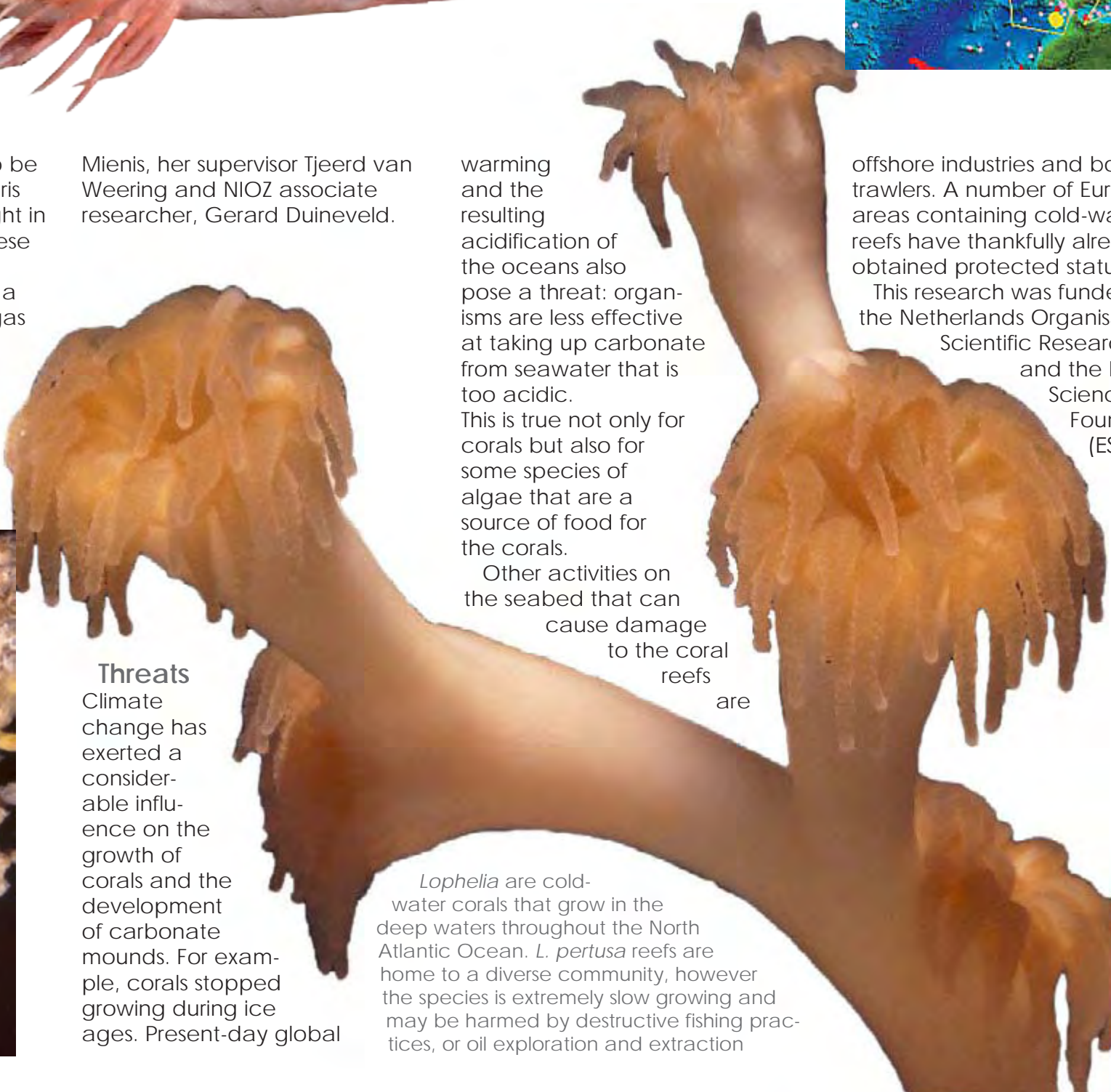


Hexadella is an encrusting sponge

**Threats**

Climate change has exerted a considerable influence on the growth of corals and the development of carbonate mounds. For example, corals stopped growing during ice ages. Present-day global

*Lophelia* are cold-water corals that grow in the deep waters throughout the North Atlantic Ocean. *L. pertusa* reefs are home to a diverse community, however the species is extremely slow growing and may be harmed by destructive fishing practices, or oil exploration and extraction



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## Tropical fish spotted off Rhode Island

Through weekly studies with a trawl boat, a University of Rhode Island professor has proven an increase in the tropical fish population in the Narragansett Bay, possibly caused by a four-degree increase in water temperature.

Professor Jeremy Collie studies bottom-dwelling fish populations and trawls weekly in and at the mouth of Narragansett Bay to collect data about the local fish. He has recorded more than 130 marine fish and invertebrate species. Among these are 31 tropical fish species, and the number is on the rise. However, he said, "The tropical fish are rare occurrences."

Collie studied the size of fish species compared to water temperature in various years, and found a link between higher water temperature and smaller body size, which could have a negative effect on the fishing industry. The region's native species could be negatively affected by the increase in temperature. A slight change of water temperature may be responsible for the decreasing populations of species such as cod and winter flounder, and increasing sightings of tropical and temperate-water fishes.

Collie believes that current practices in the fishing industry may also be to blame for this unusual ecological distribution of marine organisms. The eggs of these tropical fish are carried up to 2,000 miles north, along the eastern coastline. Tropical storms churn the seas and create warm eddies that carry the eggs away from the Gulf Stream. Occasionally, small warm-pockets of water confuse the navigational systems in marine organisms and result in misguided migrations.

Earlier this year in Jamestown, scientists, divers and fish-lovers gathered from July to September along the rocky coast of Fort Wetherill State Park to view the non-native marine species. Tropical fish such as the snowy grouper, spotfin butterfly, and the red lionfish have been sighted frequently over the last 16 years. ■

# Marine invasive species advance 50km per decade

A rapid, climate change-induced northern migration of invasive marine species is one of many research findings presented during the recent First World Conference on Marine Biodiversity held in Spain in November.

During the sessions investigators reported that invasive species of marine macroalgae spread at 50km per decade, a distance far greater than that covered by invasive terrestrial plants. The difference may be due to the rapid dispersion of macroalgae propagules in the ocean.

"The impacts of the pressure of climate change are particularly dramatic, according to results presented at the Conference, in the abrupt deterioration of the Arctic and coral reefs," said chief scientist and co-chair of the Conference Carlos Duarte. "The convergence of pressures on the ocean is leading to a global erosion of marine biodiversity where climate change may deliver the coupe de grace for a catastrophic collapse."

Almost half of the 450 communica-

tions at the Conference, organised by the Spanish Council of Scientific Research (CSIC), addressed the loss of marine biodiversity and its consequences, whereas the rest covered the exploitation of marine living resources, as well as exciting discoveries of novel ecosystems in extreme ecosystems, particularly in the deep sea.

### Deep Sea Discoveries

Deep sea research has increased greatly in the last decades thanks to technical developments like submarines, remotely operated vehicles (ROV) and autonomous vehicles (AUV). One of the coordinators of the deep sea program in Spain, CSIC researcher Eva Ramirez, is studying the hydrothermal vents which, discovered in 1977, are one of the

principal discoveries of modern oceanography. These submarine volcanoes sustain high densities of fauna which, with specific adaptations, live independently of solar energy.

"Since their discovery, more than 500 hydrothermal vent-species have been described, most endemic, as well as 200 cold water seep species and 400 morphological species of chemosynthetic ecosystems which form on the carcasses of whales," points out Ramirez.

For instance, on the mud volcanoes in the Cadiz gulf 13 new species of polychaetes (marine worms) are described as well as a new genus, *Bobmarkeya*, which, due to its characteristic appearance, owes its name to Bob Marley. ■

Invasive species of marine macroalgae spread at 50km per decade,

Lionfish have migrated north along the eastern US seaboard





### Rare Corals Resort to Hybridisation For Survival

Rare coral species are saving themselves from extinction by hybridising with other coral species, according to research published by Australian scientists. The authors conclude that a number of rare Indo-Pacific *Acropora* species are the products of recent hybridisation events, and highlight the significance of hybridisation in coral diversification. ■

### Blue Coral of Okinawa Joins Threatened List

The International Union for the Conservation of Nature (IUCN) has expanded its Red List of Threatened Species to include blue coral, which is found in the waters off Okinawa Prefecture. The IUCN, comprising governments and environmental conservation groups around the world, released the new study at a recent general meeting held in Barcelona.

Last year, a large community of blue coral covering an area of about 1,000 square meters was found in Oura Bay in Nago, Okinawa Prefecture. The coral is about four kilometers from the planned relocation site for the US Marine Corps' Futenma Air Station.

Another community of blue coral exists off the coast of Ishigakijima island. ■

## Florida's \$5.5 Billion Reef Economy at Risk From Climate Change

A comprehensive new analysis of business generated by Florida's coral reefs warns that more than 70,000 jobs are at stake

"A business-as-usual approach to climate change could mean a lot less business for Florida," said Jerry Karnas, Florida project director at Environmental Defense Fund, which commissioned the report, *Corals and climate change: Florida's natural treasures at risk*.

Florida boasts the only shallow-water coral reefs in the continental United States—and those reefs are a centerpiece of South Florida's economy. Like coral reefs worldwide, Florida's are under siege from a range of environmental challenges that could lead to huge economic losses in the state.

The groupers, snappers, jacks, angelfish, and spiny lobsters that thrive on coral reefs also make Florida a destination for

millions of fishermen every year. Catches of reef-associated species in South Florida account for US\$158 million in annual sales.

Terry Gibson, the Fishing Editor of Outdoor Life magazine and a co-author of the report with University of Miami Professor Hal Wanless, noted that "from scuba diving in the Keys to charter fishing boats in Miami-Dade to commercial fishing in Martin County, reef-related sales amount to more than \$5.5 billion each year."

EDF's Karnas said quick federal action to limit greenhouse gas emissions can help protect Florida's reefs and the state's economy. "We need Congress to cap global warming pollution. This report shows that doing nothing is the worst option for Florida's economy." ■

## Florida Town Will Apply Electric Current to Stimulate Coral Growth

The town of Lauderdale-by-the-Sea in south Florida plans to install a cluster of electrified artificial reefs off the beach and run a low-voltage current through steel frames to stimulate the growth of corals, creating habitat for fish, crabs and other marine creatures. Shaped like airplane hangars, the six undersea structures each would stretch six feet along the ocean floor. Two buoys with solar panels would deliver electricity through insulated cables.

The electric current, too weak to harm swimmers or fish, draws dissolved calcium carbonate and other minerals from seawater, helping corals build their skeletons.

But some scientists aren't sure a jolt of electricity is what South Florida's reefs

need. "There are no peer-reviewed papers that I'm aware of that really document that corals grow faster or better on it," said Richard Dodge, executive director of the National Coral Reef Institute at Nova Southeastern University.

John McManus, director of the National Center for Coral Reef Research at the University of Miami, said there's no doubt steel frames will grow coral, if only because they provide a surface off the murky floor of the ocean. But while a mild electric current stimulates coral growth initially, he said it's unclear whether the benefit continues after the coral has thickened enough to block the current. Most important, he said, there have been no studies comparing electrified steel structures with identical structures without electricity. ■

*"There's not much evidence to say it's worth putting the electricity through."*

*It's probably not going to do any harm. It might do some good."*

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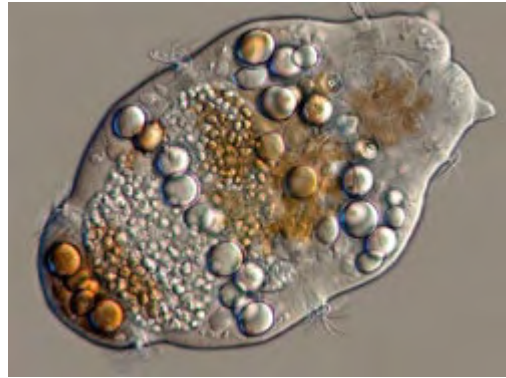
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## Zooplankton Eyes May Consist of Only Two Cells



Planktonic mollusc larva. This image by Dr Matthew Hooge, University of Maine took 20th prize in Nikons microscopy image contest in 2007

Larvae of marine invertebrates—worms, sponges, jellyfish—have the simplest eyes that exist. They consist of no more than two cells: a photoreceptor cell and a pigment cell. These minimal eyes, called eyespots, resemble the ‘proto-eyes’ suggested by Charles Darwin as the first eyes to appear in animal evolution. They cannot form images but allow the animal to sense the direction of light. This ability is crucial for phototaxis—the swimming towards light exhibited by many zooplankton larvae. Myriads of planktonic animals travel guided by light every day. Their movements drive the biggest transport of biomass on earth. ■

## It Pays to Protect the Seas



Rudolf de Groot, of Wageningen Univeristy, the Netherlands, has put a price tag on the benefits derived from the protection of coastal ecosystem.

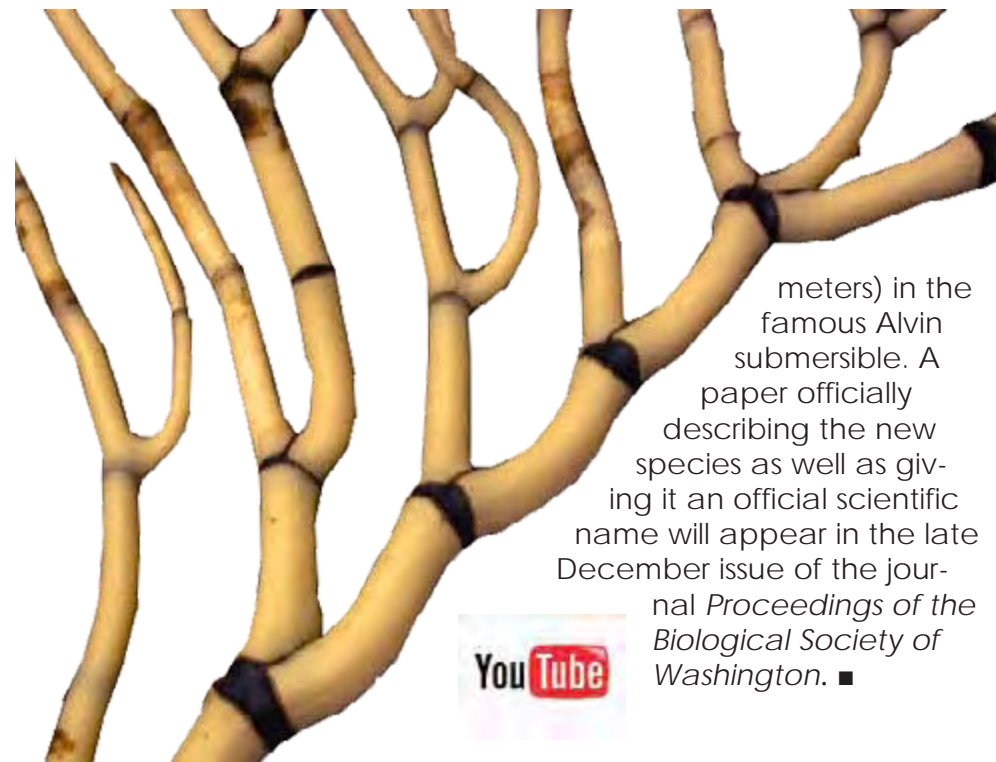
He has calculated that effective protection of 20-30% of coastal ecosystems costs between 5 and 19 billion dollars per year, but can generate benefits in terms of improving the surrounding fish stocks, exceeding the costs. As the actual expenses to maintain the currently unsustainable fishing industry are between 15 and 30 billion dollars per year, the Dutch researcher estimates that creation of the network of Marine Protected Areas would be a more efficient way to boost the fishing industry than the direct financial assistance they now receive. ■

## New Species of Isidella Bamboo Coral



A spectacular new species of coral has been discovered thriving in veritable forests on the peaks of undersea mountains off the coast of the Pacific Northwest. The large candelabra or fanlike “bamboo corals” have

been spotted by marine scientists growing to heights in excess of one meter. They are so abundant they create oases for numerous other deep sea creatures. The corals were discovered at depths of 2,300 to 3,300 feet (700 to 1,000



meters) in the famous Alvin submersible. A paper officially describing the new species as well as giving it an official scientific name will appear in the late December issue of the journal *Proceedings of the Biological Society of Washington*. ■



## Why Sand is Bad News for Corals

Australian ecologists David Bellwood and Chris Fulton studying rates of herbivory by coral reef fishes on algal turfs. Algal turfs are thick mats of sand and algae that envelope the rocky surfaces where a coral reef would grow, effectively preventing a degraded coral reef from re-establishing itself.

The key to the success of the algae in preventing the re-establishment of coral is the presence of sand, which renders

the algae less appealing to the fishes. The reasons why sand turns off the fishes’ appetite are unclear.

According to Dr Bellwood, “...it may be that the sediment acts as an antacid and gives the fish indigestion by preventing their stomach acids digesting their food. Or it may simply be that fish, like people, don’t appreciate a mouthful of sand and mud.” ■

## Elkhorn and Staghorn Corals Gain Protection



Elkhorn and staghorn corals provide the branching framework for reef creatures in search of a safe place to live, eat, and grow. The preservation and recovery of these threatened corals is essential to the conservation of an entire ecosystem. Both elkhorn and staghorn corals were listed as threatened under the Endangered Species Act in May 2006

NOAA’s Fisheries Service will increase its protection of threatened elkhorn and staghorn corals in Florida, Puerto Rico, and the US Virgin Islands through a new rule to prohibit activities that result in death or harm to either species. The new regulations take effect on Nov. 21.

“These corals were once the major reef builders in Florida and the Caribbean, but now more than 90 percent of their populations are lost,” said Roy Crabtree, NOAA’s Fisheries Service’s southeast regional administrator.

The rule will prohibit the import, export, take, and all commercial activities involving elkhorn and staghorn corals, including:

- collection or any activities that result in the corals’ mortality or injury,
- anchoring, grounding a vessel, or dragging any other gear on the species;
- damaging the species’ habitat;
- discharging any pollutant or contaminant that harms the species. ■





*Marine algae offer a vast renewable energy source for countries around the world that have a suitable coastline available*

PETER SYMES

## Seaweed Seen as a Future Green Energy Source

**Seaweed farms off Scotland's coast could help the country cut its carbon emissions, produce biofuel and provide valuable habitats for the marine life.**

Such farms could produce sustainable biofuel while avoiding the problems of producing it on dry land according to research by the Scottish Association for Marine Science. One of the most serious problems is that growing crops for biofuel takes up agricultural land that could be used for food, driving up food prices. Biofuel crops' heavy use of water is also a concern, and Scotland's cool, wet climate is poorly-suited to growing energy-rich crops. Seaweed could get around these problems.

The idea is that kelp would be harvested and placed in a large digester to be broken down by bacteria to form methane or ethanol. This could then be burned for electricity or heat. Comparatively few residues remain—seaweed contains much smaller quantities of tough lignin and cellulose than land plants—but what is left over at the end can be used as a fertiliser.

Seaweeds are extremely productive plants, with natural stands of brown kelp thought to produce between 16 and 65 kilos of biomass per square metre each year—a great deal compared to land plants like sugar cane, which produces just 8-18 kilos in the same area.

Getting these harvests would probably

involve developing some kind of aquatic version of a combine harvester so that banks of kelp could be cut quickly and without too much human input.

Kelp forests are dense and fast-growing so they should have no problem recovering from periodic harvesting. Norway has similar seaweed stocks to Scotland, and harvests 130,000-180,000 tonnes per year sustainably. Another benefit is that the seaweed farms would provide valuable habitat for marine animals, helping increase biodiversity. ■

*“Algae grows 10 times faster than sugar cane — so try to imagine mowing the lawn three times a day and you have your growth rate.”*

*—Mark Huntley, Royal Dutch Shell*

See feature-article on white whales or Belugas elsewhere in this issue

### Bioreactors fuelled by algae

Algae is an intriguing biofuel prospect because they are the fastest growing plants on the planet. Other great virtues is that unlike corn-based ethanol, many strains can be grown in salt water on marginal land. Algae only need carbon dioxide, water, and sunlight to make their own food and chemical energy through photosynthesis.

Algae makes oil that can then combust, and it can be used to make lubricants. It only takes a fraction of the space when it is grown in bioreactors, and you don't take something from the food chain.

But scientists caution that while the possibilities are interesting, the unintended consequences of cultivating algae on a large scale must also be considered.

The process of growing algae for fuel production creates a lot of waste and it requires significant energy to maintain the viable mass-culture required for commercial-scale algal operations. There is also the risk of the algae escaping from a commercial farm into the environment,

overwhelming the natural environment and introducing algal toxins. Some algae have a potent neurotoxin that can cause paralytic shellfish poisoning if mussels or the clams that accumulate toxins are consumed.

*Researchers at the Center for Biorefining of the University of Minnesota estimate that algae produce 5,000 gallons of oil per acre (56,825 litres per hectare).*

*By comparison, corn yields 18 gallons, soybeans produce 48 gallons and palm trees yield 635 gallons per acre.*

Prof. Charles Trick, University of Western Ontario and a specialist in aquatic sciences and microbial ecology, thinks the focus on algae is déjà vu.

“Much work—good work—was done in the 1970s. Algae, biofuels and power cells were all developed because of the oil embargo. The difference now, he says, is that major oil companies are behind biofuels. And there is a sense of urgency.

“The demand is now driven by India and China,” Trick says. “We have to do things differently.” ■

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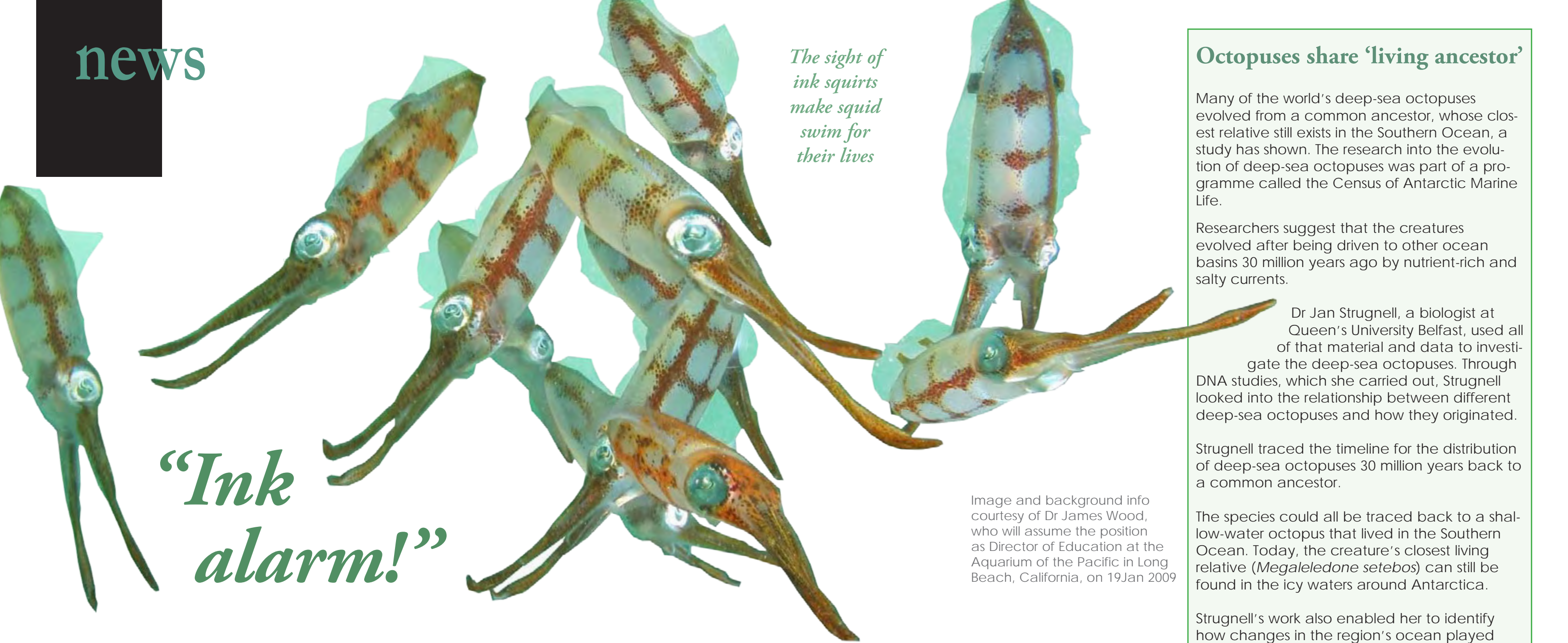
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*The sight of ink squirts make squid swim for their lives*

# “Ink alarm!”

## Octopuses share ‘living ancestor’

Many of the world’s deep-sea octopuses evolved from a common ancestor, whose closest relative still exists in the Southern Ocean, a study has shown. The research into the evolution of deep-sea octopuses was part of a programme called the Census of Antarctic Marine Life.

Researchers suggest that the creatures evolved after being driven to other ocean basins 30 million years ago by nutrient-rich and salty currents.

Dr Jan Strugnell, a biologist at Queen’s University Belfast, used all of that material and data to investigate the deep-sea octopuses. Through DNA studies, which she carried out, Strugnell looked into the relationship between different deep-sea octopuses and how they originated.

Strugnell traced the timeline for the distribution of deep-sea octopuses 30 million years back to a common ancestor.

The species could all be traced back to a shallow-water octopus that lived in the Southern Ocean. Today, the creature’s closest living relative (*Megaleledone setebos*) can still be found in the icy waters around Antarctica.

Strugnell’s work also enabled her to identify how changes in the region’s ocean played a pivotal role in the development of the new species, especially the emergence of a “thermohaline expressway”. ■

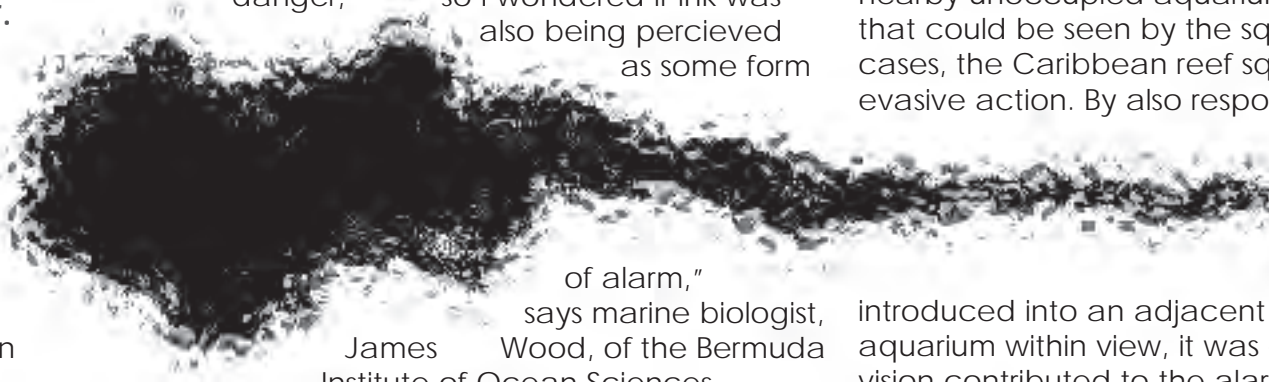
Image and background info courtesy of Dr James Wood, who will assume the position as Director of Education at the Aquarium of the Pacific in Long Beach, California, on 19Jan 2009

**When squid see ink squirted by another squid, they interpret it as a signal for danger.**

Animals respond to predatory attacks with distinctive behaviours, signals or displays. Cephalopods, with their complex nervous systems, produce many behaviors, one of which is ejecting ink when attacked by predators

It is assumed that the main reason squid squirt ink is to hide and escape from predators, but inking may also serve as an alarm cue for other squid to pick up.

“When fish bleed, the scent of their blood has been proven to alert nearby fish of danger, so I wondered if ink was also being perceived as some form



of alarm,” says marine biologist, James Wood, of the Bermuda Institute of Ocean Sciences.

**Squiddish for yelling “watch out”** Wood and colleagues collected ink from individual squid by scaring them with a shake of their aquaria. The team then

either added a dose of ink to a squid’s aquarium, to a nearby unoccupied aquarium that could be seen by the squid. In both cases, the Caribbean reef squid took evasive action. By also responding to ink

introduced into an adjacent but different aquarium within view, it was obvious that vision contributed to the alarm response. Meanwhile, ink that had the dark melanin colouring removed had no effect on squid behaviour. Together, these observations clearly indicate that the trigger is a visual and not a chemical signal. ■



Watch a demonstration on YouTube





*“We could not be more pleased with the positive feedback of this year’s show. With the current worldwide economic challenges, a number of DEMA members, retailers and exhibitors were apprehensive at the very beginning of the show. Yet, it became apparent when attendees entered the exhibit hall and disconnected from outside negative influences, they could conduct business in a direct and productive manner.”*

*—Tom Ingram, Executive Director of DEMA*



After a while most dive expos tend to look alike. Huge halls with harsh lighting, hard floors and long aisles. The interesting bits are in all the individual booths

*“Closing at 100 points up”*

# DEMA 2008



Going into the 32nd DEMA, I think many other dive professionals shared my sentiments of trepidation of what effects the financial crisis was going to have on the expo. It was only weeks before the dam burst wide open and sent stock markets worldwide into nose dives and yo-yo bounces. But I was in for a nice surprise.

I have participated in some 15 DEMA expos, but this one stood out as odd one. There weren't very many significant new innovations or developments in terms of products or new destination—the ones we found are described under the usual sections of this magazine—but the atmosphere were very energetic and positive with a lot of trading going on in the booths. Most other people I spoke to also expressed their positive surprise. It was a world apart from the gloomy news on the economy you could watch on TV back at the hotel.

X-RAY MAG's "GirlDiver"  
Cindy Ross (of GirlDiver.com)  
reporting from the floor



Tom Ingram presents Clement Lee with the 2008 Reaching Out Award

This year's show was bigger by some 50 exhibitors, and according to DEMA's president, Hornsby, there was a higher percentage of buyers on the show floor than nor-

mal, "and that's who we want to reach."

The social highlight of the DEMA Show 2008 was the 20th Annual DEMA Awards Party held on the evening of October 24 at the Riviera Hotel and Casino Ballroom. It proved to be an unforgettable night of music, delectable food, fun and live entertainment with industry peers dressed to impress as the red carpet was rolled out in celebration of both past and present SCUBA diving industry "Legends" who have helped influence and introduce the underwater world through movies, television and film. Legends Zale Parry, Stuart Cove, Chuck Nicklin, Pete Romano, Al Giddings, Gavin McKinney and their families joined Awards Party attendees at the glitz and glamour event decorated in complete Hollywood style! Party attendees were greeted at the Ballroom entrance by two 8-foot Scuba Diver "Oscar" statues and VIP tables were adorned with brilliant "diamonds" etched with respective company logos. It appeared virtually every seat was occupied to honour the recipients of the 20th Annual DEMA Reaching Out Award, Clement Lee and Marty Snyderman. ■

Continuing to be the largest trade event in the world for companies doing business in the scuba diving, ocean sports and adventure/dive travel industries, DEMA Show 2009, the 33rd Annual DEMA Show, will take place November 4-7, 2009 at the Orange County Convention Center in Orlando, FL. More than 650 exhibitors from around the world and thousands of dive and travel industry professionals are expected to gather at next year's show. ■





**US Airmen extend enlistment underwater**

ANDERSEN AIR FORCE BASE, Guam - Lt. Col. Anthony Davit, 554th RED HORSE Squadron commander, administers the oath of enlistment to Master Sgt. Chad Craig, 25 feet underwater off Gab Gab beach.



**Barack Obama on protecting the Oceans**

The US president-elect lays out steps the United States should take to protect ocean health during his presidency

Oceans are crucial to the earth's ecosystem and to all Americans because they drive global weather patterns, feed our people and are a major source of employment for fisheries and recreation. As president, I will commit my administration to develop the kind of strong, integrated, well-managed program of ocean stewardship that is essential to sustain a healthy marine environment.

Global climate change could have catastrophic effects on ocean ecologies. Protection of the oceans is one of the many reasons I have



developed an ambitious plan to reduce U.S. emissions of greenhouse gases 80 percent below 1990 by 2050.

We need to enhance our understanding of the effect of climate change on oceans and the effect of acidification on marine life through expanded research programs at NASA, the National Oceanic and Atmospheric Administration (NOAA), the National Science Foundation (NSF), and the United States Geological Survey (USGS). I will propel the US into a leadership position in marine stewardship and climate change research. Stronger collaboration across US scientific agencies and internationally is needed in basic research and for designing mitigation strategies to reverse or offset the damage being done to oceans and coastal areas.

The oceans are a global resource and a global responsibility for which the US can and

should take a more active role. I will work actively to ensure that the US ratifies the Law of the Sea Convention—an agreement supported by more than 150 countries that will protect our economic and security interests while providing an important international collaboration to protect the oceans and its resources. My administration will also strengthen regional and bilateral research and oceans preservation efforts with other Gulf Coast nations.

Our coastal areas and beaches are American treasures and are among our favorite places to live and visit. I will work to reauthorize the Coastal Zone Management Act in ways that strengthen the collaboration between federal agencies and state and local organizations. The National Marine Sanctuaries and the Oceans and Human Health Acts provide essential protection for ocean resources and support the research needed to implement a comprehensive ocean policy. These programs will be strengthened and reauthorized. ■

—Barack Obama

**Dr Sylvia Earle awarded the 2009 TED prize**



"We've got to somehow stabilize our connection to nature so that in 50 years from now, 500 years, 5,000 years from now, there will still be a wild system and respect for what it takes to sustain us."

Sylvia Earle, called "Her Deepness" by the New Yorker and the New York Times, "Living Legend" by the Library of Congress, and "Hero for the Planet" by Time, is an oceanographer, explorer, author, and lecturer with a deep commitment to research through personal exploration.

Earle's work has been at the frontier of deep ocean exploration for four decades. Earle has led more than 50 expeditions worldwide involving more than 6,000 hours underwater. She was the captain of the first all-female team to live underwater, and in 1979, Sylvia Earle walked untethered on the sea floor at a lower depth than any other woman before or since.

In the early 1990s, Dr Earle served as Chief Scientist of the National Oceanographic and Atmospheric Administration. At present, she is explorer-in-residence at the National Geographic Society.

Earle remains a dedicated advocate for the world's oceans and the creatures that live in them. Her voice speaks with wonder and amazement at the glory of the oceans and with urgency to awaken the public from its ignorance about the role the oceans plays in all of our lives and the importance of maintaining the health of the seas. ■

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## Training bulletin

Edited by  
Arnold  
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### NAUI's 2009 Just Dive Calendar is now available!

The Just Dive Calendar is back by popular demand! NAUI is happy to introduce the *2009 Just Dive Calendar*—available now for a limited time only! This calendar features impressive images from the second annual "Just Dive" Photo Contest. There will only be one printing of this calendar and it is a limited time offer. Order yours now at [www.naui.org](http://www.naui.org) ■



WATERPROOF EXPEDITIONS

## PADI Polar Diver Specialty Course

This PADI Specialty Course can only be taken with Waterproof Expeditions in Antarctica, below the Antarctic Convergence or below 60 degrees, or in the Arctic, above the Arctic Circle. The course is designed to be an introduction to polar diving and help the student diver develop the skills, knowledge and techniques necessary for diving in polar environments.

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[www.waterproof-expeditions.com](http://www.waterproof-expeditions.com)



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### PADI Thresher Shark Specialty

This unique course was written by TSD founder, Andrea Agarwal, with the help of the TSD staff. Between them, they have thousands of dives with thresher sharks on Malapascua Island, Philippines—the only place in the world known for daily sightings of this beautiful shark. The course will teach participants about sharks in general, and focuses on thresher sharks in particular. Students will also learn about the habitat of the thresher sharks in Malapascua and how to dive with them in an appropriate manner. During the course dives, students search for sharks and identify behavioural patterns, markings, and gender. The course emphasises shark conservation issues and discusses the measures taken to conserve the sharks.

[www.malapascua-diving.com](http://www.malapascua-diving.com) ■

## DAN Dive Medicine for Divers Course

In response to ongoing requests, DAN, in cooperation with its international partners, has developed a new education program called Dive Medicine for Divers. This new modular program includes sections on fitness to dive, safety planning, decompression illness, barotrauma, gas toxicities, equipment-related problems and diving maladies that aren't pressure-related.

The first three modules of this program were released this fall. Now many DAN Instructors can offer these programs. It will include a selection of skills learned with an instructor, instructor-led lectures, video programs and self-study information.

In 2009, DAN will release additional modules for this program.  
[www.diversalertnetwork.org](http://www.diversalertnetwork.org)

The first three modules are:

- **Basic Examinations** — This module teaches how to evaluate a diver's respiratory and cardiac function using a stethoscope.
- **Fitness to Dive** — This module discusses what it means to be physically fit enough to dive and the conditions that can keep divers out of the water.
- **Safety Planning** — This module includes processes and procedures to make your dives safer and also discusses how to deal with the aftermath of a dive accident, including taking care of the diver's equipment for an investigation and taking care of the rescuers afterward. ■

### Poseidon Discovery Rebreather becomes an IANTD approved CCR

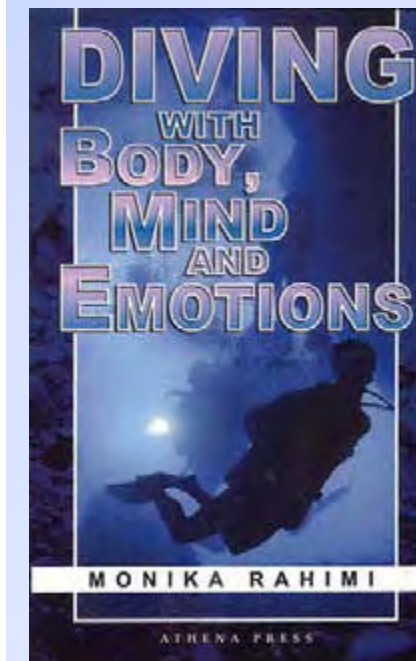
Kurt Sjöblom of Poseidon Diving Systems, and IANTD's Training Director Joe Dituri today announced that IANTD will begin offering training on the new Poseidon Discovery rebreather, effective immediately. The rebreather itself is the latest in the Cis-Lunar range (it's the Cis-Lunar Mk VII) and they are very pleased to be one of the first training agencies to approve the unit and begin offering courses on it.  
[www.iantd.co.uk](http://www.iantd.co.uk) ■

### SSI introduces online training program

This interactive online training program is consistent with the SSI philosophy of keeping the SSI Dive Center as the recognized hub of the sport diving community. SSI took the time to study online training and tailored it to maximize the benefits for the dive retailer. This online academic program is offered to the consumer and the SSI Dive Center FREE. The program is focused on driving new consumers to SSI Dive Centers where long-term relationships are developed. This type of an approach to online training will allow dive centers to provide customers a whole new element of convenience at no additional cost. SSI Dive Centers are excited about implementing this program and increasing new student acquisition. [www.divessi.com](http://www.divessi.com) ■

## Why should you read this book?

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Author's E-mail: [monika.rahimi@gmx.de](mailto:monika.rahimi@gmx.de)





Edited by  
Mathias Carvalho

## You may look, but *don't* touch

The *USS Oriskany* is considered the world's largest artificial reef. Once a mighty aircraft carrier, she was sunk 24 miles off the coast of Pensacola, on 17 May 2006. A veteran of two wars, the Mighty O's flight deck lies at 135 feet deep and is considered an exceptional destination for scuba diving and spearfishing.

And therein lies the snag. That depth is already five feet outside the current recreational diving limit, although it is maintained that it can be reached with a moderately safe dive profile.

"People just had to touch it," said Eilene Beard, chairwoman of the Escambia County Marine Advisory Committee. "And we'd say, OK, bounce down there and touch it and get back up here so you don't use all your nitrogen."

### Deeper concerns

After Hurricane Gustav went

through the Gulf of Mexico in August 2008, the vessel shifted about ten feet deeper. And without proper equipment and training, that depth can be dangerous to most sport divers.

"That extra ten feet made a huge difference," said Jim Phillips, a local dive shop owner. "What makes the aircraft carrier different than any other ship out there is that flight deck."

*After Hurricane Gustav went through the Gulf, the vessel shifted about 10 feet deeper.*

### Thunderous impact

A May 2007 report by the Haas Center, concluded that the *Oriskany's* impact on the in Escambia and Baldwin counties' local economy created a dive-related expenditures drive, generating an economic impact of US\$3.6 million in local output, 67 additional jobs, and \$1.4 million in local income. But after Gustav, business slowed down, according to Beard.

Keith Wilkins, deputy director of Neighborhood and Community

Service Bureau, commented that the *Oriskany's* depth shift now offers safer conditions, because fewer divers will be tempted to reach the flight deck and will remain at shallower and safer depths.

As the *Oriskany's* highlights are well above the flight deck mark, with the majority of marine life circling through the upper towers of the vessel, divers may still profit from a wonderful experience.

"It might be a little less attractive, a little less of a tease," Wilkins said. "But inadvertently, it's also a lot safer." ■

## The Vandenberg soap opera continues

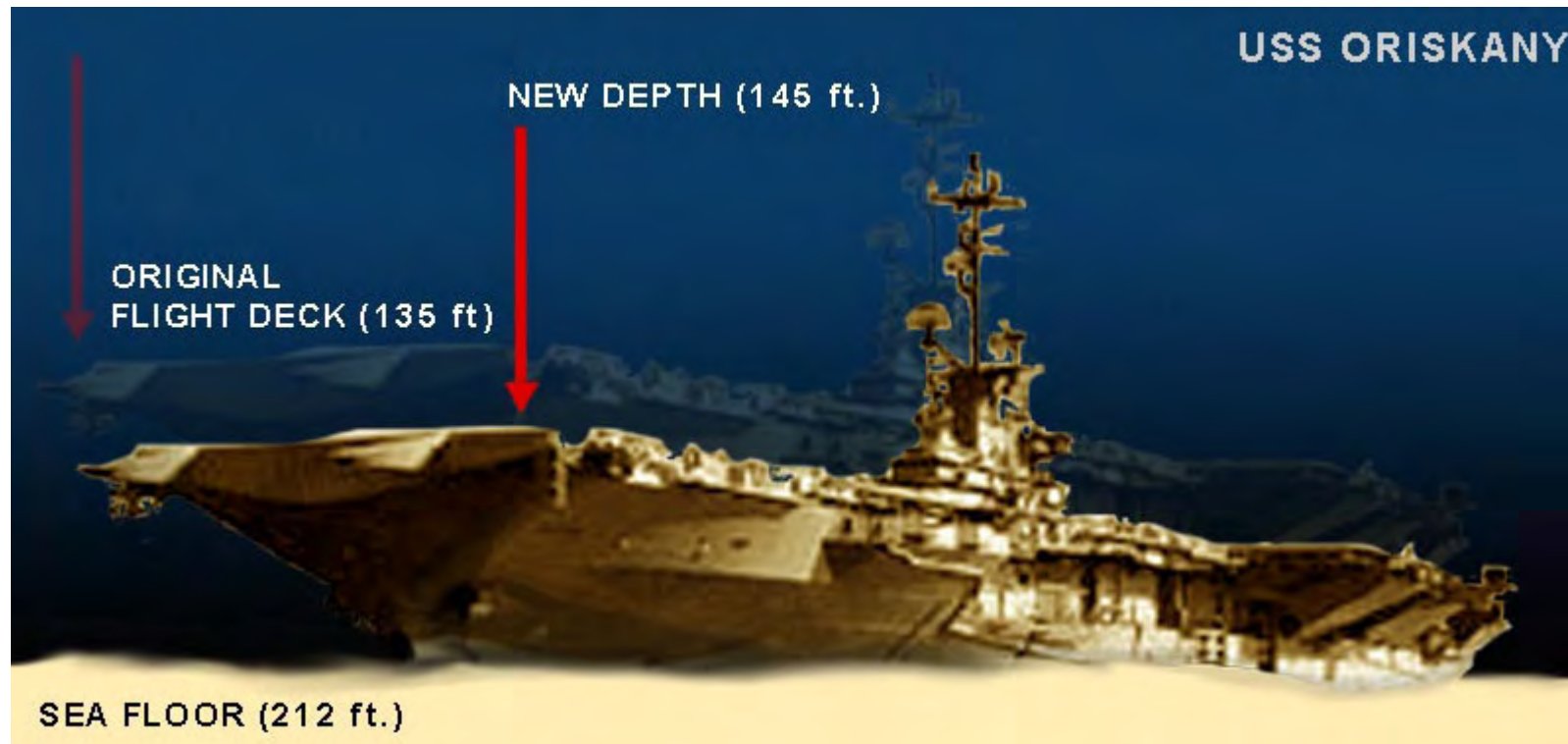


The state of Florida is poised to contribute up to US\$1.6 million to satisfy a shipyard lien so a 524-foot decommissioned Air Force missile tracking vessel can be scuttled as an artificial reef off the Florida Keys, Key West officials said.

The money to complete the *Gen. Hoyt S. Vandenberg* project is to come from an Office of Tourism, Trade and Economic Development grant. But a contract between the state and the

city has to be executed and additional details are pending. A federal judge recently ordered the auction of the ship after a contractor failed to pay Colonna's Shipyard in Norfolk, Virginia, for cleanup of the vessel.

Key West City Commissioner Bill Verge predicted the *Vandenberg* would be towed from Colonna's Shipyard in Norfolk, to Key West in December, with a scuttling to take place in February 2009. ■



Artists impression of *USS Oriskany* resting on the sea bed

MATHIAS CARVALHO



## Burning the Midnight Oil

Peter Garrett, former singer of the rock group "Midnight Oil" and current Australian Minister for the Environment, Heritage and the Arts, announced that AU\$440,000 in funding from the Australian Government's Historic Shipwrecks Program will be used to protect the nation's underwater cultural heritage. The announcement was

made during a visit to the Queen Victoria

Museum in Launceston, Tasmania, where three of the 29 funded projects will be carried out.

"Shipwrecks are virtual underwater libraries of information from our past, and the secrets and insights our shipwrecks hold tell a story about our nation, revealing information about the people that traveled to our shores and the times in which they lived. With a vast maritime heritage, it is vital that we act to preserve Australia's historic shipwrecks and their artifacts for future generations", he declared. Garrett added that each wreck is a precious record of Australia's past, a marker of some of the most significant events of their history. ■

► Famous Australian shipwrecks



*Iron Knight*  
(1943)





# Divers reach SS Portland

The *SS Portland* wreck, New England's worst maritime disaster, received its first visitors after going down 110 years ago just north of Cape Cod. A team of five recreational scuba divers from Massachusetts has become the first to directly explore the wreck. Lying at 460 feet—twice the famous *Andrea Doria* shipwreck's, this extreme depth has prevented any human visitation—until now.



The ship was never seen again. Pieces of the upper decks, along with 38 bodies, subsequently washed up along the Cape Cod shore, but the location of the shipwreck itself remained a mystery for nearly 100 years.

The *Portland* is the most important of the New England historical shipwrecks, according to Stellwagen Bank National Marine Sanctuary's officials, who also confirmed that the divers' photographs match previous video footage obtained by remote-controlled cameras, mounted on a remotely operated vehicle (ROV) used to positively identify the wreck in 2002, during a government sponsored survey.

## Protected grave site

Divers on the wreck are not allowed to remove or disturb any artifacts, given its historical value, as well as its status as a grave site.

Dives are limited to 10-15 minutes of bottom time, followed by up to four hours of decompression. "It's a lot of effort for a little time to explore the wreck," adds Foster, "but even a short visit to the Portland is absolutely worth it."

A veteran of numerous New England wrecks, Foster announced the dives in October and posted photos of the wreck site at [www.bostondeepwrecks.com](http://www.bostondeepwrecks.com). ■

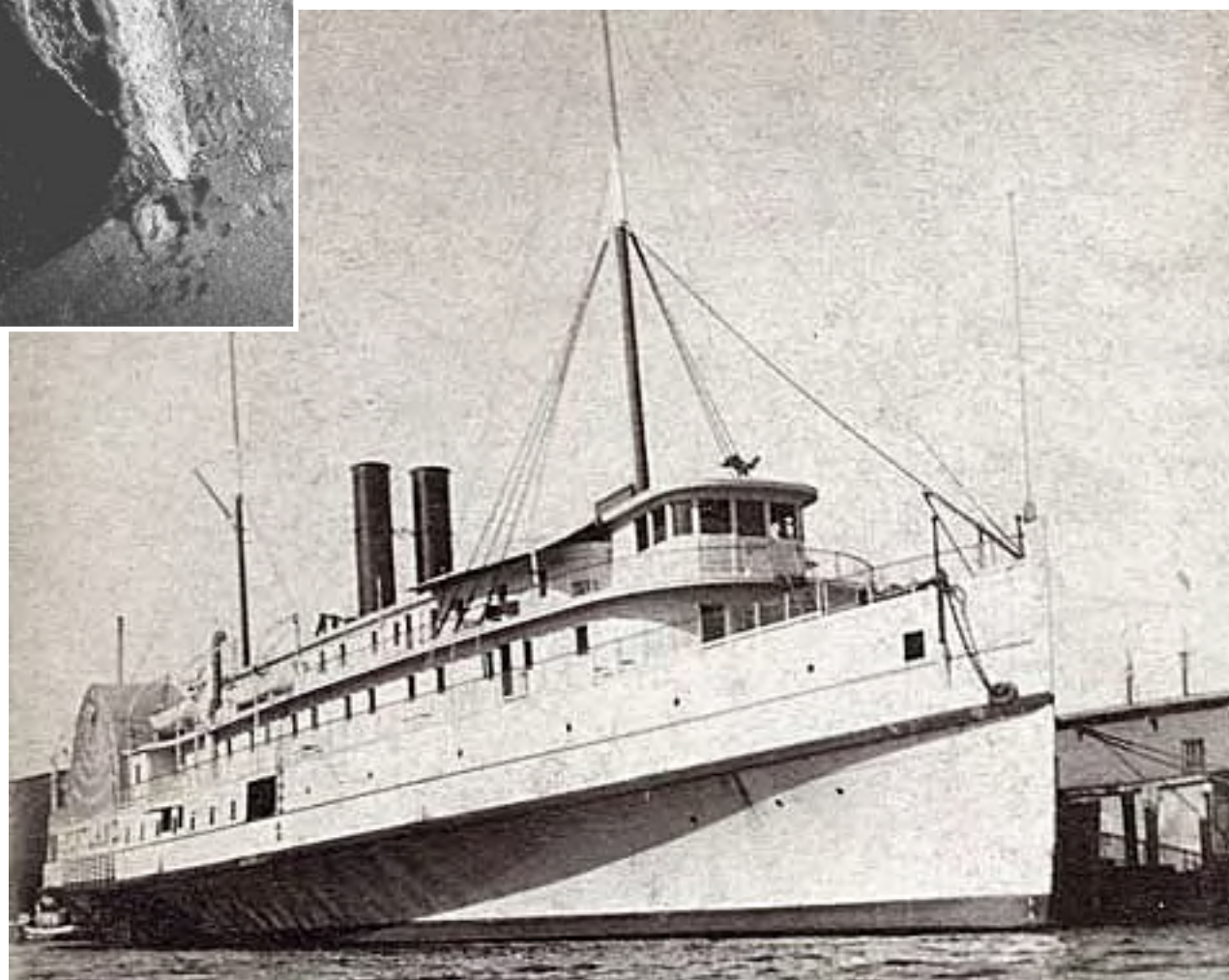
"There are more artifacts than I've ever seen on any wreck. They're everywhere—plates and dishes and mugs and sinks all over the bottom," said Bob Foster, the leader of the three dive expeditions made between August and September 2008.

## The original perfect storm

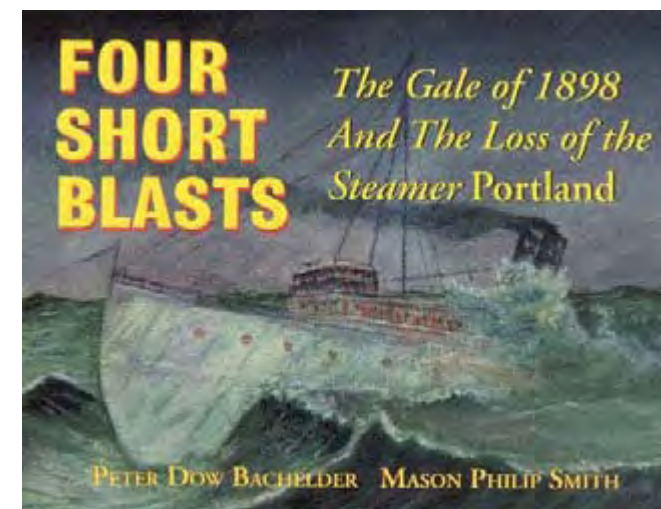
One of the last of New England's luxurious, paddlewheel-driven coastal steamers, carrying approximately 192 passengers and crew, the *Portland* left Boston bound for Portland, Maine, on 26 Nov. 1898, but was hit by a fierce storm on

the way—one of the worst in New England history and later known as the Portland Gale.

Approximately 150 additional vessels were lost in the hurricane force winds, which claimed 400 lives. Wind and water from the storm destroyed dozens of homes and even changed the course of rivers.



Book on Amazon



## Artificial reefs



With the sinking of the *USS Kittiwake*, slated for June 2009, the Cayman Islands will create an exciting new dive attraction and artificial reef, while providing much needed relief for some of the most frequently visited dive sites.

The *USS Kittiwake*, a de-commissioned naval ship, will be sunk on the north end of Grand Cayman's world famous Seven Mile Beach, providing underwater enthusiasts of all skill levels with a new year-round diving destination that is both easy to access and a thrill to explore.

"Our sea-faring heritage, our strong interest in presenting varied tourism offerings and our belief in preserving the environment, all played a major role in the decision to acquire this latest diving attraction," said the Minister of Tourism, Hon. Charles E. Clifford,

The *USS Kittiwake* was originally commissioned as a Chanticleer-class submarine rescue ship in the United States Navy during World War II. Now it will join the *MV Captain Keith Tibbets*, a Russian Frigate sunk off the coast of Cayman Brac in 1996, as one of the greatest artificial reefs in the Caribbean.

Speaking for the Cayman Islands Tourism Authority, *USS Kittiwake* Project Manager Nancy Easterbrook noted, "The *Kittiwake* has been a labor of love and extremely hard work for more than five years, and we all look forward to seeing water-based tourism in Grand Cayman stimulated by this new underwater attraction, suitable for both divers and snorkelers." ■

A side scan sonar image of SS Portland

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# Centenary Shipwreck Celebration

In December 2008, the town of Warrnambool in Victoria, Australia, festivities will take place for the 100th anniversary of one of the greatest shipwrecks of what is known as "Shipwreck Coast". The *Falls of Halladale* went down in full sight of the townsfolk gathered at the shore, after hitting a submerged reef of the coast of Peterborough, almost 100 years ago.

Centenary organizer Rex Mathieson described the wreck as one of the last "great" sailing shipwrecks. "What makes the *Falls of Halladale* more unique is that

it had steel masts and wire rigging." He added, "Most of the sailing ships of the time had wooden masts and hemp for rigging. The steel tubing on the *Falls of Halladale* would have made it handle heavy seas a lot easier without causing much damage."

**One foggy day a long time ago**  
It was a morning with a heavy mist that prevented any visual forewarning, as the ship neared the southwest Australian coastline on 13 November 1908.

Confused, the captain miscalculated the ship's position. As the fog lifted, the ship—with full sails—was only a few hundred meters from shore and surging towards a rocky outcrop. Within minutes, the ship had struck a

The Shipwreck Coast is aptly named, with more than 200 wrecks along its length. Many occurred in the goldrush years of the mid-19th century, as sailing ships bringing hopeful immigrants foundered on the rocky cliffs and reefs of the southern coast.

submerged reef, about 150 meters out to sea. It must have been an incredible spectacle. The ship was stuck on the rocks, with only the stern submerged, leaving its bow and sails in full view. The crew escaped unharmed, rowing ashore and seeking refuge at the nearby Bay of Islands homestead.

The 2085-tonne ship was bound from New York for Melbourne and Sydney, carrying 500 sewing machines, 6500 gallons of oil, 14,400 gallons of benzene and 56,763 American slate tiles. Little remains of the wreck, as explosives were used during salvage operations and the vessel came apart over the years, due to the coast's strong swells and winds.

"It was in full view for months," Mathieson declared. "It took a while to become fully submerged. When you dive the wreck, it looks like a demolition site to the untrained eye. The steel hull is no longer intact, and it's pretty much unrecognizable."

The *Falls of Halladale* was the second last sailing ship to sink off Shipwreck Coast. The last one was the *Antares*, which sunk near Nirranda in 1914. ■



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# Britannic



Is Back In Business

His Majesty's Hospital Ship *Britannic* isn't a name with which everyone is familiar. Nor did it inspire a million-dollar blockbuster movie feature like its famous sister, the *RMS Titanic*. At the time of its sinking, *HMHS Britannic* made fewer headlines, and it has since been forgotten. But modern technology and the renewed interest in the *Titanic* has also turned a few eyes towards this lesser glamorous, but very historically significant vessel.

*Britannic* was completed at Belfast's Harland and Wolff shipyard, two years after *Titanic* was lost in 1912. It was also built as an Olympic-class passenger liner, but before carrying a single fare-paying passenger, was commanded as a hospital ship serving in the allied effort during the First World War.

On 21 November 1916, just off the Greek coast, there was a sudden explosion near the bow. Within 55 minutes, she went to the bottom, a victim of enemy action.

Thirty lives were lost when two lifeboats were smashed by a still-rotating propeller. More pressing wartime matters caused the tragedy to be soon forgotten until French explorer Jacques Cousteau found it again in 1975. It now lies at a depth of over 100 meters.

## Underwater Museum

BBC News correspondent Mike McKimm joined a Greek scientific expedition and dived to the *Britannic* to bring back dramatic footage of one of the world's largest wrecks.

The expedition will also try to

discover what caused the vessel to sink, either a German torpedo or a mine. After the war, the log of the German U boat *U73*—which roamed the area—revealed that it had laid 12 mines in the Kea Channel, just two miles from where the *Britannic* lies.

As it lies on its starboard side, which took the impact of the explosion, it's still impossible to determine what took the vessel to her grave. McKimm's documentary shows the seabed at the location where the mines were supposed to be and reveals what they found there.

Better built and hypothetically a lot safer, the *Britannic* should have remained afloat a lot longer. Nevertheless, she sank three times quicker than the *Titanic*. The probable reason is that special watertight doors were left open amidst the panic to abandon ship. But this remains one of those mysteries that generate all the allure of wreck exploration.

That is precisely what drove its current owner, Simon Mills, to purchase the shipwreck in 1996 and has since worked to protect it while still allowing divers access to the ship.



"My interest went beyond the historical conservation," explained Simon. "Diving has become a part of it. I have to work with divers to get what I require as much as they have to work with me to get what they require."

"I bought the ship for marine conservation. It's also the conserving of the artifacts. We want to create some sort of unique attraction around the world. It will combine science, history archaeology," he said.

And the site will possibly become a viable attraction for tourists, as plans are already under way to start regular submarine visitations, each taking just ten minutes to reach the bottom.

"That's much quicker than the two-and-a-half hours required to dive to *Titanic*," said McKimm, who has visited both sites. "After being lost for more than half a century, the *Britannic* could soon be the biggest must-see attraction in the Mediterranean. It's a very spectacular wreck and a very special one."

## Greek interest

On a different note, Greek biologists are fascinated by the wreck, as it has become a "living" artificial reef in what is a very barren area of the Aegean Sea. Taken over by a wide variety of marine life, it is turning into a natural laboratory for scientists who want to learn more about how such reefs might benefit the marine biodiversity of the local sea-bed. ■

The *Trouvadore*, carrying 193 African captives, went down after hitting a reef. According to historical documents, 192 African prisoners managed to swim ashore. The crew shot and killed one African woman, but the others were freed in the Turks and Caicos, where Britain had abolished slavery eight years earlier.



One of the earliest photographs of Africans being rescued from a slave ship by the British Royal Navy

The discovery was made possible after 1993 when Keith and Grethe Seim, founder of the Turks and Caicos National Museum, came across an letter at the Smithsonian Institution, written by an artifact salesman from the island.

It reported the shipwreck, back in 1841, and the sale of kava kava glass-eyed dolls. Further research on historical

archives in Britain, Cuba, the Bahamas and elsewhere, completed the story and provided clues of the location of the ship. The remains of a wooden brigantine, locally known as the Black Rock Wreck, were located near the area indicated in the letter.

Researchers Seim, Keith and other archaeologists were able to determine that authorities on the islands apprenticed the marooned Africans to

local trades, subsequently allowing them to settle on the islands. The ship's 20 crewmen were arrested and sent in chains to Spanish authorities in Cuba for trial on what was then a hanging offense, though their fate is not known.

"The people of the Turks and Caicos have a direct line to this dramatic, historic event—it's how so many of them ended up being there," Keith added.

Researchers are still looking for a list of English names given to the slaves that was sent by the island's officials to the authorities, which would provide an essential piece of information to the islands' current inhabitants' history and possible descendants. ■



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## Bangladesh becomes a new dive destination

Abundant corals and clear waters have catapulted Bangladesh's only coral island into a major tourist attraction



Laying approximately 14km off Bangladesh's southernmost town of Teknaf, the tiny island of Saint Martin in the Bay of Bengal attracts thou-

sands of local and foreign visitors daily thanks to its panoramic beauty and pristine marine life. Locally known as Narikel Jinjira (Coconut Island), the

island's beaches are fringed with coconut palms, a far cry from the perception most people have of this populous Muslim nation. "It's a paradise for us," said Nahreen Akhtar, a mother of two, who works for a private bank in Dhaka and was holidaying on the island.

A decade ago, fewer than 200 people made the crossing to visit the island and most returned before nightfall. Now, more than 3,000 tourists, a majority of them Bangladeshis, arrive each day. "I enjoy bringing people here, and they are pleasantly surprised when they see all the beauty. It's a shame this is not more known to the world yet," said Filip Engsig-Karup, a Danish tour operator. "When I take people from Denmark to Bangladesh, everybody is amazed, because the impression they have got about this country is quite different from the reality," he said.

Characterized by large areas of sand dunes and scattered mangroves, Saint Martin is the only island in

## ActiVentures announces the opening of their new resort in Anilao Batangas

Long regarded as the birthplace of Philippines diving, Anilao's waters have been a magnet for diving enthusiasts attracted by its flourishing coral reefs and prolific fish life. ActiVentures is proud to announce the opening of the Acacia Dive Resort, a luxurious dive resort unmatched by no other in the area. Nestled right in the heart of what has been recently deemed to be

the centre of marine biodiversity, the resort provides an enticing fusion of exotic island culture and sophistication, a mere 2.5-hour drive south of Manila.

With offices in San Francisco and Manila, ActiVentures offers pre-set or fully customized dive tours that are unrivaled in service and attention to detail. All inclusive eight-day, seven-night packages include accom-

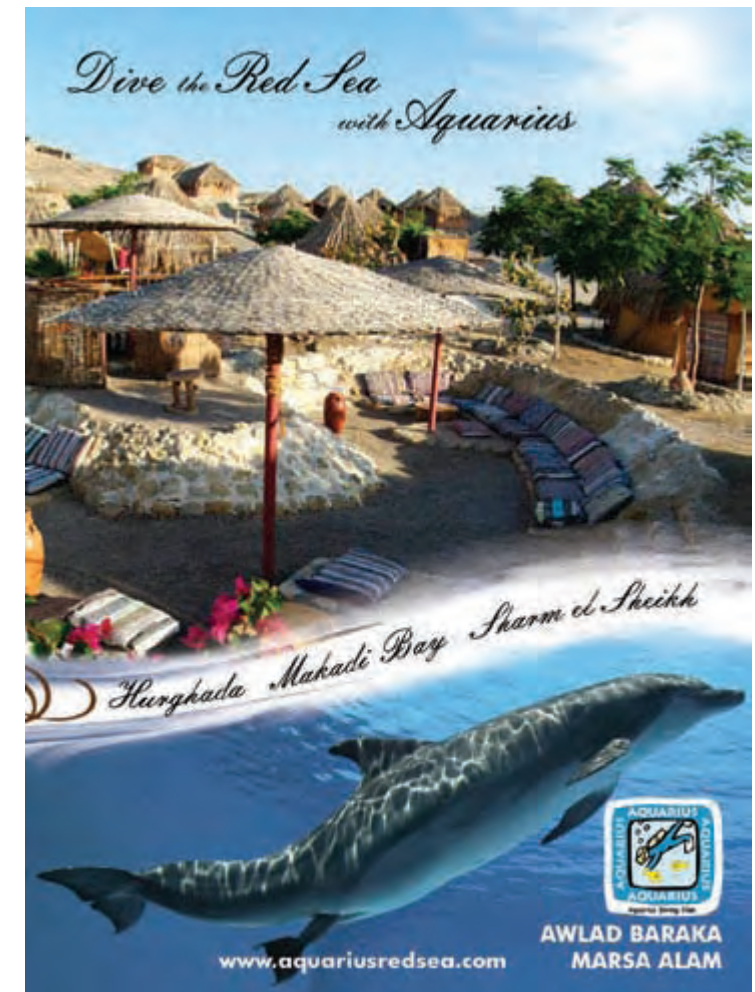
modations, all meals, 18 boat dives and unlimited shore diving, a day trip to Puerto Galera dive sites, all land and sea transfers, conservation fees and personalized ActiVentures Dive Professional Service for the duration of your trip. Prices start at US\$1650.00 excluding international airfares. For more information, contact:

info@activenturespi.com ■

Bangladesh to possess a coral reef. A total of 234 species of fish have been recorded from the coastal waters along with an abundance of molluscs and nudibranchs. In addition, the island is an important nesting site for endangered olive ridley and green turtles. Efforts are being made by local authorities to ensure protection of the turtles as well as the rare corals that are found there.

Recently introduced scuba diving has been incorporated into a bid to attract more tourists, and there are plans to bring water skiing and other sporting facilities to the island. "Bangladesh could earn millions of dollars every year if it promotes Saint Martin. People love coming here," said S. M. Kibria, a local tour operator.

Getting to Saint Martin involves flying or taking a bus to Cox's Bazar, about 400 km from the capital Dhaka, and then catching a bus to Teknaf, which is another 100 km away. From Teknaf, ferries run daily to Saint Martin, around three hours to reach the island. Most tourists visit the island from November to March. ■





Edited by  
Scott Bennett

## Curaçao gets deep-sea submersible

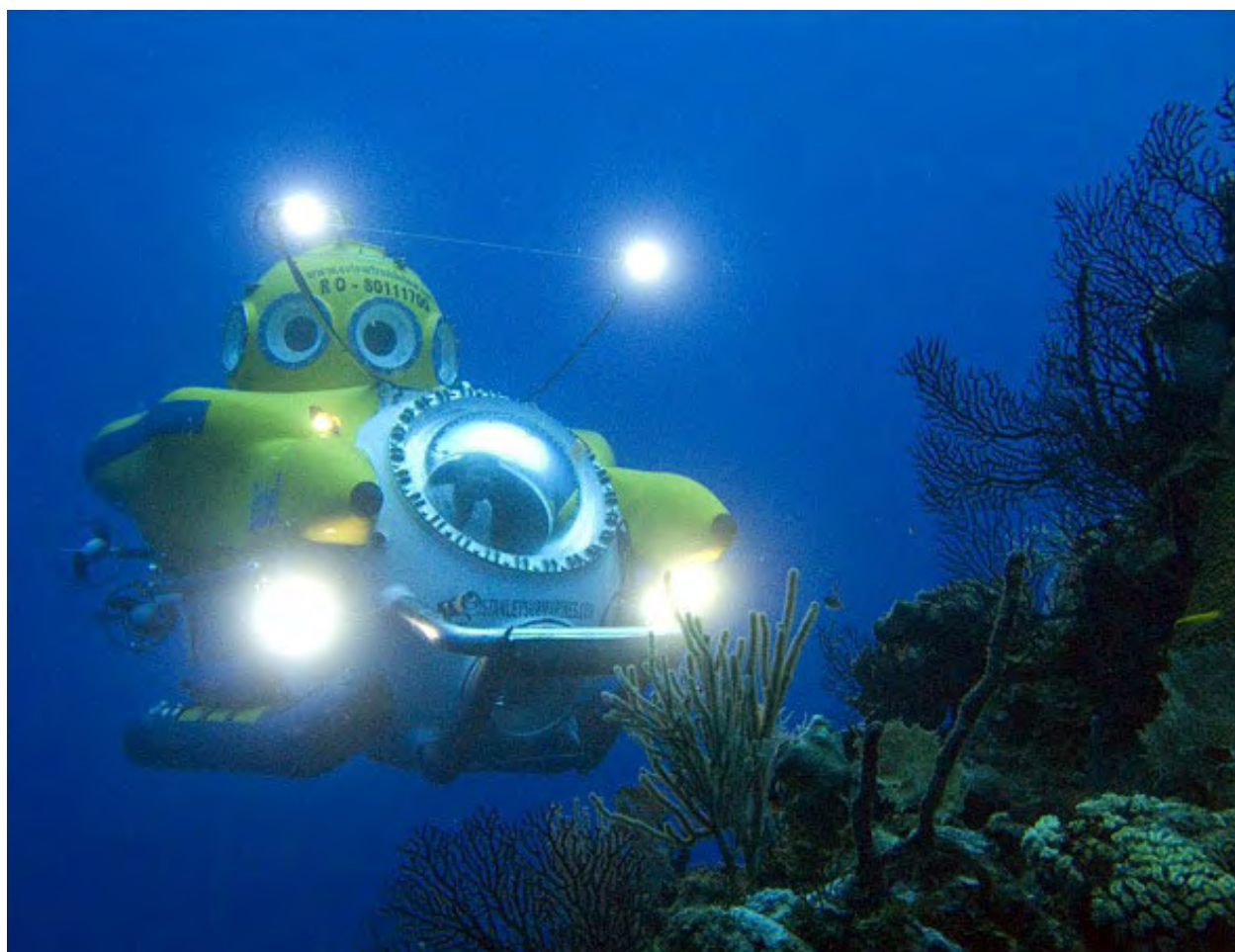
Willemstad – Curaçao will soon be having a new attraction: Substation Curaçao, a deep-diving submarine capable of cruising at depths in excess of 300 meters. Tourists can shortly experience the fascinating and spectacular underwater world in the Dutch Caribbean.

Substation Curaçao will be the only safe, certified and secured deep diving tourist submarine in the world. The waters off Curaçao have been described as "gin clear". Extraordinary fish and shipwrecks can be observed even at unsurpassed depths.

It is expected that the first submarine (for three persons, including pilot) arrives in Curaçao in December this year. It will be used temporarily until the official five-person submersible (including pilot) will be in on the island,

expected during the first quarter of 2009.

For more information, please call +5999 461 6666 or +5999 6638205. If you are in Curaçao, please drop by the Sea Aquarium, Bapor Kibra z/n. The website [www.substationcuracao.com](http://www.substationcuracao.com) will be launched in two months including information about Substation Curaçao, pictures, a virtual tour, safety measurements, etc. Visitors can also make their online bookings through this site. ■



## Diving Honduras in a homemade sub

In Honduras, a US entrepreneur takes tourists into the deep in his homemade and uninsured submarine.

In Roatan, Honduras, the 34-year-old American entrepreneur, Karl Stanley, regularly takes passengers to depths of 1700 feet, deeper than any other tourist sub in the world, in an uninsured and homemade submarine.

After nearly 1,000 dives over the past decade, Stanley has managed to accrue an enthusiastic clientele. Stanley conducts about 100 dives a year and charges US\$1,500 per person for a five-hour shark dive, not including the time it takes to prep the sub or haul a horse ahead as bait.

To help cover operating costs, he also collects a rare type of mollusc called a slit shell, which lives below 300 feet. Stanley devised a way to rig a net on the end of a pole and snags the creatures, earning him up to \$3,000 each.

"Without them," he says, "I wouldn't have been able to stay in business."

But while many admire Stanley's entrepreneurial resolve, others are concerned by his cavalier attitude towards risk. The enterprise has proven to be anything but risk-free, with assorted mishaps including cracked windows, being wedged in a cave, entanglements in lobster traps and small onboard fires.

"The guy's amazing—he's really cool," says Richard Boggs, technical superintendent at yacht brokerage firm Camper & Nicholsons International. "What disturbs me is that he's taking down people who don't fully understand the risk. That's just wrong, morally and ethically. It's illegal everywhere but the Third World, and for very good reason." ■

SOURCE: CNN MONEY

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## Scandinavian Airlines demonstrate “greener” landing procedures

New landing procedures that reduce the amount of fuel burned, as well as lowering emissions and noise levels, have been validated in “green” flight trials performed with Scandinavian Airlines Airbus 330s. SAS estimates the continuous descent approach (CDA) to airports can result in an estimated annual fuel reduction of 95 tonnes per aircraft, equaling a 290-tonne reduction in CO<sub>2</sub> emissions and a reduction in airport noise levels by 3-5 decibels. ■

## Fat Canadians get a break Canadian airlines must provide free extra seat for obese or disabled passengers.

The Canadian Supreme Court has ruled that Canadian airlines cannot charge extra for an obese person who needs an extra seat or a disabled person who needs space for a wheelchair or attendant.

Canada's largest airline is now trying to figure out which obese and disabled passengers will be eligible for the additional seats at no charge. Air Canada spokesman Peter Fitzpatrick said they are developing detailed eligibility rules for these free seats. The ruling Thursday applies only to domestic flights and will be implemented on 9 Jan 2009. ■



## MV Spree moves

Spree Expeditions have announced that the company is moving the award-winning liveaboard scuba diving boat *MV Spree* to the Dry Tortugas in the Florida Keys for full-time operation based out of Key West beginning May 2009.

*MV Spree* offers Sport Diving Charters and Technical Diving Charters. Sport diving charters to the Dry Tortugas run for three, four or five days, and offer up to five dives each day. The *MV Spree* also offers three-day and five-day “keys crawls,” featuring the wrecks and reefs of the lower Keys. In recognition of the beneficial role that nitrox plays in diver safety, nitrox is free on all charters.

For technical divers, the *MV Spree* offers specialized technical diving charters to the Key West Ghost Fleet and the deep wrecks of the Dry Tortugas. ■

## Gujarat to launch whale shark watching project to attract tourists

India – Tourists visiting Gujarat will now get a chance to watch whale sharks in their natural habitat near Saurashtra coast, with the “Whale Shark Watching Tourism” being launched in the state. The state Forest Department will also be celebrating the Whale Shark Day in Porbandar every year. This year, it is being celebrated on the day of the launch of the project.

About 1,200 to 2,000 whale sharks visit the Saurashtra coast every year. The whale sharks migrate from the north coast of Sri Lanka to the Gujarat coast. The best time for whale shark watching is between November and May.

The government plans to invite domestic as well as foreign private entrepreneurs to develop infrastructure along the coastal line, such as accommodation for tourists, restaurants and souvenir shops. ■



## Punta Cana Resort inaugurates Taino Underwater Park

Dominican Republic – The destination Punta Cana Resort and Club took the first step to create the Underwater Park Igneri / Taino, in Playa Bonita, with the laying of the first two sculptures of a total of 12 that will complete the exhibit.

The project is headed by the artist, Thimo Pimentel, with the support of the Punta Cana Group's Ecological Foundation.

The sculptures were deposited 50 feet in depth and one of them has the image of a Taina maid representing Atabeira or Mother of the Waters, and the second is a Domene with pictographs representing the god Huracan (Hurricane). ■

## Mafia Island—another coming dive destination?

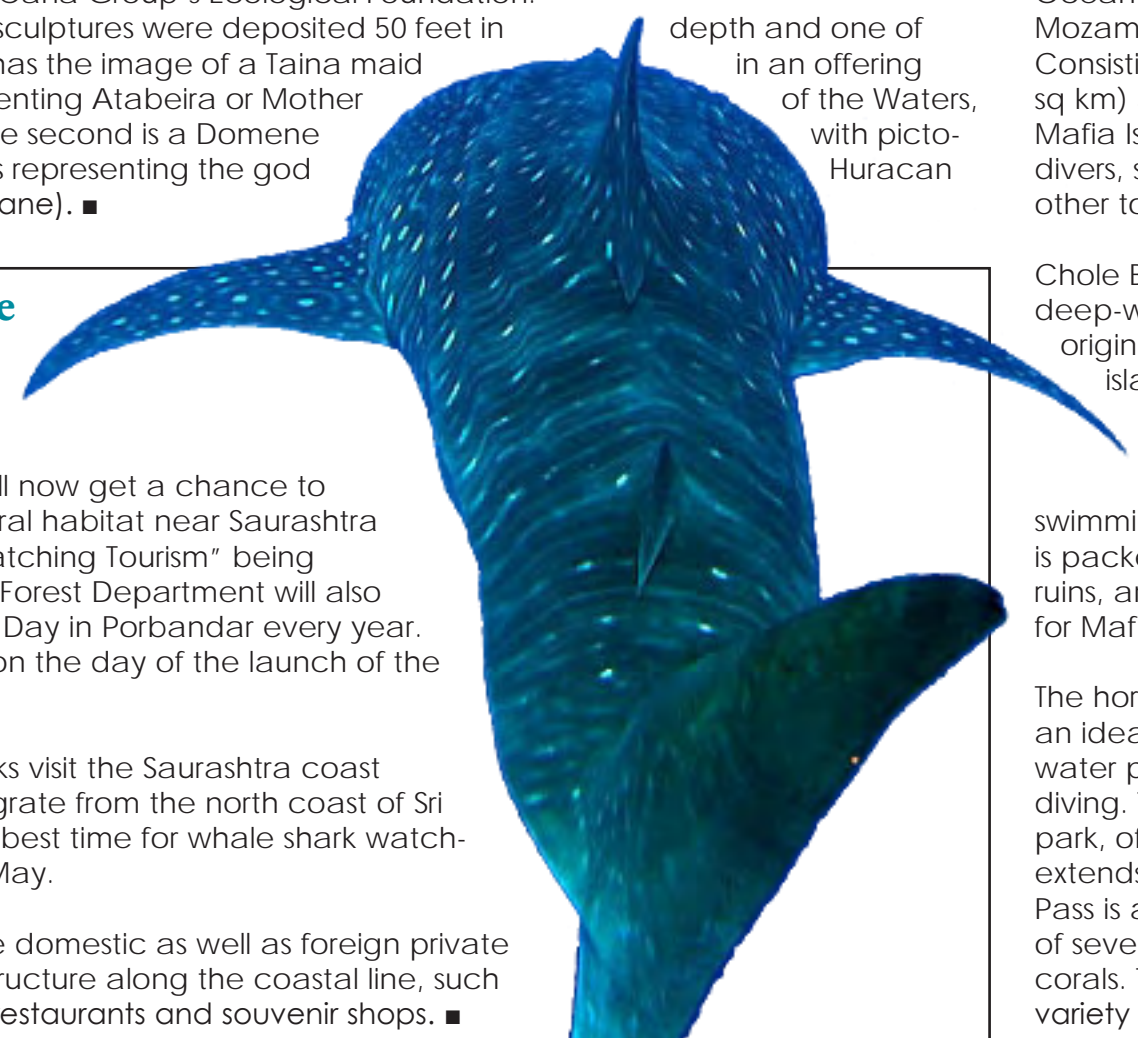
A new gateway for those who wish to discover the last remaining unspoilt islands of the world is Mafia Island, which is located off the delta of the Rufiji Islands in the southern region of Tanzania. This island is 120km from the city of Dar es Salaam in Tanzania, and it's one of the six districts of Pwani Region in Tanzania.

The Mafia Island's economy is primarily based on agriculture and fishing. Fishing is controlled in the southern area of the island within the confines of the Mafia National Marine Park.

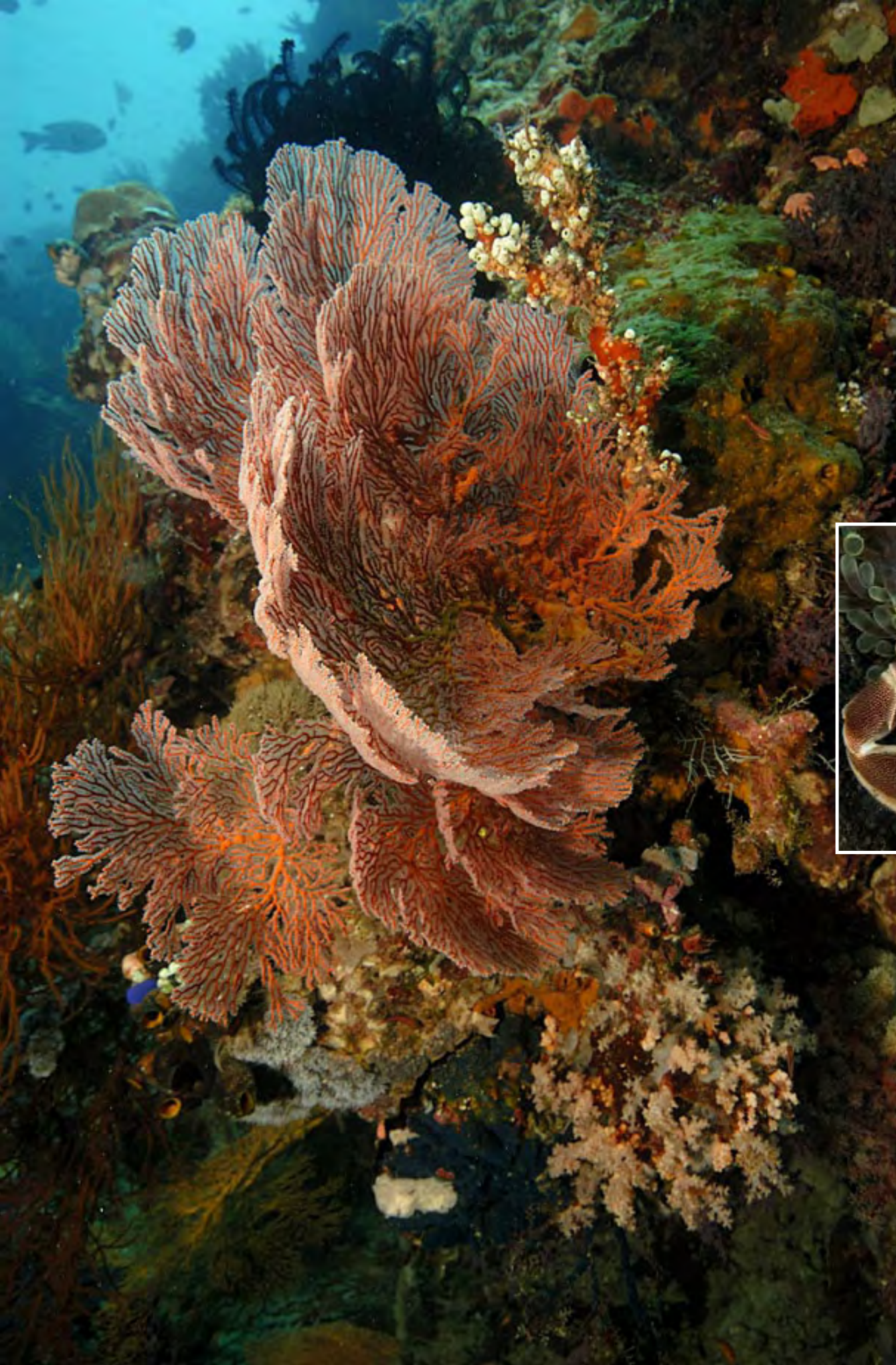
The island served as an important stop for the dhows (traditional sailing vessels) of Arabs and Persians who plied their trade in the Indian Ocean waters from the gulf to Mozambique and Madagascar. Consisting of one large island (394 sq km) and several smaller ones, Mafia Island attracts many scuba divers, sport-fishing enthusiasts, and other tourists.

Chole Bay, Mafia's protected deep-water anchorage and the original harbour, is studded with islands and beaches. The refreshingly clear protected waters provide wonderful snorkeling, sailing and swimming. Chole island excursion is packed with numerous ancient ruins, and it is a good starting point for Mafia Island tours.

The horseshoe-shaped Chole Bay is an ideal site for snorkeling, underwater photography, and scuba diving. The Mafia National Marine park, of which Chole Bay is part, extends to Kinasi Pass Wall. Kinasi Pass is a sheltered reef comprising of several species of hard and soft corals. The reef supports a wide variety of marine life. ■







# Bali

*Island of the Gods*



Text and photos by Scott Bennett

**Bali.** It's a name synonymous with a tropical island paradise, conjuring up images of emerald rice terraces, an exotic, vibrant culture and friendly people. This jewel of the Indonesian Archipelago is also a magnet for scuba divers, drawn by a bevy of attractions ranging from tiny jewel-like nudibranchs to enormous mola molas. Once you've been, you're hooked!

My previous visit had been a year and a half earlier. Although I had only stayed for a week, I was eager to return for a longer

stay. Due to previous commitments, the only time I could visit was in January, which to my dismay, turned out to be the height of the rainy season. However, I'll take rain in Bali over winter in Canada ANY day, so I threw caution to the wind and decided to go for it.

Twenty hours and several stopovers after leaving snowy Toronto, I finally arrived in Bali on a sultry tropical evening. The heavy rains that delayed our departure in Singapore had given way to a vibrant sunset, and I was feeling cautiously optimistic about the weather. On hand to meet me was my driver Alit, who would take me on the two and a half hour drive to my first stop of the trip, Scuba Seraya Resort on Bali's

CLOCKWISE FROM FAR LEFT: Fan corals on Menjangan reef; View at Tirtanangga; Mating crabs; Boxfish; Juvenile Frogfish; Decorator crab. BELOW: Moray eel serviced by cleaner shrimp







CLOCKWISE Seraya Beach; Balinese boy in ceremonial wear; Harlequin shrimp; Seraya resort

northeast coast. Still groggy from jet lag, I slept for most of the way, and before I knew it, we were pulling into the resort's driveway. The grounds were quiet, with the only sound being crickets and the occasional dog barking in the distance. After grabbing a quick drink, I retired to my room to assemble my camera gear.

The next morning, the skies were gloomy but my spirits were high as I wandered over to the dining room for an early breakfast. After a kick-start with a cup of strong Balinese coffee, I was eager to get into the water. I headed over to the dive shop to get my gear sorted out. There I met Degeng, who was to be my guide. It also turned out I was the only diving guest that day. Sweet!

When owner, Patrick Schwarz, first developed the property, no one had any idea as to the treasures that lay just offshore. Now, this innocuous corner of the North Bali coast is something of a mecca for muck, attracting divers the world over to experience the myriad of critters that can be observed here. And I was going to have it all to myself!

Despite having my "critter shopping list" handy, I asked Degeng what he had seen recently. Upon hearing the magic words "boxer crab with eggs", there

was no doubt as to where the first dive would be! After gearing up and doing a final check on the camera, we walked the scant few metres to shore and our entry point. The unsettled conditions had resulted in strong surf, which made our shore entry a bit awkward to say the least! Fortunately, conditions were somewhat calmer underwater, and we swam down the gentle slope of black sand.

Seraya Secrets is comprised of two sections, each with distinctive habitats. Just off the beach, the bottom gradually descends to a depth of around 3-9 metres. This is 'Top Secrets' where the black sand is punctuated with a mixture of small rock outcrops, sponges and tiny hard coral clusters. It was here that we found our quarry!

With a truculent stance, the boxer crab waved its claws like a miniature cheerleader, each equipped with a tiny stinging anemone for protection. Underneath its carapace was a jewel-like cluster of vivid red eggs! I immediately put my close-up filter over the macro port and inched closer. The subject cooperated by remaining relatively still; unfortunately, it was I that was moving! The surge from the waves above made focusing a real challenge. No sooner did I focus that the







surge shoved me enough to throw everything out of focus. Necessity is the mother of invention, so I did everything possible to steady myself. Between holding Degeng's shoulder and bracing my elbow against the sandy bottom, I was able to get the shots.

If the dive ended then and there, I would have been one happy camper, but Degeng had a lot more to show me. A concrete block at four metres played host to a lionfish convention of several species

in addition to tiger shrimps, nudibranchs and a pair of curious white-eyed morays who obligingly posed for photos.

Moving deeper, abundant crinoids were home to commensal shrimp in a variety of colours, while a myriad of nudibranchs inched their way across the barren substrate. My camera was already exhausted, and it was only the first dive!

The dive also took the record for possibly the most undignified shore exit of all time. After handing Degeng my camera, I was in the process of trying to remove my fins off when a big wave knocked me off balance onto my back. Bobbing helplessly in the rolling surf, I felt like a turtle that had been flipped over! Fortunately, Degeng came to my rescue, and I made it to shore with nothing bruised but my ego.

Over the next three days, Seraya Secrets was like an underwater



CLOCKWISE FROM FAR LEFT: Tiger shrimp pair at Seraya Secrets; Crinoid commensal shrimp at same site; Boxer crab with eggs also at Seraya Secrets; Ribbon eel at Coral Gardens; Frogfish; Bristle worm at Seraya Secrets





CLOCKWISE FROM LEFT: Coral garden at The Drop Off; Offerings (above) for the resort ceremony (left); Goby; Seahorse pair



treasure hunt, with each dive revealing a rich bounty of critters at each and every turn. This time, there was lots of REALLY small stuff; In addition to some absolutely minuscule nudibranchs, Degeng found a couple of frogfish so small I had to look through my camera's viewfinder to see what he was pointing at! If that wasn't enough, harlequin shrimp, saw blade shrimp, mantis shrimp a plethora of partner gobies and yet more nudibranchs kept my camera shutter clicking furiously.

Night dives brought out a different set of critters, including flatheads, decorator crabs, bobtail shrimp, bristleworms and several octopus

species to name a few.

With the imposing silhouette of Agung volcano as a backdrop, Scuba Seraya Resort sits amidst lush tropical vegetation alongside one of Bali's signature black sand beaches.

### Resort life

On my second day of my visit, Patrick drove up from Sanur. Over a delicious dinner of Kerala prawn curry, he told me of all the changes that had been done since my previous visit. A broad expanse of grass between the rooms and the dive shop had been replaced with a stylish new dining area and bar. I could see a lot of landscaping had been done, too. This part of Bali is normally dry but now, at the height of the rainy season,



everything was lush and green.

I was also privileged to witness a traditional Balinese blessing ceremony, which is held every six months. The entire staff dressed in their finest traditional clothes to take part. A small temple on the grounds of the resort was the focal point. The women negotiated the steep steps to the top, carrying seemingly endless baskets of offerings. Soon the platform was overflowing with offerings, ranging from fresh flowers and fruit to an entire *babi guling* (Roasted pig).

After sessions of prayer involving the entire staff, several of the women proceeded to walk around the resort, blessing every corner. At the end, the *babi guling* was divided up amongst the entire staff.

### Dive sites

One could spend their entire stay photographing Seraya Secrets, but

many superb sites are but a mere zodiac ride away from the resort.

Consisting of a series of underwater lava flows radiating out from shore, The Drop Off's slopes are adorned with a multitude of fan and whip corals, including one massive purple gorgonian. There is also abundant fish life to be found including yellow-ribbon sweetlips, eye-patch butterflyfish and three-spot angelfish.

The Coral Garden consists of a series of three steep ridges, each cloaked with a rich tapestry of marine life. Ribbon eels are particularly common with all three colour phases of black, blue and yellow to be seen.

Another superb site is Batu Kelabit, whose current-swept point is alive with coral growth. There are reef fish galore including bumphead parrotfish, jewel groupers and clouds of anthias.







However, no visit to Seraya is complete without a visit to the world-famous *Liberty* wreck. With all the superlatives regularly bestowed on the site, it's almost enough to make a diver wary. "How good can it REALLY be?" one might be inclined to ask. Well, the *Liberty* delivers and then some!

Torpedoed by the Japanese off Lombok during the Second World War, the vessel was towed to Bali for salvaging. Unfortunately, it took on too much water during the trip and was left at Tulamben, where it remained semi-beached until 1963. Tremors caused by the eruption of Mount Agung volcano caused the ship to

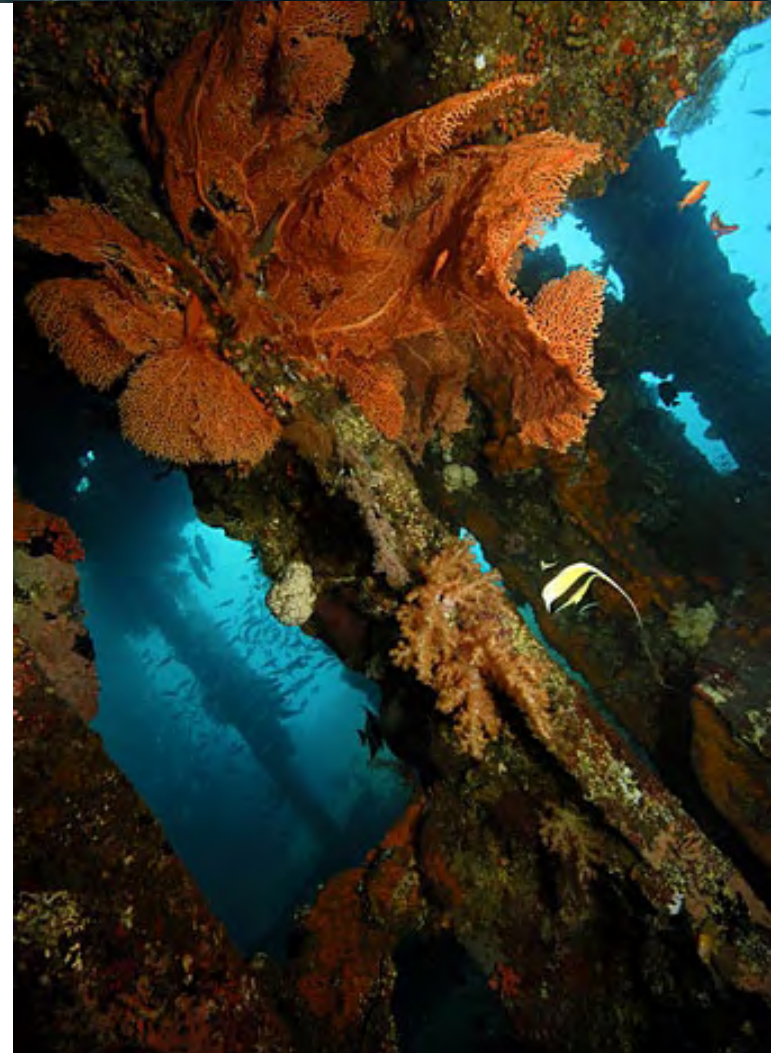
slide down the slope to submerge 30 metres from shore where it remains to this day.

During the high season, this site can be a virtual expressway of diver traffic, but during my stay, it was all but deserted! Well, not quite. Within moments of entering the water, Degeng gestured excitedly towards the surface near the zodiac. Tulamben's famous school of jacks was in attendance! During my visit the previous year, I had the misfortune of having a macro lens on the camera when they made their appearance. This time, I was armed with a 10-20mm wide-angle zoom and swam directly into the swirling maelstrom of shim-

mering fish. This was by far and away the biggest school of jacks I had ever seen. Back on the zodiac, Degeng estimated the school was comprised of around 1000 individuals. I nearly forgot about the wreck!

After a photographing frenzy, I finally had to drag myself away and we descended. The vessel seemed even more luxuriant with coral growth than I remembered. Fan and soft corals jostled each other for space amidst a myriad of sponges and tunicates. Beams and parts of the ship's frame thrust outwards like the skeleton of a gigantic whale, each bedecked with coral growth. Even with the lower visibility, close-up wide-angle shots were a joy to take. Just to prove you can never win, I saw a yellow clown frogfish and a host of colourful nudibranchs!

The ship's cargo hold is a definite highlight of any dive. With its massive columns and ethereal beams of light illuminating the gloomy interior, it is like an undersea gothic cathedral. Beams from my flashlight revealed a riot of



CLOCKWISE FROM ABOVE: Grouper and Cleaner shrimp; Bumphead Parrotfish; Schooling Jacks at *Liberty* wreck; Coral encrusted beams of the *Liberty* wreck





again.

After bidding Patrick farewell, it was time for the second leg of my journey.

### The North Shore

It is often said that when one door closes another one opens. During the trip's planning stages, a proposed visit to

another resort had fallen through at the last minute, leaving me with several days to spare. At the recommendation of a friend, I contacted Blue Season Bali in Sanur to arrange some diving. A relatively new operation, the company is run by Englishman Jonathon Cross.

No stranger to the Bali diving scene, Jonathon offers a variety of dive trips around the best dive sites Bali has to offer. As I hadn't really dived the north shore of the island, he immediately

suggested Puri Jati, Permuturan and Menjangan. He assured me they could make all the arrangements, including accommodation, transportation, dive gear, equipment, guide and driver. I was sold!

The day after my arrival in Sanur, I headed to the shop first thing in the morning. Although Jonathon was out of town, I met head divemaster Putu and driver Wayan who would be accompanying me for the trip to Puri Jati, or PJ as it is commonly known. Within an hour, everything was set, and by mid-afternoon, we were on our way in a comfortable van packed with dive gear and loads of tanks.

Driving up the back roads to avoid the traffic, we passed by quintessential scenes of Balinese village life.

Groups of women, baskets of offerings perched precariously atop their heads, made their way to the local temples, while stone carvers toiled meticulously over their latest creations.

Leaving the lowlands behind, the road writhed like a serpent as we ascended the central mountains. Passing trucks, heavily laden with carrots and cabbages, were evidence of the cooler temperatures, along with



colour; Fan corals cascaded from overhead beams while abundant fish swirled about vertical columns. The fish here are used to divers and allow a close approach for photography. The oblique-banded sweetlips are particularly approachable. And all this with nary another diver in sight!

After three memorable days, it was time to bid Scuba Seraya adieu. I was able to catch a lift with Patrick back to Sanur. On the way, we stopped at Tirtagangga to admire the wonderful panorama of emerald rice terraces lining the roadside. Strangely enough, I stayed in a guesthouse less than a kilometre down the road on my first visit to Bali 13 years earlier. The views here are spectacular, and I was eager to have the chance to photograph them



CLOCKWISE FROM ABOVE Nudibranch pair at Seraya Secrets; Menjangan Reef; Tirtagangga; Sweetlips at Liberty wreck; Dive master, Putu, at Blue Season Bali in Sanur





people wearing jackets and woollen sweaters. A light drizzle started falling, and swathes of clouds soon engulfed the peaks creating an ethereal landscape. Crossing the mountains, the road twisted and turned as it descended to the coast far below. With frequent photo stops along the way, the 3-hour trip had turned into four, and we finally arrived at the Zen Resort late in the afternoon.

The resort itself was stunning; with 15 luxurious villas set amidst luxuriant tropical gardens, Zen is Bali's only

Ayurvedic Resort and Spa. Translated as "the science of life", Ayurveda is a 5000-year old holistic healing system originating in Southern India. The resort's spa offers a myriad of health and beauty treatments including ayurvedic massage, yoga and mediation. An infinity pool offered a stunning panorama of rice fields and vineyards cascading down to the palm-fringed ocean.

After a delicious dinner of vegetable satay and brown rice at the outdoor restaurant, I retired to my room to assemble my camera gear.

The next morning, the weather gods were smiling as I awoke to a beautiful, sunny morning. Camera gear assembled, I had a quick breakfast and headed to the reception where Putu and Wayan were patiently waiting. The drive down to the water was short but scenic. Verdant fields of rice sloped gently towards



CLOCKWISE FROM TOP LEFT: Gorgonian fan coral at Menjangan Reef; Devil Scorpionfish; Ambon Scorpionfish; Dwarf Scorpionfish; Moon-faced Euselenops nudibranch

the shore while a Hindu temple stood defiantly, an island encircled by a sea of green.

Within minutes after leaving the resort, we arrived at the beach. The ocean was a sheet of glass as we geared up and made our way to the shore. The beach was virtually deserted except for a few local kids splashing about. PJ was all ours!

As it turned out, we had a bit of a swim ahead of us, as the bottom remained level for quite some distance. After swimming for around 30m, the slope finally started to drop off. At 3m, the barren expanse of dark sand was interrupted by the appearance of a tiny thumb-sized coral.

By the time the slope reached 4m, one had turned into multitudes radiating out in all directions along with intermittent patches of seagrass and clusters of large-leaved Halimeda algae. Moments later, Putu stopped beside one such cluster

and gestured towards it.

Moving closer, I discerned a pair of eyes staring right back. The owner turned out to be an impeccably camouflaged Ambon scorpionfish. An adjacent cluster proved to be a second individual, and before long, we discovered four more in the immediate vicinity. Talk about hiding in plain sight!

After photographing the scorpionfish entourage, Putu beckoned me to follow. From that moment on, my camera's shutter was firing virtually non-stop for the ensuing 80 minutes. Putu's eagle eyes were nothing short of miraculous. His uncanny ability to discern all manner of

creatures from the seemingly barren terrain put my critter-spotting skills to shame!

A minute pygmy pipehorse sat amongst an assembly of the omnipresent corals, while nearby, a jewel-like painted frogfish the size of my baby fingernail sat conspicuously atop the dark sand. Even with a close-up filter on the camera, it was still absolutely minuscule in my viewfinder!

While nudibranchs were somewhat







more elusive than I expected, Indian arminias were especially common. It almost seemed like mating season, as amorous trysts were routinely encountered. On one occasion, a third individual was eager to get in on the action of an already mating pair.

On the barren expanses of sand, lone anemones were home to colonies of blacksaddle anemonefish while the undulating fronds concealed entire communities of porcelain crabs and commensal shrimps of several species.

The highlight of the dive was a sea cucumber carrying two colourful hitchhikers: a pair of imperial partner shrimp. Perched atop the continually feeding invertebrate, they hung over the side, deftly scooping up tiny morsels of food dislodged as it slowly undulated across the sandy bottom.

After downloading the images back at the resort, I was surprised to discover the sea cucumber was in fact a semi-sea cucumber: Something had made a meal of the animal and roughly two thirds of its body was missing!

**Facilities**

Despite the absence of a

dive shop, the local community had recently installed facilities for the ever-burgeoning numbers of divers. Along with some rinse tanks for dive gear, I was pleasantly surprised to discover a separate tank for cameras, and it had just been filled with fresh water.

Each diver is charged a fee of Rp 5,000 to use the facilities, with the money going back to the local community. A simple warung provided an assortment of snacks as well as coffee, tea and soft drinks. In addition, a number of tables and benches had been set up where divers could relax during their surface intervals. The ensuing hour proved to be difficult indeed. Fighting the temptation to look at all the images on my camera view

screen proved to be a tremendous challenge to say the least!

Finally, our surface interval was up, and we were back in the water.

For our second dive, we swam in the opposite direction from the first. Curiously, the Ambon scorpionfish had all vanished, but PJ had more surprises in store.

Even areas of bare sand in a scant metre of water were home to filefish, sandivers, starfish and snails. Upon descending the slope, a moon faced euselenops nudibranch inched along the sand, the first time I've seen one in the daytime.

At a round 5m, a bright green shrimp perched atop a small clump of hard coral, its green body perfectly mimicking the adjacent clusters of vegetation. Adding to the cavalcade were finger dragonets, ornate and robust ghost pipefish, seahorses, cuttlefish and tail-fin batfish.

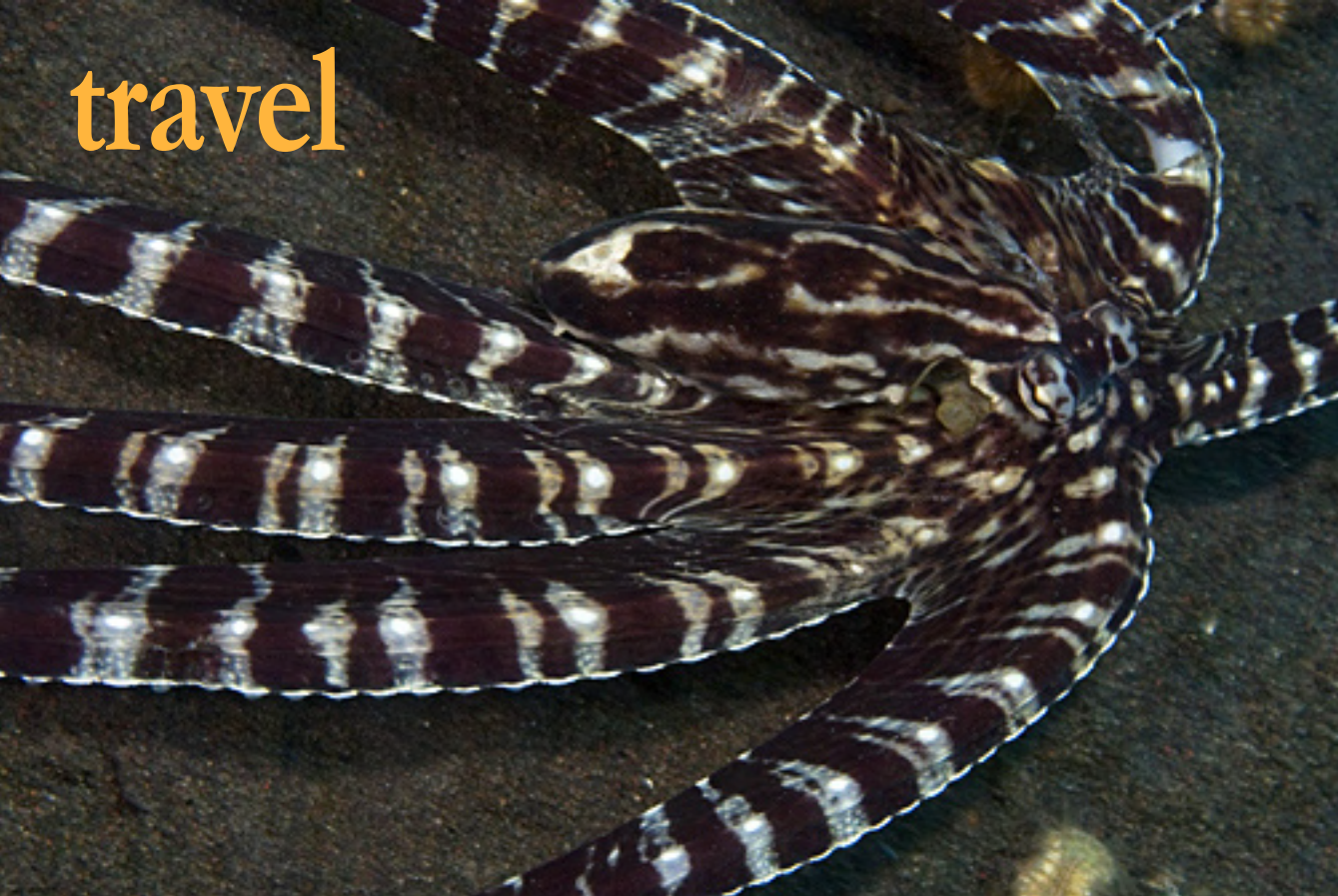
The latter, was a particularly compliant photo subject, posing patiently as I took photos from every angle. I was already grateful for making the switch to digital; ten minutes into the dive and I'd already shot the equivalent of a roll of film!

While it's easy to be engrossed in photography, care must be taken when kneeling on the bottom. An ill-placed hand or knee may result in an unwelcome encounter with a painfully sharp appendage, as the volcanic substrate is prime scorpionfish habitat! In addition to the Ambon species, PJ is also home to dwarf lionfish, devil scorpionfish and dwarf scorpionfish to name but a few.



CLOCKWISE: Imperial shrimp on Sea cucumber; Finger dragonet; Green shrimp; Robust Ghost Pipefish; Coral gardens at Menjangan reef





CLOCKWISE: Mimic octopus; Wonderpus; The Auyurvedic spa at the Zen Resort near the Puri Jati dive site on the North Coast greets guests with tub baths decorated with colorful floating tropical flowers

The ensuing dives over the next two days proved to be a macro bonanza, with each dive revealing a cornucopia of critters. Although there is only one

dive site at PJ, the area is actually quite large, allowing boundless exploration over a number of dives.

At around 8m, the slope becomes dramatically steeper. The tiny corals disappear entirely and the terrain becomes barren once again. At 20m, intermittent mounds of sand punctuate the bottom like a range of miniature hills. Apart from the occasional sea pen or hydroid, the terrain seems completely devoid of life. At PJ, however, looks can be deceiving! This

is the realm of flying gurnards, cockatoo waspfish, mantis shrimp and a myriad of goby species with their attendant partner shrimps.

I was also able to cross off not one but two major items off my critter wish list. While photographing a goby, a particularly

frenetic bout of tank banging heralded the discovery of something significant. The goby was instantly forgotten as I rapidly finned towards Putu.

It was significant all right; sitting on the sand was a wonderpus! It was only a juvenile, but hey, a wonderpus is a wonderpus! Minutes later, the adrenaline level was amped up another notch with the discovery of a mimic octopus. Putu managed to find two more mimics, one of which was a fully-grown specimen.

### Rejuvenation

After all the diving, I decided that a massage at the spa was in order. At the reception, I perused a list of nearly 30 treatments before deciding on the Abhyangam, a hot oil massage followed by a therapeutic herbal bath. Upon my arrival at the spa in a bathrobe, one of the attendants held up a piece of cloth marginally bigger than a dishcloth and cheerfully requested I put it on. "You want me to wear THAT?!?" I queried in equal doses of disbelief and horror.

Within moments, the scanty attire was all but forgotten as the two masseuses worked their magic. The massage was

fabulous, although the large volumes of coconut oil made me feel like I was being basted for the main course at Christmas dinner! The massage was wonderful, and after an hour, I felt as limp as a boned fish.

I was then ushered into the bathing area where a tub waiting. This was no mere tub but an exquisite work of art! The water's surface was covered by a multitude of flowers in amazingly intricate design patterns while the wooden deck surrounding the tub was decorated with gorgeous floral bouquets. The presentation was so artistic, I was reluctant to get in and ruin it.

Before the bath, I was then told to sit while the two attendants applied a paste comprised of green gram (lentil) powder and turmeric. By the time they finished, I looked like I was covered with a layer of yellow oatmeal. Especially worrisome was the tumeric; I was beginning to wonder if I'd be stained permanently!

Once in the tub, the yellowy concoction washed right off and I spent a relaxing hour soaking up the splendid view of the surrounding countryside as a passing thunderstorm



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## Bali

rumbled overhead. Nearly three hours later, I got back to my room, utterly relaxed and rejuvenated.

Unfortunately, the effects of the spa treatment were about to be undone by a used wetsuit and salt water. There was a night dive to be done!

### Night dive

Arriving at dusk, the beach was deserted as we geared up and headed for the water. Flashlights scanning the sandy bottom soon revealed a different array of creatures than we'd seen during the day.

While no more mimics were found, there was plenty of other octopus species about, including one coconut octopus peeking out of a large discarded shell. Flatheads were everywhere, their iridescent blue fin patches contrasting sharply with the dark, sandy bottom.

A profusion of crabs and shrimp crept across the sandy bottom while a weedy patch revealed a green robust ghost pipefish. Another patch of reddish coloured weed turned out to be a decorator crab looking like an orangutan crab on steroids.

Seahorses were out in full force too,



both alone and in pairs. All possessed that irritating seahorse trait of looking the other way as I tried to photograph them! Putu had a great solution though. As he moved towards the seahorse, it would instinctively turn away, looking right in the direction of my camera.

Especially memorable was a crab barreling across the sandy bottom with a second individual firmly clasped in its claws, which I can only assume was something akin to love on the run! Getting a photo proved to be a real challenge, as they didn't stop for a second!

### Permuturan

The next morning, after a final dive (and one more massage) we packed up the van and headed for our next stop, Permuturan. The 30-minute drive was quite scenic, passing small villages framed by a backdrop of rugged peaks. The north coast of Bali is usually one of the island's driest regions, but the wet season had garbed the landscape a vibrant green. Unique in Bali, Permuturan possesses the

island's most extensive areas of shallow reefs easily accessible to divers. With an absence of the strong currents and waves that affect other parts of the island, it is also home to a remarkable artificial reef project.

The Biorock installation at Permuturan is larger than all of the other installations worldwide combined. This simple yet highly effective process aids reef regeneration with an electrically conductive frame utilizing rebar (re-enforcement steel). After being submerged and anchored to the sea bottom, a low-voltage current is then applied via a generator through an

LEFT TO RIGHT: Biorock installation at Permuturan; Octopus in a coconut; Diver inspects Biorock structure at Permuturan; Decorator crab looks like a strange orangutan





anode mesh composed of titanium.

Approximately three hours after the current is turned on, the corrosion turns into a white film of limestone due to an electrical process called mineral accretion,

where calcium carbonate is removed from the seawater. This material, a composite of limestone and brucite, is similar to the composition of natural coral reefs. Once the power is left on, the layer of film becomes thicker and soon becomes encrusted with the precipitated minerals.

Within a few weeks, the resulting structure possesses the strength of lightweight concrete. During this time, the safety of the structure in combination with the mild electric current attracts a variety of marine organisms including small fish, crabs, sea urchins, ascidians and tunicates.

The next step involves the transplant of coral fragments, which immediately bond with the accreted minerals and grow very quickly. The strength of the existing structure also provides stress relief for the growing coral, enabling them to grow some three to five times faster than normal.

Studies have shown that coral grown with assistance from the Biorock has proven to be 40 percent more likely to resist the effects of a coral bleaching.

As Putu had filled the tanks before our departure, we just pulled right up to the beach and immediately geared up. Admittedly, my knowledge of the site was somewhat limited, and I wasn't exactly sure what

to expect. Swimming along the sandy bottom in less than ideal visibility, we came upon a very large mound rising abruptly from the bottom dotted with assorted clusters of coral. "Surely, this can't be it?" I mused to myself in disbelief, peering through the murky water at the smattering of reef fish swimming about.

After a few minutes, Putu gestured for me to follow, and we were seemingly headed back to the beach. Fortunately, we had merely headed in the wrong direction and within moments arrived at our destination.

Before us lay an immense domed structure, its framework composed of an intricate latticework of steel encasing a pair of smaller domes within. Large lionfish, completely unfazed by our presence, glided lazily amongst the steel beams looking for an easy meal.

The uppermost portion was swathed with coral growth, while a myriad of reef fish



CLOCKWISE: Lionfish makes home on Biorock; The Dome at Biorock; Boats at Menjangan await tourists heading to Permuturan; Biorock, view from below



Fan coral and Anthias at Batu Kelabit (right)  
Thriving coral gardens on Menjangan Reef  
(below)

darted about. Even the visibility had improved. This was more like it!

Close by was another, albeit smaller, structure. Then another. And yet another! The entire area was strewn with innumerable structures boasting a broad spectrum of shapes and sizes, each home to lush coral growth and thriving populations of fish.

As I discovered after the dive, the Permuturan site encompasses an area of two hectares at depths ranging from three to five metres. Beyond the dominant structure called "The Dome", there are a total of 50 structures with such whimsical names as the Nautilus, Flowers, Caterpillars and Tepee.

Since the project's inception in 2000, coral growth has been phenomenal, with the structures now thoroughly encrusted with a broad range of species. The project is now a major attraction in itself, drawing legions of divers to see the regenerating reefs. I could have easily done more dives here. However, there was one final stop to make.

## Menjangan Island

Prior to 1998, Menjangan Island's flourishing reefs were an essential stop on the North Bali dive circuit. Then El Nino arrived. The subsequent coral bleaching due to the increased water temperatures hit Menjangan hard, decimating the island's shallow water coral gardens.

Over the ensuing decade, I'd heard horror stories about the reef's destruction and was somewhat apprehensive about diving there. Despite my trepidation, I was interested to see how the reefs had fared in the ensuing decade.

Laying in wait at the jetty was a virtual flotilla of boats, eager to ferry visitors out to the island. Upon loading up all our gear, we headed across the somewhat choppy waters for the 30-minute ride to the island.

Menjangan is noted for its wall dives, and our first dive site was Garden Eel Point situated on the island's northwest tip. From the top, the wall descends from 8 metres down to 35 metres. Abundant corals cascaded from the steep slopes



while plentiful cracks and crevices provided home to prolific numbers of reef fish.

As we were diving on a slack tide, the lack of strong currents meant the absence of large pelagics, although whitetip reef sharks, barracudas and Napoleon wrasse have been observed here. Nevertheless, a small school of bluefin trevalley patrolled the blue just off the wall, keeping a watchful eye on our progress. In turn, I kept an eye on a few ominous titan triggerfish.

Ascending to 18 metres, a big expanse of white sand was home to the site's namesake. Large congregations of garden eels undulated in the gentle current, disappearing into the safety of their burrows at the first sign of danger (or photographers). For our safety stop,

the depths between 5-6m were home to healthy congregations of corals, a far cry from the decimation I'd heard about.

For our surface interval, we headed to the main jetty on the other side of the island. Even from the boat, the destruction wrought from El Nino was all too apparent in shallows surrounding the jetty. Most of the bottom was barren, although there were definite indications that the coral was starting to return.

Our final dive was Pos II, and we just swam right from the boat. The sand soon gave way to a wall at 12m and we headed deeper. The contrast was remarkable. The cooler waters had shielded the corals from El Nino's wrath and the corals were back with a vengeance. A rich tapestry of species

cloaked the walls, including copious gorgonians in a variety of hues. Adding to the colorful mosaic were several angelfish species as well as anthias, chromis, butterflyfish, while moray eels peered inquisitively from rocky clefts.

Despite all the doom and gloom reports of Menjangan's apparent demise, I was pleasantly surprised to find many of the island's reefs thriving. Once again, Mother Nature shows her resilience in the face of adversity.

Bali's undersea environs never cease to surprise and enthrall. Be it reefs, wrecks or critters, there's something on the Island of the Gods for just about everyone. The only thing I found lacking were the crowds. Despite initial misgivings about the weather, Bali in the rainy season is a blessing all on its own. ■





*A Story in Images*

# *The Liberty Wreck*

Photos by Lawson Woods





TOP LEFT TO RIGHT: Large fan coral hanging off the wreck of the *Liberty*; Close-up of Anemone Shrimp; Freckled Frogfish creeps over the black volcanic sands of Tulamben; Soft coral and anthias thrive on the *Liberty* wreck; The Pigmy seahorse is tiny, no bigger than an inch or 2.5cm (right)



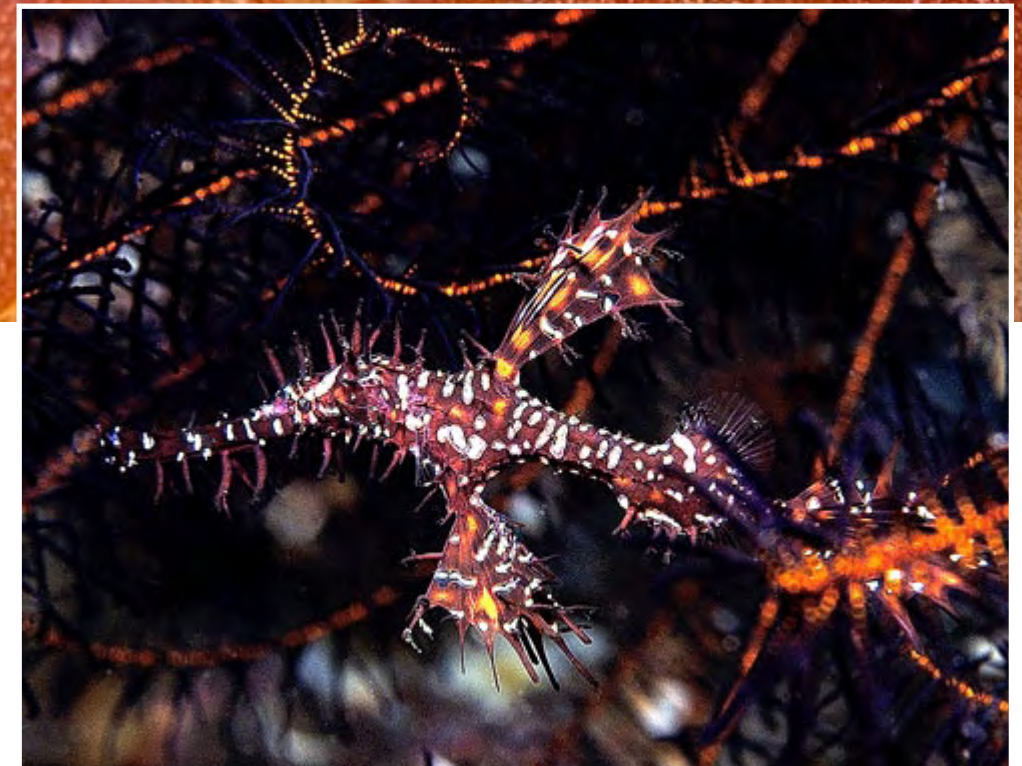
PREVIOUS PAGE: The *Liberty* wreck is a microcosm of life providing lush coral habitat for a plethora of tropical species. Here, a diver inspects a beam decorated thickly with coral growth

LEFT: Leaf Scorpionfish

RIGHT: Great Barracuda lurks in the bowels of the wreck







CLOCKWISE FROM TOP LEFT: The tiny Pigmy Seahorse anchors itself by its tail, which is wrapped around a branch of coral; Commensal shrimp is perfectly camouflaged riding on the back of a Spanish Dancer, a colorful and lacy swimming sea slug; Ornate Ghost Pipefish hangs out in a feather star; Polka dots decorate the Baramundi cod



# Bali's East Coast

Superb sponges on the reefs of Nusa Penida

Text and photos by Donald Silcock

When India's Prime Minister Pandit Nehru visited Bali in 1950 to attend celebrations marking the newly established independence of Indonesia, he famously called the island "the morning of the world". His simple but eloquent description really does encapsulate the uniqueness of this special island.

Balinese dancer at Candi Dasa



Predominantly Hindu in a nation of over 220 million people, where Islam is the principal religion, Bali is the only place outside of the Indian sub-continent where the Hindu religion exists in any real strength.

Introduced in the 6th century, by Hindu traders from India, the religion spread rapidly across this huge

archipelago of over 17,000 islands, peaking in the 14th century with the Majapahit Empire. The rise of Islam from the 14th century slowly but surely eclipsed the Hindu kingdoms, and Hinduism itself, and ultimately forced what was left of the Hindu elite to take refuge, consolidating in Bali around the end of the 15th century.

Their descendants have succeeded in protecting their heritage, and it's this strong culture that makes the island so special.

## Tourism in Bali

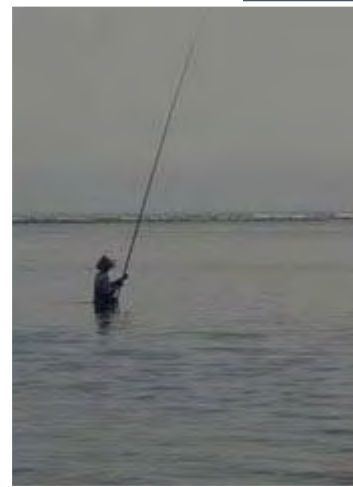
Simply stated, tourism is the life-blood of Bali. Its unique culture, special ambience and physical features have

drawn visitors to the island since the 1960s. The Balinese are generally very tolerant of tourists and their mores and almost always manage to maintain their smiles and composure. It's their strong culture and tight village lifestyle that provides this foundation.

It's not just the money that tourism brings to the island that the Balinese







like; they are genuinely open and friendly to foreigners as any study of their history shows.

Tourism can be roughly divided into three groups. There are the mass-market visitors for whom the southeast corner of the island caters. The so-called "tourist triangle" of Kuta, Nusa Dua and Sanur caters for every variation possible from the low end budget accommodation in Losmens, to the very top end of town and everything in between.

Beaches, restaurants, bars and nightlife provide everything that these visitors want from their vacations, which typically last about seven days.

The second group are those coming in search of the 'real Bali'. The exact location of this mysterious place is not really clear, apart from it not being anywhere near the tourist triangle. However, the most likely location is the town of Ubud up in the hills north of Denpasar, although there is a

counter argument that it's really in Seminyak at the western edge of the tourist triangle.

Ubud is certainly a charming place that combines the best of both worlds—so charming that my wife and I have actually bought a place there!

The third group is those visitors who come to sample what the seas surrounding Bali have to offer. By far, surfers dominate this group, and Kuta, the epicenter of the tourist triangle, became what it is because of the quality of the breaks just off the beach there.

Second to the surfers are us

divers who are attracted to the island because, unlike many other locations in Indonesia, it offers a great combination of diving and things to do and see when we are not underwater. Also Bali, along with Jakarta, is a "hub" that caters for international flights and allows the onward dive traveler to get to places like Manado and Sorong.

Many divers choose to break their long international journeys and sample the delights of Bali for a few days.

CLOCKWISE FROM TOP LEFT: Padang Bai harbor; Traditional fishing; Possibly some kind of Balinese Hindu shrine or offering; The vibrant local market at Padang Bai





Anthias on the reef at Nusa Penida  
BELOW RIGHT: Angelfish on the reef at Nusa Penida

### Diving Bali

Bali's most famous dive site is the *Liberty* shipwreck just off the beach at the small town of Tulamben on the northeast coast of the island. A close second is probably the muck diving Mecca of Seraya, just a few kilometers east of Tulamben.

The *Liberty* wreck is without doubt a great dive, but to enjoy it, you need to be there early or late in the day, because in between, it gets very crowded as the day-trippers arrive.

The physical distance from the southeast corner to Tulamben is about 80km, but the journey takes between three to four hours on Bali's narrow and crowded roads. Most divers either base themselves in the southeast and do day trips or stay up on the northeast coast and forego the restaurants and bars. Either way, they will pass through the town of Candi Dasa on the east coast.

Often referred to as the eastern frontier of tourism in Bali, Candi Dasa is a pleasant town located at the northern end of Amuk Bay and hosts a good selection of hotels, restaurants and cafes. It is also a great place from which to base yourself in order to explore the east coast of the island.

### The East Coast

There are two things you really need to know about diving on the east coast—first, the area is subject to some of the strongest currents you are ever likely to experience, and secondly, the water can be really cool, so a 5mm wetsuit is highly recommended. The strong currents are the result of the Indonesian Throughflow (see sidebar below) and the water temperatures are produced by the cold-water upwellings from the deep trenches to the north and south of Bali. This is a powerful combination, which acts as the catalyst for some really great diving, but a good guide with local knowledge and experience is essential if you want to experience the sites safely.



#### 10,000 RIVERS

What makes the East Coast of Bali, and in fact many of the other great locations in this vast archipelago such good diving, is Sverdrups and the Indonesian Throughflow.

If, like me, you had never heard of Sverdrups before, I suggest you buy a copy of David Pickell and Wally Siagian's excellent book *Diving Bali* (ISBN 962-593-323-9). It's the best reference I have found to diving in Bali, and you will find that its contents and maps are used by virtually all the dive guides on the island.

But it's David Pickell's excellent description of the immense hydraulic forces that prevail in the Lombok Channel, which separates Bali and its eastern neighbor of Lombok, that sold me on the book. Understanding these

forces enables an understanding of why the East Coast can be such good, but potentially challenging, diving.

Let me give you the Readers Digest version: To the northwest of the Indonesian archipelago lies the Pacific Ocean where the sea level is 150 mm (6 ins) above average; whilst to the south lies the Indian Ocean where the sea level is 150mm below average.

This disparity is caused by the trade winds and associated currents that act in opposite directions in the northern and southern hemispheres, but the overall result is a massive flow of water from the Pacific to the Indian Ocean. So huge is the volume that traditional measurements such as cubic meters and gallons are inadequate to describe it in an easily understandable way. So

the Norwegian scientist Harald Sverdrup invented the Sverdrup—one million cubic meters of water per second.

David Pickell visualizes like this—think of a river 100m wide, 10m deep and flowing at 4 knots. Then imagine 500 similar rivers—that's one Sverdrup!

It is estimated that the total amount of seawater that passes through the Indonesian Throughflow is 20-22 Sverdrups, or 10,000 of those rivers. A massive volume of water that has to make its way around the chain of islands, which runs along the bottom part of the Indonesian archipelago called the Lesser Sundas that stretch from Bali in the west to Timor in the east.

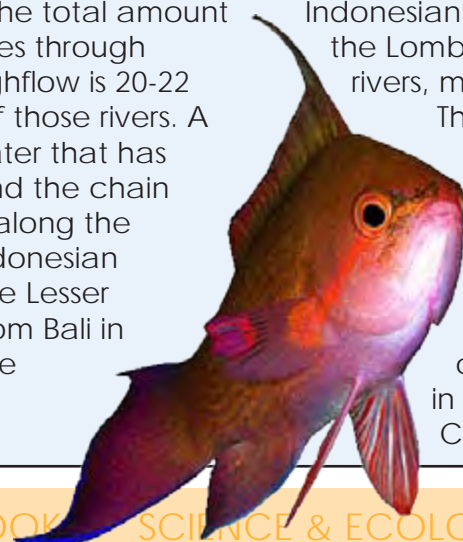
There are a limited

number of channels between the islands of the Lesser Sundas, and of these, the 35km wide Lombok Strait, between Bali and its neighboring island Lombok, offers the most direct path to the Indian Ocean. It is estimated that about 20 percent of the shallow water flow of the Indonesian Throughflow passes through the Lombok Strait, which in terms of rivers, means 1500 of them.

That's a lot of water, but what's so important is that it carries with it the eggs and larvae of the marine life of the Indo-Pacific, an incredibly diverse area with over 4000 identified species—compared to around 1000 in the Red Sea and 400 in the Caribbean. This helps to explain

the intense biodiversity of some of Bali's reefs and dive sites. But the other piece of the puzzle is the seasonal upwellings from the deep waters around the island.

The Indonesian archipelago's underwater topography is incredibly complex with deep trenches, troughs and basins surrounding its 18,000 islands. Around the Lesser Sundas, it is particularly complex, with the very deep Flores and Banda basins to the north and the Bali and Sunda trenches to the south. As the Indonesian Throughflow weaves its way over and through this complex underwater landscape, it creates upwellings that carry streams of nutrient rich cold water from the deep, which nourish the reefs of eastern Bali and other hot spots on the island. ■







**Amuk Bay**

Amuk Bay itself is roughly 8km wide, with Candi Dasa at the northern end and Padangbai just round the southern tip of the bay. Padangbai is a small but very pleasant and picturesque fishing village, best known as the place to catch the ferry to Lombok and where most of the dive operators working the east coast depart from.

The three main dive areas—The Blue Lagoon, Mimpang and Gili Tepekong—offer considerable diversity, and each

one has its own unique features.

**The Blue Lagoon** is the location that less experienced divers are usually taken to first, as the dive sites in this area are generally much less exposed to the strong currents experienced at the other sites. However, don't let this fool you into thinking that this is a second rate area,

it's not, and of the six dives I experienced here, I was impressed with the health of the bommies and the general marine life.

More of a macro than a wide angle area, I saw a great selection of frogfish, leaf scorpion fish, moray eels, scorpion and stone fish, blue spotted stingrays and lots of nudibranchs.

The name Blue Lagoon conjures up images of deserted Pacific Ocean islands with swaying palm trees, however it's actually a small bay located just around the headland and to the northeast of

Padangbai Bay. There is a small resort located right on the beach, which is popular with tourists from Candi Dasa who go there to snorkel.

The more correct name for the area is Tanjung Sari, and there are a number of sites to dive, not just the bay in front of the resort. The relative lack of currents and maximum depths of around 15-18m offer a pleasant combination of an uncomplicated dive site, with plenty to see.

**Gili Mimpang** is one of three islands located just outside Amuk Bay as the seafloor starts to drop down into the depths of the Lombok Strait, which means that all three spots are subject to the strong currents associated with the Throughflow. None of them are suitable for newly qualified divers, and again, a good guide is essential for even the most experienced diver.

The other two islands are Gili Tepekong and Gili Biaha, with Tepekong about one kilometer south-east of Mimpang and Biaha about 4km northeast.

Gili Mimpang is actually a group of small islands, three of which break the surface and are known as Batu Tiga. Local legend has it that they were used for target practice by the Indonesian

air force in the 1960's—thus possibly explaining why they are so broken up compared to the very solid lumps of rock that make up Tepekong and Biaha. Mimpang's position is closer towards Amuk Bay, which means that it is less exposed to the currents of the Lombok Strait, and therefore, is often considered to be a lesser site than the other two.

My experience from two days of diving both Mimpang and the nearby Tepekong is that it has a great deal to offer, particularly the southern edge of the site where there are some excellent small caves teeming with fish life and very healthy soft coral that are surrounded by very photogenic glass fish.

I was amply rewarded for visiting

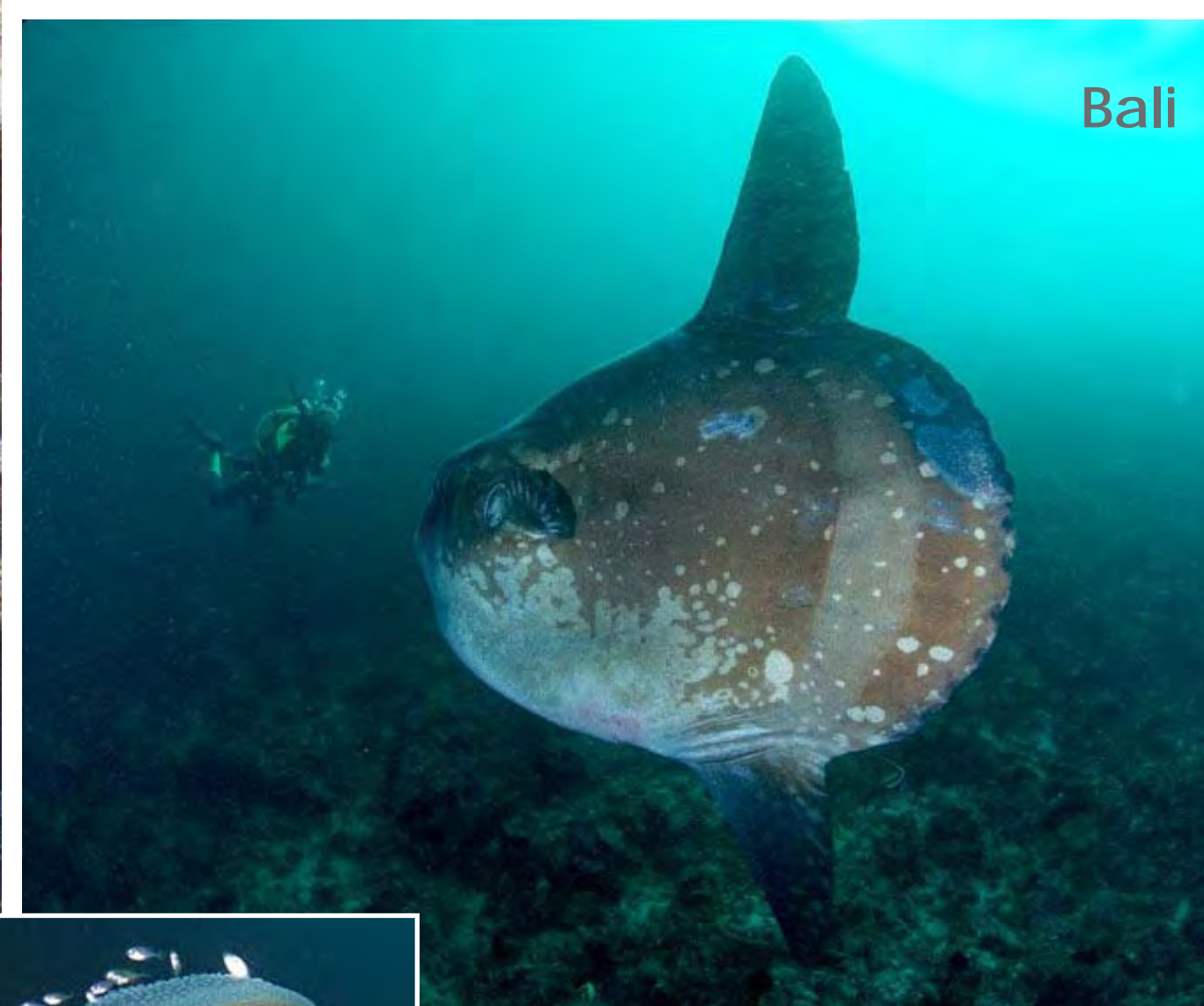
Mimpang when, on the first dive of the second day, my very excited dive guide, Mitra, basically dragged me away from the caves giving me a very strange hand sign that I subsequently learned is the local code for the Mola Mola, or Oceanic Sun Fish, that this area of Bali is well known for at certain times of the year.

I have long wanted to photograph the Mola Mola, but was not expecting to be so fortunate as it was late December,

THIS PAGE: Critters of the Blue Lagoon—these images illustrate the vibrancy of this site. CLOCKWISE: Moray eel; Scorpion fish; Cuttlefish; Leaf fish; Big eyes







Bali



RIGHT: Jellyfish at Tepekong

ABOVE: Mola Mola taken at Mimpang

and September is known as the time to see them. Not only did one grace us with its amazing presence that day, but I was actually able to photograph it as I had made the decision to use a fish-eye lens after being shown the cave area on the previous day.

They really are a unique creature, almost 3m from tip to tip they appear quite ungainly at first glance but can move very quickly, as I learned when I tried to get “the shot”. A true pelagic about which very little is known, they are believed to come to this area of Bali to be cleaned of parasites—usually by the common banner fish, which was indeed the case with the one we saw that day.

The southern edge and the western side of Mimpang are one of the best places in Bali to see white tip reef sharks, and on my second day, I saw a group of about ten large ones swimming in the strong current. Like most sharks they are wary of divers, particularly ones emitting large streams of bubbles as they struggle

against the current to get in position to take photographs—no award winning shots that day!

**Gili Tepekong** is only one kilometer from Mimpang, but the conditions can vary considerably between the two sites, and often when one can be dived in safety, the other is out of the question. Located as it is, right on the edge of the Lombok Strait, Gili Tepekong is swept by the Indonesian Throughflow, which means that when it is safe to dive the site, it is spectacular. But if you try to dive the site in the wrong conditions, you

may experience the so-called toilet effect where instead of going up to the surface as nature intended, your bubbles are spiraling in the opposite direction—caught in one of the infamous down-currents that make the East Coast so potentially challenging.

Definitely a site only for experienced divers, Tepekong rewards those who do venture there with some spectacular diving. The highlight of which is the Canyon at the south-western tip of the site where fallen rocks from the island have created an area reminiscent of Roman ruins, which is now populated by large schools of sweetlips, jacks, groupers and white tip reef sharks.

ABOVE: Inside the small, but vibrant caves at Mimpang  
TOP LEFT: The shark nursery at the Faux Canyon at Tepekong





The Canyon has apparently established a reputation as a “must-dive” location but many operators are very reluctant to take divers there because of the dangers of the downdraft. Patience and trust in your dive guide are a must, because if they tell you that the conditions are not suitable, you need to accept their judgment, as they can read the situation better than you can.

Such was the story on the days I was diving Tepekong, and my guide, Mitra, knew how much I wanted to dive the Canyon, but cautioned me against it, which is basically what you are paying for—good advice!

At the northern tip of Tepekong there is a site known as the “Faux Canyon”, as apparently some

operators have been known to take divers there and tell them it is the real Canyon! I dived this site a few times and enjoyed it, particularly the shark nursery—a wide but low and tapering cave that is host to a substantial number of white tip sharks. It’s called the nursery because of the baby white tips that are always found there. In fact, the first couple of times I visited, that was all I found—four to five one-metre-long juveniles. However, on the last dive, it must have been lunchtime,

as mum and dad were home as well, and although initially quite camera shy, they started to come closer and closer. Quite an exciting sensation when you find yourself jammed into the cave due to the strong surge!

### Nusa Penida

—Sental, Ped, SD and Toyapakeh

Nusa Penida, together with Nusa Lembongan and Nusa Ceningan, is a group of three islands that sit right in the middle of the Lombok Strait between Bali and Lombok. This position means that their northern coasts bear the full brunt of the Indonesian Throughflow as it hits the islands. The western and eastern coasts experience very strong currents due to the huge

volumes of water sweeping past.

Nusa Penida is by far the largest of the three islands—roughly 18 km long and 14 km wide, compared to the combined size of Lembongan and Ceningan at just 3 by 5 km. Separated from Lembongan and Ceningan by the Toyapakeh Strait, Penida is a low, dry limestone island, which means that it does not have the wet season heavy river run-offs that significantly reduce the underwater visibility.



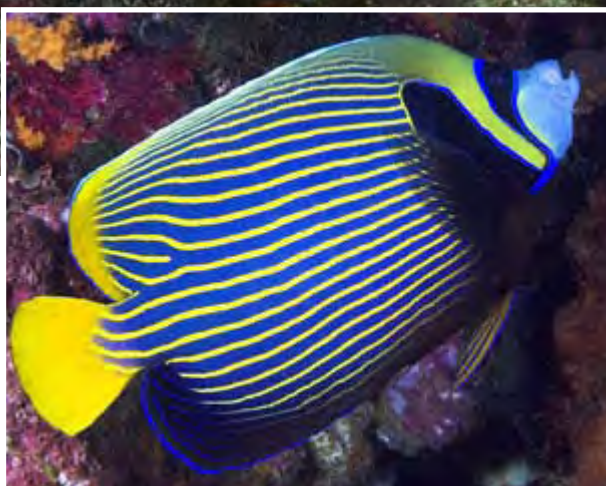
Ribbon eel on the reef at Nusa Penida; School of golden bait fish shelter in small cave at Nusa Penida; Photogenic sponges on the reef at Nusa Penida; Sea whip on the reef at Nusa Penida; Scorpionfish blends into the reef; File fish on the reef at Nusa Penida





CLOCKWISE FROM LOWER FAR LEFT INSET: All images from the reef at Nusa Penida — Emperor Angelfish; Soldier Fish; Box fish; Dwarf Hawfish; Star fish and barrel sponge; Striped Triplefin

BELOW: Moray eel on the reef at Nusa Penida



I had read stories of the excellent visibility and healthy reefs on the northern and northwest coasts of Nusa Penida, but had also heard others about coral bleaching as a result of El Nino in 1998. So, I guess my expectations were fairly low. However, on my first few dives there, I was frankly

quite stunned by the 25m plus visibility, excellent fish life and overall vibrancy of the reefs.

The water temperature at all the sites on the north coast—Sental, Ped and SD, and Toyapakeh on the northwest coast—can be really quite cold. My computer registered 22°C on one dive! But the strong currents and nutrient-rich, cold-water upwellings combine to create some tremendously rewarding diving.

I had also read that many of the Nusa Penida sites were not particularly good for underwater photography, as the strong currents basically turn every dive into a high-speed drift. However, I

actually got some of my best images of the trip on these sites by keeping close to the reef and looking for spots where I could shelter from the current.

The north and northeast coasts of Nusa Penida are also known as locations to see the Mola Mola, and to my surprise and delight, on the fourth day of diving in the area, I saw another one. This time, I spotted it myself when something caught my eye down in the blue. I was at about 15m at the time, and what I saw was a cloud of banner fish surrounding a large but non-descript lump of something. The lump was the Mola Mola looking up the reef slope, as it was cleaned of the

many parasites that live on its body, and when it turned slightly, my nitrogen saturated brain finally registered what it was.

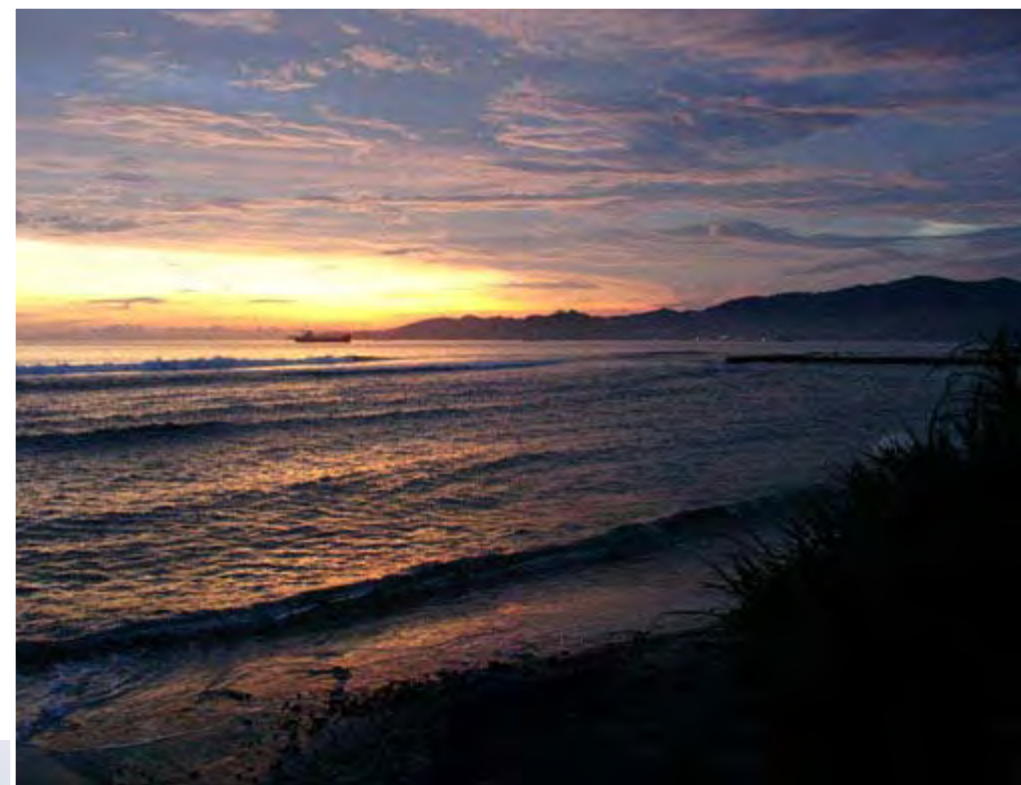
This time, I did not have the fisheye lens, but it did not really matter as the Mola Mola only allowed me to get close enough for one shot before demonstrating its strange but very effective swimming technique and disappeared rapidly into the depths.

### Conclusion

As a general rule, I much prefer liveaboard diving to land-based. My day job pays for my dive travel and cameras and, like most people, I get a limited number of days vacation every year. Liveaboards allow me to get the maximum diving in the shortest time, whereas land-based diving usually restricts you to three dives a day, and too much time is spent getting to the







CLOCKWISE FROM ABOVE: Bali fragrances; Balinese dancers; Amuk Bay at sunset; Balinese rice terraces

sites.

Having said that, what I really liked about diving the East Coast on this trip were the logistics. I based myself in Candi Dasa and was picked up every morning about 08.30 for the 15-minute drive to Padangbai, where I was able to enjoy a Bali coffee at the Topi Inn ([www.topiinn.com](http://www.topiinn.com)) whilst the dive boat was loaded with the gear for the day's diving.

We were usually on our way by about 09.15, and the maximum time to any of the sites was 40 minutes, but usually much less. The morning's two dives were done before noon, and then it was time for a nice lunch ordered the day before from the Topi Inn, followed by a quick snooze.

The afternoon dive was usually completed by three, and then it was back to Padingbai for a quick fresh water shower and another coffee before heading back to the hotel in time for a sundowner of ice cold Bintang whilst reviewing the days images—very civilized!

*My visit to the East Coast of Bali was organized through AquaMarine Diving ([www.aquamarinediving.com](http://www.aquamarinediving.com)) and I would like to thank Annabel Thomas and her staff for a first class trip, which was superbly organized and very professionally conducted.*

— Don Silcock  
[don.silcock@ge.com](mailto:don.silcock@ge.com)  
[www.indopacificimages.com](http://www.indopacificimages.com) ■

**BALI**  
 The Island really is a special place, each time I visit Bali the more enjoyable I find the experience. The Balinese people are predominantly Hindu in a nation dominated by Islam, and have a long history & a unique culture that draws visitors from far and wide.

**Safety** Bali has been the subject of two horrendous bombings and both of them occurred in the "tourist triangle" in the southeast of the island, a long way from the dive locations on the east, northeast & northwest of the island. My opinion is that I am perfectly safe away from the principle tourist areas, which I tend to avoid anyway.

**When To Go** The dry season of April to October is the best time to dive the east coast and May to September have the optimum conditions & visibility. My trip was actually in December, right in the middle of the rainy season, so the heavy river run-offs from the often-torrential afternoon rain in Bali meant that the underwater visibility was not particularly good – especially at the sites closest to shore. However, overall I was most impressed by the diversity of this part of Bali and was pleased with the images I took.

**Who To Dive With** There are many dive operators in Bali offering a range of diving and services but I have personally found AquaMarine Diving ([www.aquamarinediving.com](http://www.aquamarinediving.com)) to be very professional and highly organized and would thoroughly recommend them.

**Getting There** Bali's airport is located in the southeast of the island, very close to the main tourist areas. It is a major hub in Indonesia and very well serviced by international and domestic carriers.

**Where To Stay** I personally stayed at the Water Garden Hotel in Candi Dasa [www.watergardenhotel.com](http://www.watergardenhotel.com), which was suggested & arranged by AquaMarine Diving. There is a wide variety of hotels to suit all tastes and budgets in Candi Dasa.





If there is one thing that we know about mimics, it is that they are rare. Since they were first recognized, very few have been collected or observed in the wild. Even in areas such as the Lembeh Straits and Bali, which have been extensively dived by knowledgeable naturalists, sightings have been infrequent and sporadic. Only dozens have been seen, not hundreds or thousands. Yes, it is a big ocean. However, the habitats apparently suitable for the mimic are limited, easily accessible and the number of people (including collectors) diving on them is rapidly increasing ... I would urge everyone, amateurs and professionals alike, to curtail your desire to display these animals. I hope that with our help they can continue to survive in the wild where they can be studied, photographed and appreciated.

— Dr. Roy Caldwell  
The Cephalopod Page

See a video on YouTube of a mimic octopus impersonating a sole fish, a lionfish, and a sea snake:  
[www.youtube.com](http://www.youtube.com)



# The Mimic Octopus

Text edited by Gunild Symes  
Photos by Andrea Ferrari

The amazing mimic octopus was discovered in 1998 on the bottom of a muddy river mouth in Indonesia, off the coast of Sulawesi. Since then, it has been reported that researchers have filmed nine different kinds of mimic octopuses, *Thaumoctopus mimicus*, in the act of mimicking flatfish, lionfish and sea snakes as they move across the ocean floor. (See [video link](#)). It is a strategy that this fascinating creature uses to avoid predators and other threats.

Typically, the mimic octopus is brown and white striped and grows to about 60 cm long. Its habitat is in muddy estuary bottoms in the tropics around Bali and Sulawesi. Small crustaceans and fish are most likely their source of food.

Octopus are highly intelligent. They can change the texture and color of their skin to display camouflage in avoiding predators. But the ability to impersonate another animal was unknown until the discovery of the mimic octopus. Indeed, the mimic octopus is the first

known species to be able to mimic multiple species.

Other creatures have been known to take on the characteristics of just one other species as a survival tactic. For instance, there are flies that can display the black and yellow stripes of bees—a warning aimed at predators. The mimic octopus is so intelligent, it can figure out what dangerous sea creature to impersonate for each specific kind of threat.

It has a varied repertoire: As a sole fish, the mimic octopus can accelerate in speed through jet propulsion as a leaf-shaped wedge with all its arms closed together and undulating like a flat fish. As a lionfish, it can ward off enemies, tricking them to think it has the fish's poisonous fins, by spreading its arms wide and hovering above the ocean floor. As a sea snake, the mimic octopus looks menacing to pesky damselfish, which are common prey to sea snakes, while it waves two arms in opposite directions like a snake wriggling in the water. It is thought that the creature can also mimic stingrays, mantis shrimp, sand anemones and even jellyfish. ■ SOURCE: MARINEBIO.ORG





# fact file



X-ray mag

SOURCES: WWW.CIA.GOV, WWW.STARFISH.CH, WWW.SCUBA-DOC.COM

## Bali, Indonesia



**History** In the early 17th century, the Dutch began to colonize Indonesia. During WWII, the islands were occupied by Japan. After Japan's surrender, Indonesia declared its independence, but four more years passed with intermittent negotiations, recurring hostilities, and UN mediation before the Netherlands let go of its colony. Home to the world's largest Muslim population, Indonesia is the world's largest archipelagic state. Its government faces several challenges including alleviating poverty, preventing terrorism, consolidating democracy after 40 years of authoritarianism, reforming the financial sector, irradicating corruption, halting human rights violations by the military and police, and controlling avian influenza. Indonesia reached a historic peace agreement with armed separatists in Aceh in 2005, which led to democratic elections in December 2006. In Papua, a low intensity separatist movement continues to confront Indonesia. Government: republic. Capital of Indonesia: Jakarta. Main city of Bali: Denpasar.

**Geography** Indonesia is located in Southeastern Asia. It is an archipelago of islands between

the Indian Ocean and the Pacific Ocean with a total coastline of 54,716 km. 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 on 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.

**Time Zone** GMT plus 8

**Climate** Tropical, hot and humid. Temperatures range from a high of 31°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. The dry season takes place April through November, and the wet season, December through March. Natural hazards



Map of Bali  
INSET: Map of Indonesia

RIGHT: Global map showing location of Bali



include occasional floods, severe droughts, tsunamis, earthquakes, volcanoes, and forest fires.

**Environmental Issues** deforestation, sewage, industrial water pollution, urban air pollution, forest fire smoke and haze

**Health** In Bali, there is no major risk. Unlike islands further east in the archipelago, there is no Malaria/Dengue fever in the northeast 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. However, 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. When traveling in the rest of the country, be aware of the high degree of risk of food or waterborne diseases such as bacterial diarrhea, hepatitis A and E, and typhoid fever, as well as vectorborne diseases such as chikungunya, dengue fever, and malaria. Please note that highly pathogenic H5N1 avian influenza has been identified in Indonesia, but it poses a negligible risk with extremely rare cases possible among visitors who have close contact with birds (2008)

**Population** 237,512,352 (July 2008 est.); 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 six 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 (IDR). Exchange rate: 1EUR=15,052 IDR; 1USD=12,028IDR; 1GBP=17,917IDR; 1AUD=7,577IDR; 1SGD=7,861IDR. Credit cards are accepted by most higher end resorts and businesses. Payment in US\$ cash and traveller's 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.

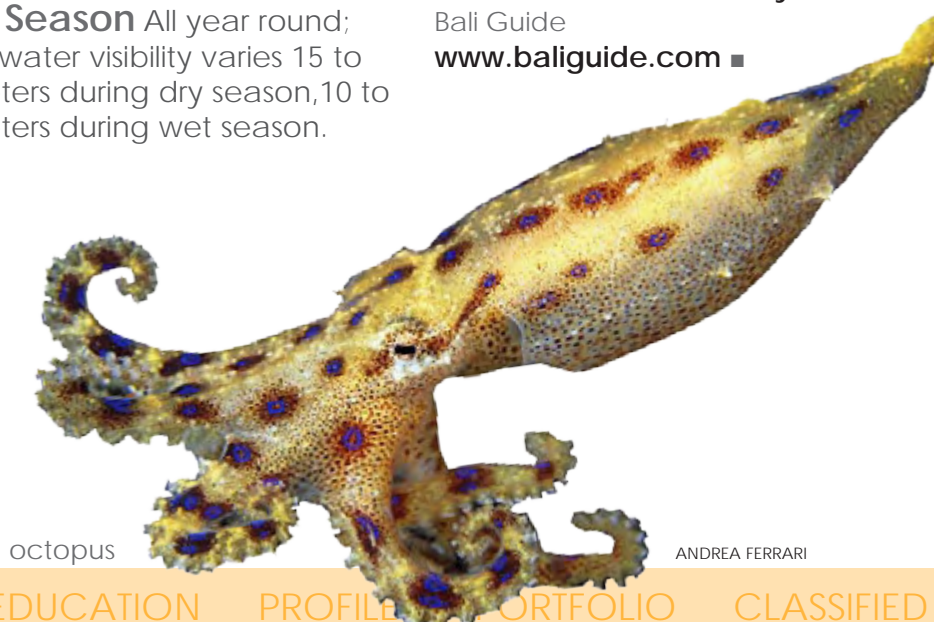
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[www.sanglahbalihospital.com](http://www.sanglahbalihospital.com)

Rumah Sakit Angkatan Laut  
(Navy Hospital)  
Jl. Bendungan Hilir No.17  
JAKARTA 12950, JAVA, INDONESIA  
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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)



Blue-ringed octopus

ANDREA FERRARI





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# & Stocking Stuffers for Divers

# Holiday Gifts

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### Big Blue Silver Sea Turtle Pendant

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### Big Blue Clown Fish Key Chain

Capture your keys on this dive-striped clown fish key chain. Created by Roland St. John, this Clown Fish with dive flag is a realistic, three-dimensional, life-like key chain made of solid pewter with a clear lacquer finish. Price: US\$6.50 [www.bigbluedive.com](http://www.bigbluedive.com)

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Exquisite 18ct Gold and Silver Single Seahorse Pendant, GB£138 [www.reefjewelry.com](http://www.reefjewelry.com)







gifts

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These whimsical lunchboxes were designed by Iconic Covers and award-winning children's book illustrator, Stephen Savage, who gained inspiration for the fun designs from zoo animals. Made from polypropylene, these practical lunchboxes insulate foods and beverages, have small handles for small hands, unzip to a placemat and store flat. They are reusable so save hundreds of paper or plastic bags per year. Tested lead and food safe. [www.iconiccovers.com](http://www.iconiccovers.com)



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Put these fun ornaments on your tree at Christmas or hang them up in your office or give one to your dive buddy. Diver in blue also available. [Fun-christmas-ornaments.com](http://Fun-christmas-ornaments.com)

[Fun-christmas-ornaments.com](http://Fun-christmas-ornaments.com)

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This cute teddy bear is wearing a funky scuba-themed t-shirt that says Dive Talkin'. The retro design is a play on the disco phrase: Jive Talkin'.

This unique design makes it a great gift for trendy scuba divers. International shipping available. [www.cafepress.com/servopuff](http://www.cafepress.com/servopuff)



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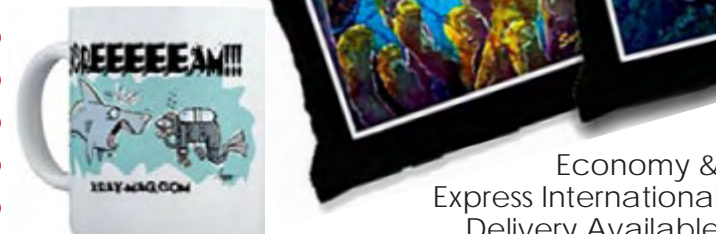
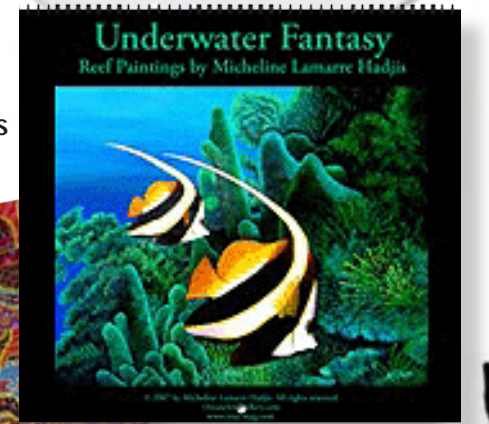
### Dive Stickers

Let the world know what you're into (or just decorate your annoying neighbour's car) with these cool dive stickers. You'll be the toast of the boat on your next dive trip, no doubt about it! [www.fishpie.com](http://www.fishpie.com)

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**Eco-friendly Christmas Cards**

Each year, billions of Christmas cards are sent and read and enjoyed and then tossed in the bin.

Reduce paper waste and save thousands of trees by emailing your cards this year. Project aware has teamed up with artists Jo & Joe to create a colorful line of animated e-cards to send your ocean-loving friends and dive buddies. Enter the code 'AWARE' when you join and £1 (\$2) will be donated directly to Project AWARE.

[Joandjoe.com/projectaware](http://Joandjoe.com/projectaware)



**Wetsuits for your laptop**

Neoprene is not just for diving anymore. Protect your precious laptop with this padded water-repellent neoprene with PVC sleeve. It has an exterior accessory pocket with zipper; asymmetrical zipper design that allows easy access from top or side; and metal side D-ring. Three sizes available to fit laptops with screens up to 17 inches. Matching messenger bag also available. Price: US\$39.99. [www.laurex.com](http://www.laurex.com)



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Edited by  
Peter Symes

*Jellyfish having few and sparse predators their population explosion can be of serious ecological and economic consequence as is the case in the Black Sea.*



NEMOPIEVA NOMURAI GFDL

## Where do they come from?

From Japan to Europe, fishermen have seen their catches destroyed, and in the Mediterranean, several popular beaches had to be closed following massive invasions by huge swarms of jellyfish. While there are records of people dying from the noxious sting from the jellyfish, reports of serious human injury are fortunately quite rare.

# The JELLYFISH cometh

Fishfarmers off the British Islands could only watch helplessly as their whole stock was killed in the matter of minutes by the non-native marauding stingers and in Japan massive Nomura's jellyfish the size of sumo wrestlers, more commonly found in Chinese and Korean waters, were proliferating off Japan's coast where they have grown a hundredfold in some areas turning into a pest for Japanese fishermen. During the recent years the massive sea creatures, which can grow two meters wide and weigh up to 220 kilograms, were clogging and ripping fishing nets, causing havoc for fishermen who have to spend hours hacking them out of their nets. The fishermen's catch were also being poisoned by the invertebrates' toxic stingers. At one point, the crisis prompted fishermen to come up with cooking recipes, although the jellyfish are rarely eaten in Japan.

Japanese scientists speculated that the jellyfish grow big along the coast of China and have been drifting from China's Yangtze River Delta, where unusually heavy rains may be pushing the jellyfish to Japan.

Then suddenly this year—to the great relief and puzzlement of fishermen and researchers alike—the Sea of Japan saw a drastic decline in swarms of the huge jellyfish. According to the Japan Fisheries Information Service Center, fishermen had reported about 6,300 sightings of Nomura's jellyfish as of November 20 last year, compared with only 128 this year. "This is a dramatic fall in numbers," said Katsuya Saito, an official at the Tokyo-based non-profit research center.

"Up to last year, 3,000 to 5,000 of the jellyfish would get tangled up in a single fixed net in some cases. But this year, only one or two were reported to have been caught," Saito said.

Saito said that until 2001, a heavy presence of the jellyfish occurred only once every several decades. But from 2002 to 2007, thousands were seen in fall and winter in the Sea of Japan and parts of the East China Sea, Saito said.

## Out of Control?

## Is Ocean Acidification to blame for Jellyfish invasions?

Hitoshi Iizumi, an official at Japan Sea National Fisheries Research Institute, a government-affiliated agency, said scientists have not

determined the cause of the sudden disappearance. Researchers believed three factors near China conspired to create the surge in jellyfish in the recent years: Eutrophic water coming to the sea from modern Chinese cities, global warming that has increased the sea temperatures, and increased fish catches resulting in more zooplankton. But researchers are not sure if those factors changed this year, Iizumi said. Yet another is that China has over-fished their waters and reduced the populations of the jellyfish's natural predators, which fed on the larvae while they are still zooplankton. Yet another cause may be China's new dam,

## Japan Sea jellyfish menace eases





the Three Gorges Dam. On the Yangtze River, the Three Gorges Dam, the world's largest hydroelectric project, has increased the amount of phosphorus and nitrogen in the waters off China, creating an ideal breeding ground for Nomura's jellyfish. A final possibility is global warming, which would cause the heating up of the seawater and encourage jellyfish breeding. Jellyfish also have the ability to take in oxygen directly from their skin allowing the jellyfish to thrive in the oceans growing dead zones.

### Global warming

In Malaysia

where dozens of people have been stung by jellyfish at popular beaches over a period of a few days, Dr Mohammed Rizman Idid of the University of Malaya said environmental changes caused by global warming had compounded the problem and made it more difficult to handle jellyfish blooms.

Many jellyfish species were capable of congregating in huge swarms, which consisted of hundreds or even thousands of individuals, said Rizman. "It is a complex process and is dependent on various factors, including the concentration of nutrients, water temperature, and oxygen content."

In a more serious scenario, he said, jellyfish would mass breed during blooms and could cause serious ecological

problems. It was impossible to determine the exact time when jellyfish outbreaks, or blooms, occurred but they often seemed to occur during the dry season when the sea water was warmer, said Rizman.

### Ballast water to blame?

Another concern was the possible spread of invasive foreign species, which could be more dangerous than local jellyfish species, said Rizman. "In Europe, they have found many invasive species and similar cases could also happen here."

Globalisation had made it easier for foreign species to breed in Malaysian waters. Ballast water in the hulls of seagoing ships was the best medium for such species to be transported unintentionally to foreign regions.

"Just imagine what will happen if a deadlier jellyfish from Australia invades our waters. It will definitely affect our tourism and fishery industries." Rizman said information on the matter was scarce, and he would begin a comprehensive study on jellyfish distribution soon.

### Acidification?

Since the start of the Industrial Revolution, there has been a drop of 0.1 pH unit in the global ocean. Such acidification of the ocean may make calcification more difficult for

calcareous organisms, resulting in the opening of ecological space for non-calcifying species. It has therefore been speculated that jellyfish simply have taken advantage of the vacant niches made available by the negative effects of acidification on calcifying plankton.

There is some evidence for this effect in the west-central North Sea over the period 1971-1995. Working with data from a larger portion of the North Sea, as well as throughout most of the much vaster Northeast Atlantic Ocean, two researchers, Richardson and Gibbons, compared jellyfish records and pH data for the period 1946-2003 to explore the possibility of a relationship between jellyfish abundance and acidic ocean conditions. This work revealed that there were, as they describe it, "no significant relationships between jellyfish abundance and acidic conditions in any of the regions investigated."

The study does not rule out a relationship between acidification and jellyfish populations on local scales, but concludes if low pH has any effect on natural populations, this may be negated by the much more important effect of warmer water temperatures.

### The bottom line

We still don't know. ■



Nomura's Jellyfish

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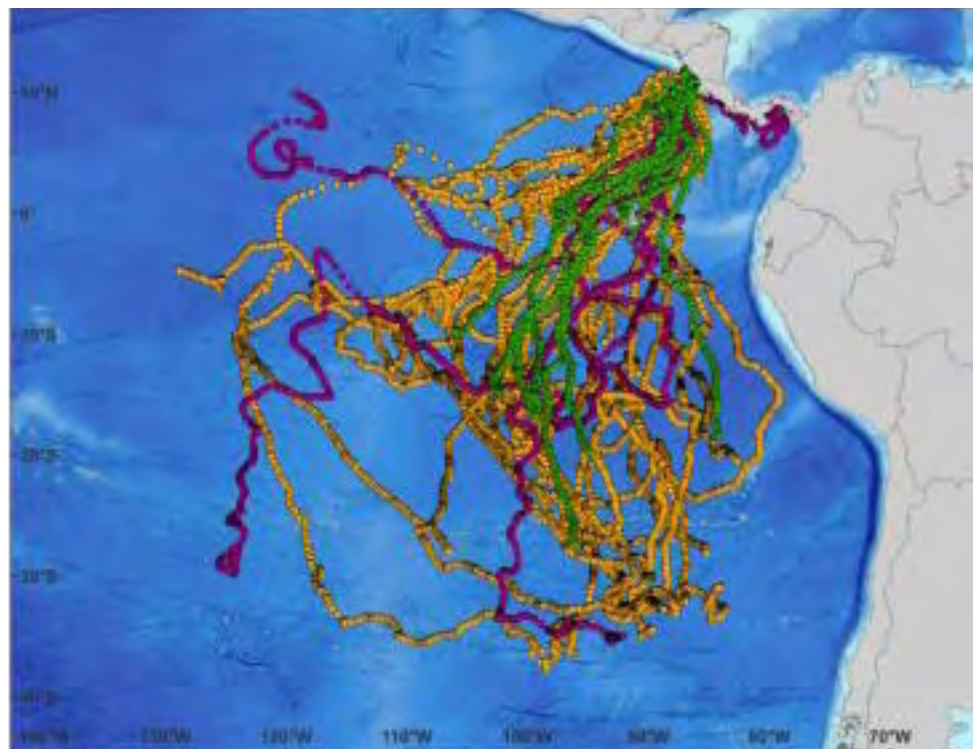
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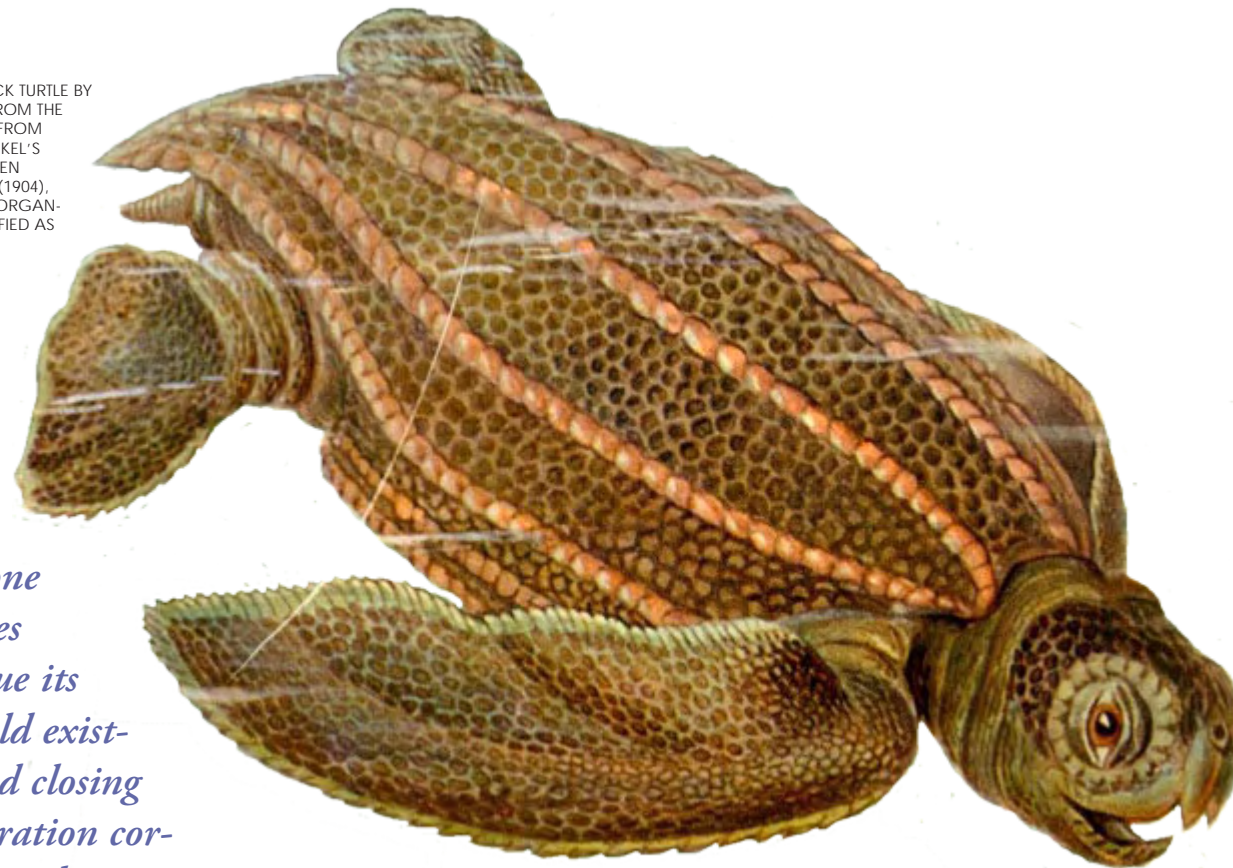


Edited by Peter Symes



Leatherback sea turtles satellite tracks as recorded by Stanford researchers

LEATHERBACK TURTLE BY HAECKEL. FROM THE 89TH PLATE FROM ERNST HAECKEL'S KUNSTFORMEN DER NATUR (1904), DEPICTING ORGANISMS CLASSIFIED AS CHELONIA.



*“Our plan allows one of the largest reptiles on Earth to continue its 100-million-year-old existence by opening and closing portions of the migration corridor to fishing as turtles enter and exit the area. We believe this corridor is also used by other endangered species, such as hammerhead sharks and would benefit many other threatened marine species.”*

RANDALL ARAUZ, PRESIDENT OF COSTA RICAN-BASED PRETOMA

Leatherback sea turtles in the Pacific Ocean have declined by more than 90 percent over the past three decades as a result of drowning in industrial longline and gillnet fisheries targeting swordfish, sharks, and tunas. Egg harvesting, marine plastic debris and loss of nesting beaches due to global warming-induced sea level rise also threaten the leatherback. If current trends continue, Pacific leatherbacks are predicted to go extinct within the next few decades.

## How the turtle's shell evolved

A newly discovered turtle fossil, found near Guangling in south-west China has shed light on how the turtle's shell evolved. The find shows that the turtle's breast plate developed earlier than the rest of its shell.

Researchers say the development of the shell to first protect the underside points to a mainly aquatic lifestyle. Other marine species were found with the turtle fossil.

The 220 million-year-old fossil is thought to be the ancestor of all modern turtles, although it differs markedly. The shell only covers its underside. The breast plate of this fossil was an extension of its ribs while only hardened skin covered its back. It also has teeth rather than a bony plate, and it has a long tail.

The researchers say this idea is supported by evidence from the way modern turtle embryos develop. The breast plate grows before the shell covering their backs.

The fossilised turtle ancestor, which has been named *Odontochelys semitestacea*, meaning half-shelled turtle with teeth, probably inhabited the river deltas or coastal shallows of China's Nanpanjiang trough basin—the area where the fossil was unearthed. ■

# Protecting the turtles' migratory routes

The International Union for the Conservation of Nature's World Conservation Congress adopted a resolution urging nations to protect the leatherback sea turtle and sharks from the world's industrial fisheries by identifying and creating marine protected areas along the Pacific leatherback's migratory routes.

More than 8,000 scientists, government officials and environmental organizations from over 250 nations overwhelmingly supported the resolution, which includes the “Cocos Ridge Marine Wildlife Corridor,” designed to shield the critically endangered Pacific leatherback and the hammerhead shark from longline and gillnet fisheries. Recent satellite tracking data from Stanford University researchers shows that after nesting on the beaches in

Playa Grande, Costa Rica, Pacific leatherbacks swim toward the Galapagos Islands.

Sea turtles are capable of diving more than half a mile deep, and migrate across the entire Ocean basins to feed in the jellyfish-rich waters off the west coast of North and South America. Leatherbacks swim over 6,000 miles within a single year—the largest geographic range of any living marine reptile, and one of the longest known migrations for

any marine species in the world.

In the recent study, Persistent Leatherback Turtle Migrations Present Opportunities for Conservation, Shillinger used satellite tracking and remote sensing to describe the effects of oceanography, such as ocean currents, phytoplankton distribution and sea-floor topography, on Pacific leatherbacks' distribution and movement; and then developed a model that could predict the presence or absence of the

sea turtles.

His work is part of the Census of Marine Life's (CoML) Tagging of Pacific Pelagics (TOPP) initiative, a multidisciplinary, international research program utilizing electronic tags to track the migrations of a variety of open ocean animals. Shillinger adds, “Now it's time to turn the high-tech science into political will and conservation action for critically endangered leatherbacks.” ■



Valerie and Ron.  
A lifetime dedicated  
to the preservation of  
our oceans' marine life

Text by Mathias Carvalho  
Photos courtesy of Ron and Valerie Taylor,  
and *Blue Water, White Death*

Valerie Taylor, along with her husband Ron, are two of the true pioneers of underwater photo and video, since their debut in the 1960s. Their efforts brought the wonders of the blue oceans to our households, through footage acquired for several TV and film productions. Ron and Valerie are especially renowned worldwide for their specialization in getting images of the shark in its habitat. Always ahead of the latest technology, they adopted the use of DV cameras and decks, adding to their vast portfolio of professional film and analog video footage. Valerie was kind enough to offer me some insights, on this brief interview, after their return from a long expedition to Indonesia.



## *A talk with the* **Taylors**

*XRM: I am sure that you have both heard this question before, but for our readers' benefit, how did you two begin diving with sharks? And, why sharks, specifically?*

Valery Taylor: We started out as spear fishing champions. In those days, there were plenty of sharks, and they were attracted to

our speared fish. Ron started filming them in 16mm because he found that the footage could be sold first to Movietone news for their news reels they used to screen before the main feature film, then to TV when it arrived in Australia in 1956. Shark footage sold, and we needed money.

*XRM: You were the first to actually document sharks in their natural habitat. What was the general public's reaction to that?*

Valery Taylor: Yes, we were. The public thought we were mad, but they loved our images. We learned a great deal about sharks in a very short time. This was back in







Hundreds of sharks gathering into a lagoon pass in French Polynesia

## The Taylors

ting out of the cages among hundreds of large, dangerous Oceanic White Tips feeding on a harpooned whale. I truly believed that one or more of us could not survive. An odd thing, I felt no fear, just aggression.

*XRM: How hard is it to photograph sharks underwater? They must be hard to find, let alone get close to.*

Valery Taylor: Because of over harvesting, they are getting hard to find. For many species, we use baits to attract

the late 1950s and early 1960s.

*“Blue Water, White Death was the greatest adventure of our lives.”*

*XRM: “Blue Water White Death”—was it what actually put the Taylors in the limelight, with your first hit? What was it like?*

Valery Taylor: BWWD was the

greatest adventure of our lives. It not only made us famous as divers, it also was very instrumental in teaching other divers that it was possible to work with potentially dangerous sharks in their natural environment.

*XRM: Any memorable moments in that expedition?*

Valery Taylor: The whole expedition was memorable, but I think the biggest adrenalin hit was get-



them to our cameras, otherwise they would either swim over for a quick look or simply swim past ignoring us. A hunk of tuna tied to the reef will keep them interested as long as it lasts, which is generally not long. To overcome this, we would have the tuna frozen hard. The sharks take much longer to eat a frozen fish.

*XRM: So, your next major role in movie making*

Valerie arm-wrestling with a shark—“Thank God for those gauntlets”—still the most successful protection outside a metal cage against dangerous sharks

FAR LEFT: Blacktip sharks—they rarely will attack divers—a media boosted myth





## The Taylors

phy and videography play a key role in the preservation effort today? How?

Valery Taylor: Of all the hundreds of shark species found world wide, there are only six or seven species potentially danger-

water housings with special ports for wide angle lenses. It is important when filming sharks to have equipment that works well every time.

*“Children are always asking us questions about sharks. Never about corals or fish.”*

*XRM: On the negative side, the JAWS series made everyone afraid of sharks everywhere. How harmful was its effect on the public opinion? Or has it had not much effect at all?*

Valery Taylor: Peter Benchley, Universal Pictures, and us were all amazed at the public reaction to the film. It was a fictitious story about a fictitious shark. No one ever expected the bad and very unjust publicity regarding sharks that followed. You do not worry about King Kong when you visit New York, so

be regarded as true, which illustrates the incredible power of suggestion the media can have. Even today, people come up to us and say they will never swim in the ocean again because they saw JAWS.

*XRM: Does shark photogra-*



was as the technical underwater crew in JAWS 2. What can you tell us about that experience, moving from documentaries to a blockbuster?

Valery Taylor: We had already worked on several feature films. We thought *Jaws* would be a sort of B class movie, but it was good money, and the people we worked with were fabulous.

At the time, Ron shot enough footage for *Jaws 2* as well as the first one, which turned into the blockbuster. We were employed originally to shoot the live shark footage for *Jaws*, a story written by Peter Benchley. Although we were taken to Marthers Vinyard where the main unit was filming, Ron shot all the live shark footage off South Australia.

*XRM: What filming techniques did you use, and what did you have to come up with?*

Valery Taylor: Ron used a 35mm camera in an underwater housing he made himself. Ron is very clever at making things. He makes all our underwater housings, and they are far better than any we could buy. He is still making them, and my latest digital camera housing makes other underwater photographers envious.

*XRM: Ron, you are a pioneer of underwater housing for cameras. Did you apply any of your inventions during the film?*

Ron Taylor: I used two of my own self-designed and constructed 35mm under-

why worry about a fictitious shark off the local beach?

We feel the adverse reaction was caused by the human race having an instinctive fear of being eaten alive. Sharks do—on rare occasions—bite people, but we are not their natural prey. Unlike the monster in *JAWS*, sharks do not swim around looking for people to eat. If they did, no one could ever go into the ocean without serious risks.

*XRM: Was the result a direct hit on the new discoveries about sharks that you and other professionals were making?*

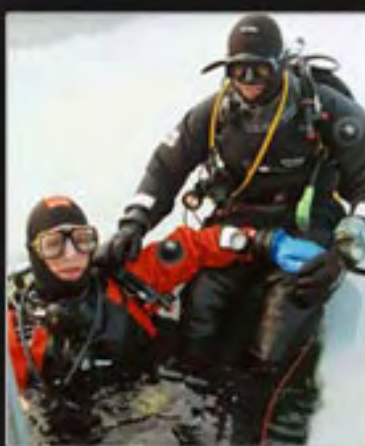
Valery Taylor: I do not think *Jaws* had anything to do with new discoveries about sharks. It had more to do with how a well-presented film can

A White Shark inspects the diver's cage in South Australia—size does matter. All photos this page courtesy of *Blue Water, White Death*





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## The Taylors

ries like shark fin soup. Interestingly, this soup has no taste. It is more of a texture, as the flavor is added.

The sale of shark fin soup should be banned in all western countries, the same as with tigers claws and elephant tusks. The harvesting of sharks for their fins should be outlawed but, even as I write, the Queensland Government in Australia

is giving commercial fish-

ermen permission to long line for sharks inside our Great Barrier Reef Marine Parks. It seems incredible that a fish that has survived for hundreds of millions of years can be hunted almost to extinction in a few decades.

*XRM: What else can be done, especially if one isn't a shark spe-*

ous to humans.

Depicting sharks via the media as they really are has, over many years, given the public a different view of sharks in general and some, such as the Grey Nurse (Sand Tiger), in particular.

Sharks have always fascinated people, but because of television, much more is known about them. Children are always asking us questions about sharks. Never about corals or fish.

and the fins dried out for sale in Hong Kong and Singapore. The dried fin of say a Whale Shark is worth about \$1,000 US on the Hong Kong market. Wealthy Chinese buy these big fins to celebrate a wedding or a special event.

As the Chinese become more affluent, many more of them will be able to afford such luxu-

*XRM: So, sharks have benefited from an increasing number of educational and protection campaigns all over the world. But we see that they are at the top of the list of oceanic endangered species. Why is that?*

Valery Taylor: The Chinese lust for shark fin soup. Sharks are hunted world wide for their fins. The body is generally dumped,



THIS PAGE: Valerie inspects a dead victim of a whaling fleet still run by Norwegians—wailing still kills hundreds every year. All photos this page are courtesy of Blue Water, White Death

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Ron filming some clever sea lions. U/W technology proven on the field

cialist? How can the rest of us contribute?

Valery Taylor: Not much really. Sharks are very much an endangered species and will be hunted until it is no longer viable, which means, there are too few left. Banning fining in the territorial waters off your coast would be a big help, but controlling poachers is very hard and convincing governments even harder.

XRM: What campaigns, projects or associations are you affiliated with?

Too many to name. I am the New South Wales patron of National Parks Marine Association in Australia. And we belong to many other organizations trying to protect sharks. If they all got together and formed a huge group, they could make a difference, but this is unlikely to happen.

You know the saying, "united we stand, separate we fall"? In a world where countries cannot even agree on a standard for power outlets, how can they ever come together on protecting sharks?

One good example is whaling. Whales are incredible animals.

*"We now have a marine world as man has made it, not as nature intended it to be."*

Everyone loves them, but there are dozens of countries where they hunt them without punishment and in the cruelest of fashions.

XRM: Can you tell us about your current projects?

Valery Taylor: About to write a book. We keep filming and taking photographs. Goodness, we just keep on doing what we have always done. Dive, eat, dive, eat, sleep...

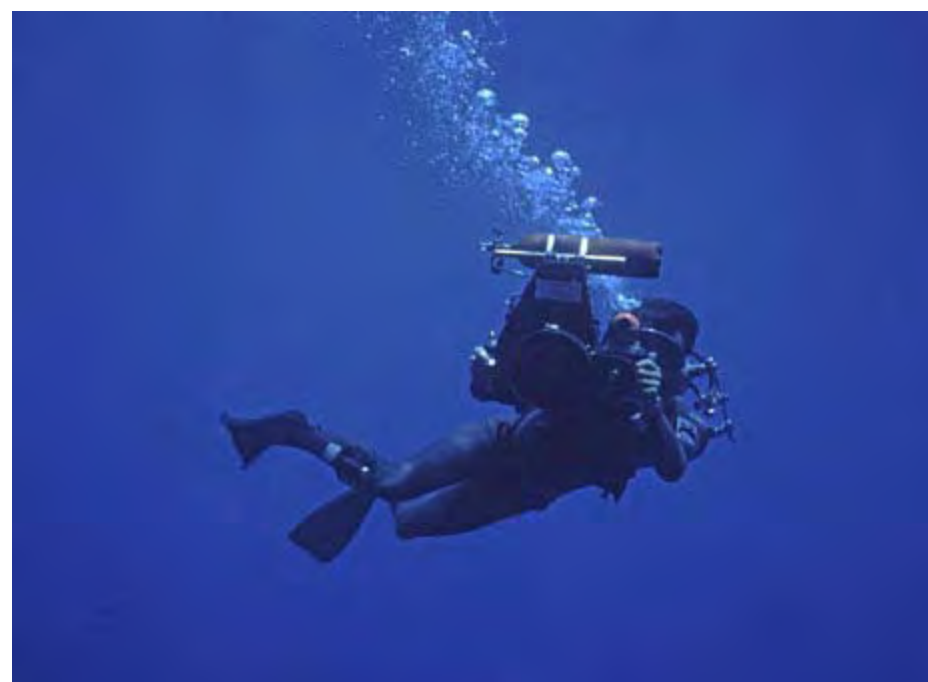
XRM: What does the future has in store for us, regarding the protection of the oceans?

Valery Taylor: In my option, it is doomed. Look what we, the so-called civilized countries, have done and knowingly continue to do with this most precious resource. When India and China catch up with us, and they already have, it will be the death knoll for the remaining eatable life in the ocean.

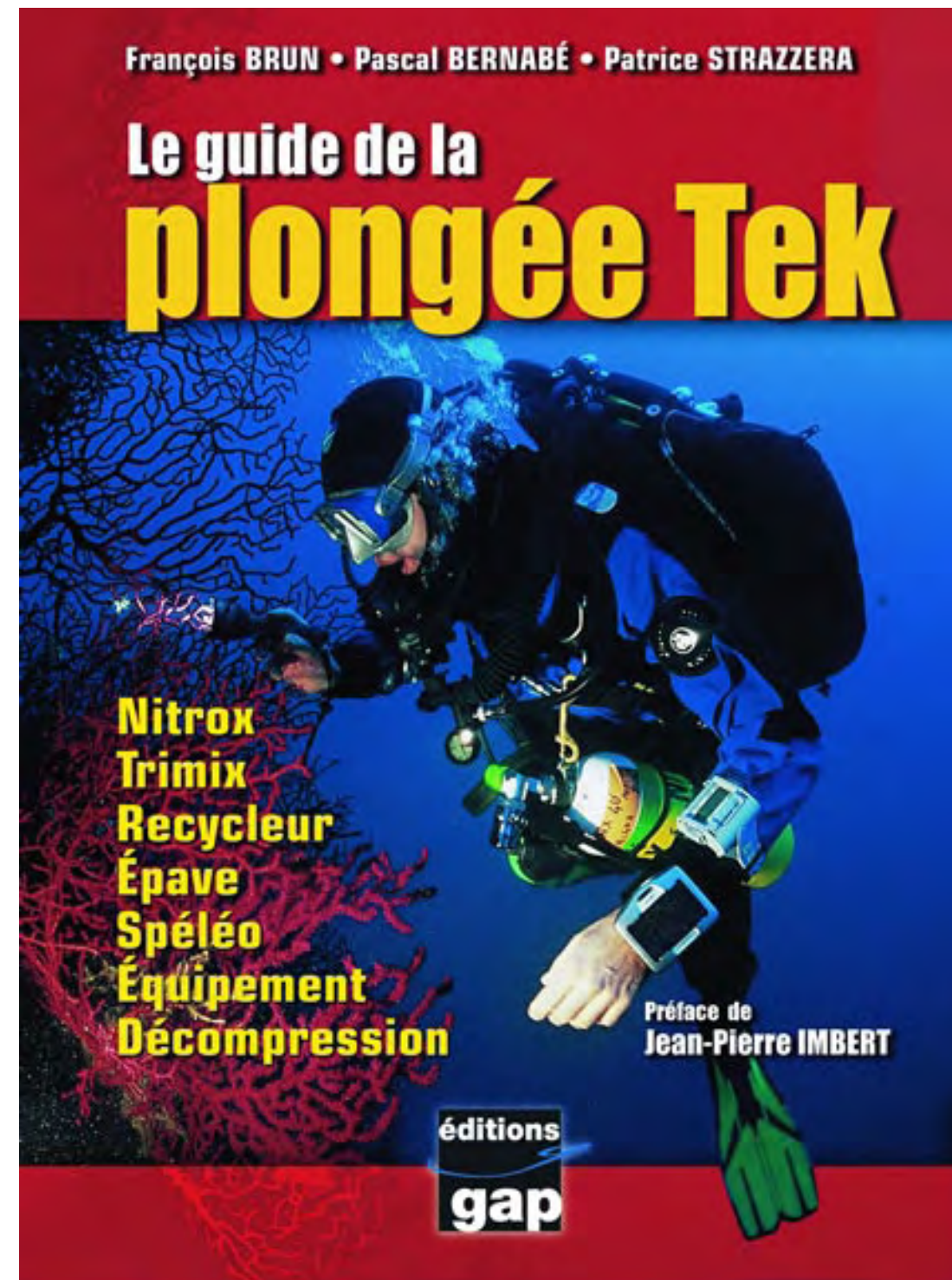
The biggest problem is that the marine animals

## The Taylors

are free for the taking. They do not have to be farmed, just harvested. No one has to clear the land or grow the crops to feed the farm animals, nature has already done that. Fishermen take away and put nothing back. The ocean, as we knew it in our youth, has gone. We now have a marine world as man has made it, not as nature intended it to be. ■



RIGHT: Ron with one of his homemade camera housings— ahead of his time. Photo courtesy of *Blue Water, White Death*



François BRUN • Pascal BERNABÉ • Patrice STRAZZERA

# Le guide de la plongée Tek

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technical matters

# Seven Deadly Sins of a Rebreather Diver

Text by Cedric Verdier

Except if you spent a few years in a catholic church or a few hours enjoying the movie with Brad Pitt and Morgan Freeman, the seven deadly sins are often considered a notion of the past. In the modern world, examples of pride or envy don't seem to immediately drive the sinner to hell, and lust is all over the Internet.

Nevertheless, they should be regarded as valid for a rebreather diver using a CCR or SCR. Looking at the statistics and the accident reports, the seven deadly sins of a rebreather diver can surely help you to buy an express ticket to hell. First class. One way.



DETAIL FROM HIERONYMUS BOSCH'S THE SEVEN DEADLY SINS AND THE FOUR LAST THINGS. C.1450-1516

## Gluttony

Our body needs food. Our body needs oxygen, too. But too much food or too much oxygen can also kill you sooner or later. A setpoint too high on an eCCR, exceeding the MOD on an SCR, or simply exceeding the physiological limits of oxygen

exposure can lead a rebreather diver to oxygen toxicity and its various manifestations (acute Oxygen Toxicity poisoning on the Nervous System, whole body toxicity and its effects on the lungs, O<sub>2</sub>-induced myopia).

- Limit your oxygen exposure.

*Gluttony: Simply exceeding the physiological limits of oxygen exposure can lead a rebreather diver to oxygen toxicity...*

## Lust

Nitrogen is like having sex. It can give us a lot of fun, but it can also impair our judgement. Deep air divers are sometimes compared to drug-addicted people, and there is a good reason for that. An Equivalent Narcotic Depth too high is a good way for a rebreather diver to make a mistake while using his/her unit. And, for a same depth, a rebreather diver is always more prone to Nitrogen Narcosis than his fellow Open Circuit diver. Why? Because even with the most efficient scrubber, the CO<sub>2</sub> level in the loop will always be higher than in a second stage. And that will increase the susceptibility to inert-gas narcosis.

- Don't expose yourself to excessive Nitrogen Narcosis.

*Lust: Nitrogen is like having sex. It can give us a lot of fun, but it can also impair our judgement.*



Detail from Hieronymus Bosch's *The Seven Deadly Sins and the Four Last Things*. c.1450-1516

## Greed

Scrubber material is cheap. So, why pushing the limits? Why try to save some money when your



safety is much more important?

A diver who has invested in a rebreather and the proper training to use it, shouldn't try to extend the duration of his/her scrubber beyond the manufacturer's recommendations. CO<sub>2</sub> is a nasty gas, and nobody really wants to experience signs and symptoms of hypercapnia. A CO<sub>2</sub> hit is one of the worst things that could happen to a rebreather diver at depth.

- Change your scrubber in time.

*Greed: Scrubber material is cheap... Why try to save some money when your safety is much more important?*

'Avarice' print engraving from Jacob Matham's series *The Vices* c.1587



DETAIL FROM *DESIDIA (SLOTH)*, 1558, BY PIETER VAN DER HEYDEN AFTER BRUEGEL



**Sloth:** *A rebreather diver who doesn't properly take care of his/her unit is an accident waiting to happen.*

more things to do and to control than his/her fellow Open Circuit scuba diver. Keeping a good buoyancy control, checking the functioning of the unit and properly operat-

ing the rebreather are all parts of a normal rebreather dive. How to avoid task-loading? Take your time. Don't try to do several things simultaneously. All actions have to be done much slower with a rebreather: descending, ascending, swimming and even breathing.

- Avoid task-loading at depth.

### Pride

With experience and logged dives, some rebreather divers become overconfident. After having followed a check-list for a hundred times, one may have the feeling he/she doesn't need it anymore. Or one might think

that some parts of it can safely be skipped as nothing ever happened during the hundred dives before. The positive/negative pressure tests are cut



**Pride:** *With experience and logged dives, some rebreather divers become overconfident.*

Pride, from the *Seven Deadly Sins* by Jacob Matham, circa 1592

'Envy' in *The Seven Vices* by Giotto, 1306 fresco in the Cappella degli Scrovegni or the Arena Chapel in Padua, Italy

short. The different components of the unit are too quickly checked. Or the rebreather diver only relies on his/her memory to follow the various steps of the check-list and simply forgets some of them. Then he/she will maybe dive on a partially inspected rebreather...

- Always use your check-list before each dive.

### Envy

The desire to go deep or to explore new environments is a normal behaviour for most rebreather divers. Nevertheless, this has to be done properly and only after completing the adequate training. Diving deep with a rebreather doesn't seem very complex. Just use the appropriate helium-based mix and follow the computer! Unfortunately, nothing is that simple when it comes to proper

- Be trained for the equipment you use and the environment you dive in.

By using the previous rules, a diver could expect to avoid the seven deadliest sins of rebreather diving—a good way to keep your head on your shoulders and to avoid being sent to hell sooner than expected...

■  
*Cedric Verdier is a PADI course Director, ANDI-PSA-TDI-IANTD-DSAT Trimix Instructor Trainer, and CCR Mixed Gas Instructor Trainer. For more information, email: [info@cedricverdier.com](mailto:info@cedricverdier.com)*

## 7 Deadly Sins



**Envy:** *The desire to go deep or to explore new environments is a normal behaviour for most rebreather divers.*

### Sloth

If complacency kills, laziness is one of the accomplices to the murder. A rebreather diver who doesn't properly take care of his/her unit is an accident waiting to happen. A rebreather is an expensive and delicate piece of equipment. So, a proper maintenance schedule is a must. It's a life support system, and it needs to be regularly serviced as such. A lot of its components can fail (o-rings, electronics, valves, etc) and their failure may remain unnoticed until a small problem triggers a life-threatening situation.

- Maintain and service your rebreather properly.

### Wrath

Most of the time, in our daily lives, anger comes from a lack of control of events. Task loading, overexertion and stress could happen to any diver, but a rebreather diver has



**Wrath:** *Anger comes from a lack of control of events. Task loading, overexertion and stress could happen to any diver..*



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# Equipment *A-Okay*

Edited by  
Arnold We



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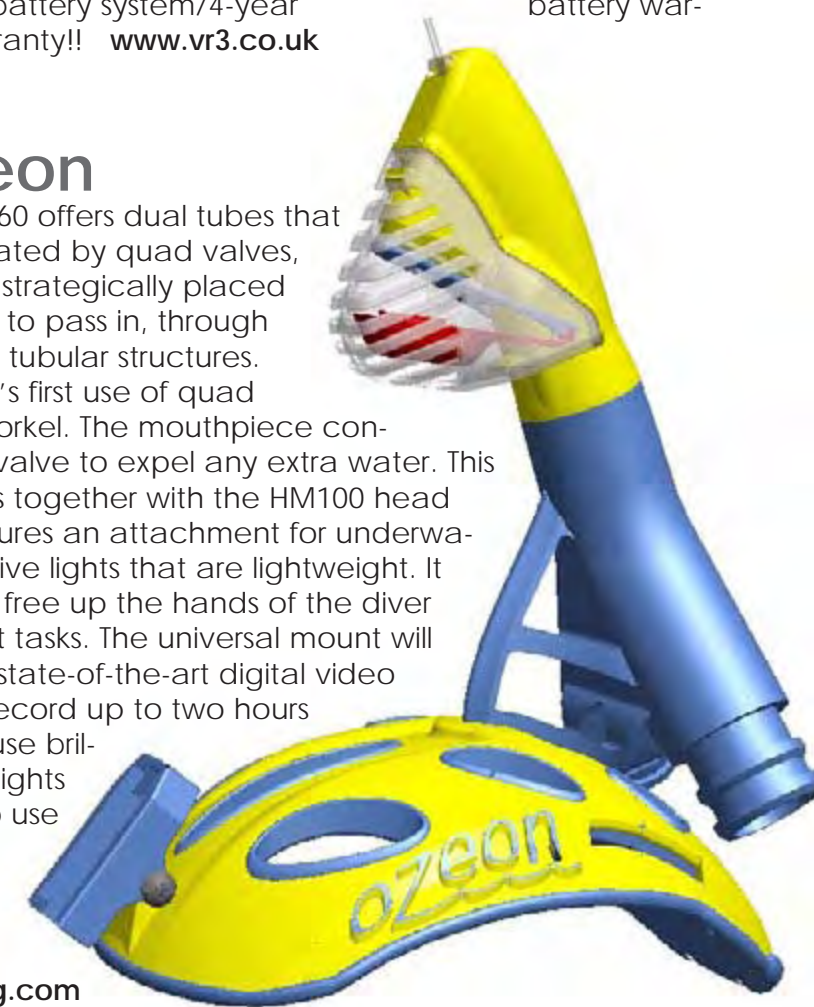
## VRX

The new algorithm incorporates the best of Gradient factors, bubble models and Haldane dissolved gas models. For a limited period the '08 model will come fully loaded as a Closed Circuit Trimix computer (C1 to C4 PIN's supplied) with rebreather port activated. Features: built in torch, range of colours, low profile design, high resolution graphics, enhanced ergonomic functionality, Variable Gradient Model (VGM) algorithm, rebreather interfaces, 1 or 3 cell monitoring, replaceable, Lithium Ion rechargeable battery system/4-year battery warranty!! [www.vr3.co.uk](http://www.vr3.co.uk)



## Ozeon

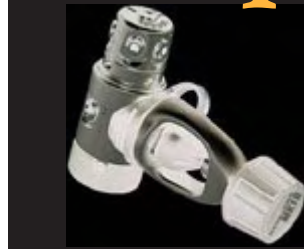
The QV360 offers dual tubes that are regulated by quad valves, which are strategically placed to allow air to pass in, through and out the tubular structures. It's the world's first use of quad valves in a snorkel. The mouthpiece contains a purge valve to expel any extra water. This product comes together with the HM100 head mount also features an attachment for underwater cameras or dive lights that are lightweight. It could be used to free up the hands of the diver for more important tasks. The universal mount will allow divers to use state-of-the-art digital video cameras that can record up to two hours of full rate video, or use brilliant LED underwater lights without having to use their hands.



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



# equipment



## SR<sup>1</sup>

the SR<sup>1</sup> is the most technologically advanced regulator Sherwood Scuba has produced in its storied 50-year history. The SR<sup>1</sup> utilizes a pneumatically balanced second stage, with a two-piece flow-through first stage piston for precise optimum balance and intermediate pressure control. The first stage is environmentally sealed featuring a dry-sealed spring chamber, two high pressure ports, five low pressure ports on a 360 degree swivel and is compatible with a yoke or DIN attachment. [www.sherwoodscuba.com](http://www.sherwoodscuba.com)

## OCB from APD

Ambient Pressure Diving's Open Circuit Bailout Mouthpiece, the OCB, is now available. APD's patented dual valve technology allows gas to be fed from the left or right facilitating individual configuration and is ready for use with high oxygen percentage gases. Manufactured to a very high standard in their specialist facility, it can be fitted to existing units and will be optional on the purchase of a new unit. As with all their products full spares and back up are available. [www.apdivingdirect.com](http://www.apdivingdirect.com)



## Infinity

The close-to-the-eyes frame design produces a mask with a low profile and an excellent view upwards and downwards. The side lens is made of an optical quality polymer and offers brighter vision and increased side light.

Cardanic joint buckles rotate both up-and-down and in-and-out. [www.aqualung.com](http://www.aqualung.com)



## Surface Support Station

This Surface Support Station is a unique float that utilizes storage pockets, which can be removed from the float and attached to the instructor's BC for easy access. To complement the Surface Support Station, the Sand Grab Anchor was developed for anchoring floats in sandy or silty conditions. It folds in half with two handles for easy transportation and to carry equipment to and from the dive site, multiple points for attaching pockets to customize the float to individual needs, two pocket sizes designed to fit various dive equipment, pockets are designed with oversized flaps for easy opening, pockets can be removed from the float and attached to the diver's BC for extra storage during a dive. [www.atwaterconcepts.com](http://www.atwaterconcepts.com)



## Minno

Widely used by NASA, marine researchers and organizations, the aquaSketch Minno is not a slate but a revolutionary new system that successfully brings the convenience and versatility of paper underwater. While the aquaSketch Minno surpasses the capabilities of the slate by offering unlimited writing capacity and the ability to save notes, it also opens up new possibilities for on site reference and documentation with the ability to scan dive notes into a computer after dives and print material directly on the vellum for reference during dives. [www.aquasketch.com](http://www.aquasketch.com)





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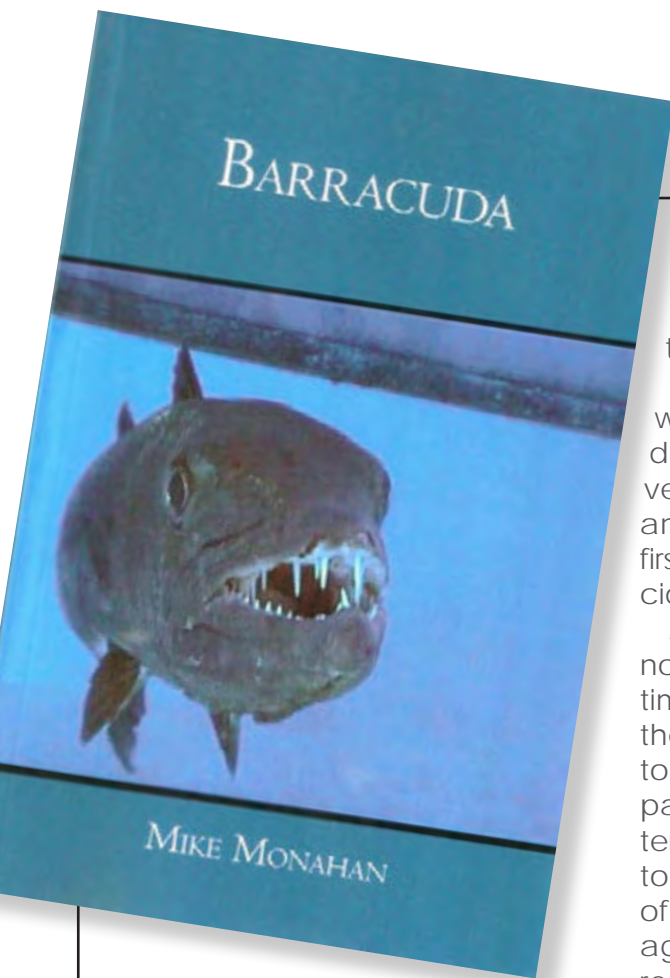
# reviews



## Books Film DVDs CDs

Edited by Catherine GS Lim & Simon Kong

POINT & CLICK ON BOLD LINKS



### Barracuda

Detective Mike O'Shaughnessy is a likeable guy. From the start, he comes across as someone whom you won't mind having a beer with. Indeed, his easy-going personality proves to be an asset as he travels to Bikini Atoll to recuperate. Along the way, he makes friends with fellow divers, resort staff and a pair of scientists as

he stumbles upon some illegal activities involving the Japanese and Russian crime syndicates on the island.

Add to the mix a band of wayward (to put it lightly) renegade divers and a bad-ass (to put it very lightly) mutant barracuda, and what you get is this exciting first novel by former NYPD homicide detective Mike Monahan.

Although this self-published novel can be a tad formulaic at times, it is easy on the eye and the characters are easy to relate to. However, thanks to the writer's passion in diving (he's a divemaster with more than 1,000 dives to brag about), the descriptions of scuba diving and marine life against a fictional background is realistic enough to warrant a second or third reading.

We're definitely looking forward to the next book in the Mike O'Shaughnessy series!

Published 2008  
235 pages, paperback  
ISBN-10: 1419684027  
ISBN-13: 978-1419684029

—Catherine GS Lim

**Nadine** *Labour of Love* is a picture book of underwater art by Indonesian Windiarto Tjandra with a forward by Todd Essick. It features Nadine Chandrawinata, a former Miss Universe Indonesia 2006 modelling underwater sans scuba.

Every photo is given a name that oftentimes sounds silly but nevertheless imaginative such as The queen and her coterie, Rhythm of the currents, Caught in the act, Pulse of the waves, At your beck and call. Nadine poses in all sorts of manner only a mermaid could and in very stylish outfits too. One thing that is very distracting is the amount of bubbles rising to the surface at the edges of some pictures. No doubt they are from her safety divers, but if perfection is the aim of this portfolio, then in my opinion, Windiarto Tjandra lacks an eye for detail. I'm also surprised he didn't learn anything about including marine life in the shoot from Todd Essick whose own underwater pictures feature sharks and a damsel in distress — themes that would have definitely given this book an interesting marine life angle as well.

A bed of embroidery needs special mention. It is the only picture featuring Nadine with fishes. A school of juvenile catfishes, to be exact. I suspect the inclusion of the catfishes here is by pure chance when they were swimming in the area as the shoot was taking place. The picture is interesting and nicely taken but not perfect. Nadine is

WINDIARTO TJANDRA



## Nadine

LABOUR OF LOVE



Foreword by TODD ESSICK

seen lying on the sandy bottom behind the feeding school in a semicircle, but she had to spoil the almost perfect shot with her wayward left leg awkwardly stretched out behind her head. If it had hidden behind her wavy hair, the shot would have been the highlight of the whole book!

Title: *Nadine Labour of love*  
Author: Windiarto Tjandra  
Publisher: John Thet of ScubaDiver Australasia  
Editor: David Espinosa  
No of pages: 144  
Date published: 2008  
Hardcover, 250mm x 288mm  
ISBN 9810801939

—Catherine GS Lim

## Nudibranchs Encyclopedia

Catalogue of Asia/Indo-Pacific Sea Slugs

Neville Coleman has done a good job of updating his 1001 Nudibranchs with the eagerly awaited *Nudibranchs Encyclopedia*. Featuring his own work and those of many other renowned marine life photographers, this extensive encyclopedia is handy enough to bring with you on nudibranch expeditions. Producing the book in hard cover was a smart choice as it is able to better endure the wet hands of divers eager to reference their latest discovery just after a dive.

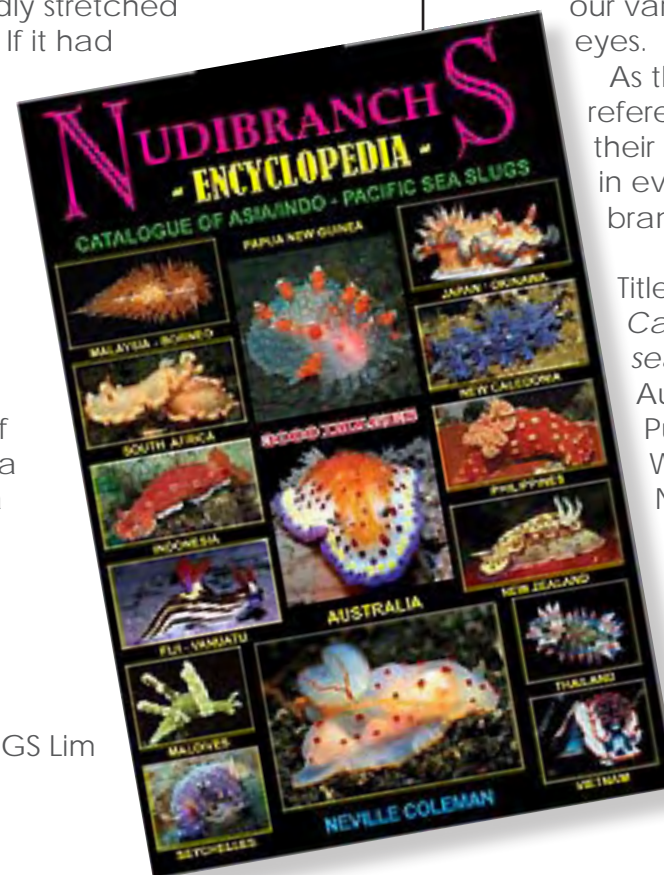
The amount of pictures, more than 3,000 in all, is mind-boggling. If you were to personally identify each species, it would probably take more than a lifetime. To the casual reader, thumbing through the book is a fascinating discovery in itself as page after page of unimaginable and bizarre species can be seen.

Where a species has many regional colour variations, many pictures of that variation by different photographers and at different locations are shown. This aids positive identification. An example is the species *Phyllidia ocellata*, which has extensive colour variations that look like bull's-eyes.

As the most comprehensive reference on nudibranchs and their relatives, this book should be in every dive centre and nudibranch lover's collection.

Title: *Nudibranchs Encyclopedia Catalogue of Asia/Indo-Pacific sea slugs*  
Author: Neville Coleman  
Publisher: Neville Coleman's World of Water  
No of pages: 416  
Date published: Jan 2008  
Hardcover, 168mm x 242mm  
ISBN 9780947325411

—Simon Kong





Edited by  
Peter Symes



© Eric Cheng  
<http://echeng.com>

## Shark skin adds speed like golf ball

Scientists have discovered that sharks can raise their scales to create tiny wells across the surface of their skin, just like the dimples on a golf ball, reducing drag to reach high speeds in the water.

The minute scales, which are just 200 micrometers long, are made from tough enamel, such as that found on teeth, giving the skin a rough texture like sandpaper. Lying flat, they had previously been found to reduce drag as the shark swims. Some reports had also suggested that sharks can bristle their scales, causing them to stand up on end.

Experiments have now revealed that tiny vortices or whirlpools formed within the cavities between the scales.

These vortices form a kind of "buffer layer" between the skin's surface and the

fast moving fluid, preventing a turbulent wake from forming behind the shark.

Since a wake has a lower pressure than the rest of the fluid, it exerts a backwards pull on an object, decreasing its speed and making it harder to change direction.

Eliminating this wake decreases the overall drag on the shark, allowing it to travel faster and move more easily without the thick, syrupy feeling humans get as they try to move through water.

The same principle explains the dimples on golf balls, which also create mini vortices to reduce drag in this way. ■



CENTERS FOR DISEASE CONTROL AND PREVENTION

## Shark Blood Help Fight Malaria and Arthritis

Shark antibodies might be used to treat a wide range of diseases from malaria through arthritis and even cancer.

Sharks have over 100 million antibodies that are amongst the smallest in the animal kingdom. They are also far more biologically stable than human ones. This means that they can also be used to develop oral treatments rather than ones that need to be injected as they can withstand the extremes of the human digestive system.

By using shark genes and putting them into a genetic vector together with random proteins, Australian scientists Professor Mick Foley and Dr Stewart Nuttall

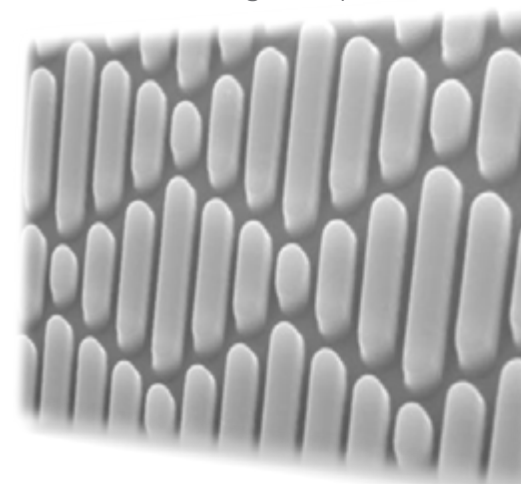
have managed to manipulate the sharks genetic material to produce antibodies to a wide range of human ailments.

The shark antibodies produced have a finger-like loop that binds to the disease protein and stops the molecular function of the cell, and therefore, prevents it from invading the human cells. The biologists are working on ways in which they can select the relevant antibodies and then optimise it so that it binds very tightly to the protein in question. ■

## Shark Skin Design Helps Hospitals Fight Infections

Dr Anthony Brennan and researchers from the University of Florida invented a surface made up of micro-scale features shaped, arranged, and spaced in a specific pattern called Sharklet™. The pattern was inspired by the skin of sharks and is a non-toxic and non-biocidal approach to enhancing the ability of a biomaterial surface to control microorganism growth. ■

Shark skin patterned surface could fight hospital infections



## FINS protect the fins

Researchers in Spain are reporting that a new DNA identification method could thwart false labeling of shark species used in various seafood products, including the expensive Chinese delicacy known as shark fin soup.

Consumption of shark meat appears to be on the rise worldwide, with some seafood companies reportedly having substituted cheaper shark species for more expensive species and incorrectly labelling their products. European Union regulations now require listing the species name on shark products to avoid fraud and to help conserve certain shark species. However, a fast, reliable method for distinguishing between different species of shark remains elusive.

The scientists describe the use of a relatively new technique called forensically informative nucleotide sequencing (FINS), in which DNA isolated from unknown biologic samples is compared to a database of DNA markers from known species.

In the new study, the scientists collected DNA markers from nine different commercial seafood samples containing shark meat and compared them to known DNA markers from 23 different shark species.

The scientists found that two of the nine shark products analysed had been labelled with incorrect species names, demonstrating the effectiveness for the FINS method. ■





## Europe's Most Endangered Sharks Slated for Protection

The European Commission releases bold proposals to end all fishing for spiny dogfish, porbeagle and angel sharks, expand protections for rays.

The Shark Alliance is applauding the European Commission's proposals, released today, to end fishing in 2009 for six shark and ray species classified by the International Union for the Conservation of Nature (IUCN) as Threatened with extinction in the Northeast Atlantic.

The Commission has proposed setting total allowable catch (TAC) for spiny dogfish (or "spurdog") and porbeagle sharks at zero and prohibiting fishermen from keeping angel sharks, common skates, undulate rays or white skates.

The Commission has also proposed additional

improvements to the management of fisheries for skates and rays. The European Council of Ministers will make final decisions on EU 2009 fishing limits December 17-19.

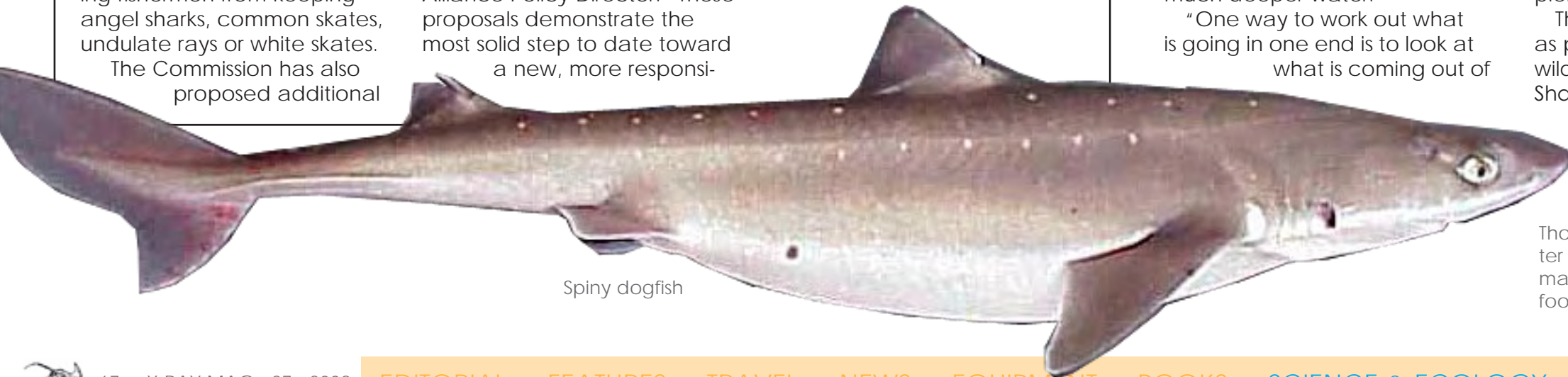
*"The future of Europe's most endangered sharks and rays now lies with the European Council of Ministers"*

with respect to fishing limits for several of Europe's most endangered sharks and rays," said Sonja Fordham, Shark Alliance Policy Director. "These proposals demonstrate the most solid step to date toward

a new, more responsi-

ble era in the management of European shark fisheries."

Earlier this year, the International Council for Exploration of the Seas (ICES) warned of severe depletion and local extinction of the bottom-dwelling angel shark and white skates and recommended that these species receive the "highest possible protection". ICES also called for an end to fishing for undulate rays and common skates. Common skate, angel sharks and white skates are listed by IUCN as Critically Endangered; undulate rays are classified as Endangered. ■



Spiny dogfish

—What is this fascination we have with poo?

## BBC Reporters Breathless Over Whale Shark's Pooping in Front of Rolling Cameras

It is as thick as your arm and smells disgusting. In what is thought to be a first, a BBC film crew has filmed a whale shark pooping. It was then scooped up for research.



SCREENSHOT FROM BBC'S VIDEO

The sample has helped us discover more about the giant creature's feeding habits, said biologist Mark Meekan, who called the shark's feces sample "scientific gold."

"It does seem rather weird, someone being so excited about seeing whaleshark poo. And I'm pretty certain that this is the first time it has been filmed. But it is pretty rare—they are usually doing their business down in much deeper water."

"One way to work out what is going in one end is to look at what is coming out of

the other."

He said that by getting hold of some of the shark's waste, they could use sophisticated genetic techniques to look at the DNA in the sample to find out exactly what those animals have been eating.

The whale shark had been feasting on red crab larvae, according to genetic analysis, which could be why the fish are attracted to Christmas Island, which has plenty of this food available.

The footage will be available as part of a BBC Natural World wildlife program called, "Whale Shark". ■



Those with an obsession for this matter of whale shark bowel movements may take interest in this additional footage we found on YouTube

## WWF: Ban shark fishing on GBR to save species

Conservation group WWF says the Queensland government must phase out targeted shark fishing on the Great Barrier Reef in a bid to preserve the species.

A report by the Environment Department has raised concerns over the practice in Australia's northern waters.

WWF spokeswoman Gilly Llewellyn says species like the hammerhead thresher sharks and bull sharks are at risk of becoming extinct within 30 years. ■

## Nz Government Fails to Curb Shark Finning

The New Zealand government's recently released five-year national plan of action for sharks continues to allow shark finning.

Conservation advocate, Kirstie Knowles, says that while the plan was welcomed and long overdue, its failure to take the crucial step of banning finning to protect vulnerable shark populations was hugely disappointing.

Finning of sharks while they are still alive is illegal under animal welfare laws, but there is video evidence this still happens. Finning of dead sharks is still legal in New Zealand waters.

Knowles says the minister is hiding behind the live finning issue. Allowing shark fins to be landed alone makes enforcement of the Animal Welfare Act nearly impossible—unless an observer is on all vessels—and continues to allow highly vulnerable sharks to be killed. ■





# Belugas *of the White Sea*





## *New Sea Farm Raises White Whales in the White Sea*

Text by Natalia Cherviakova  
and Andrey Bizyukin

Photos by Natalia Cherviakova,  
Marina Kochetova, Irina Rudenko  
and Peter Slezak

Natural reserves, nurseries,  
marine parks, aquariums and  
farms that save different animals  
and birds are becoming more

and more popular all over the  
world and their numbers are  
growing constantly. Scientists  
of many countries still dispute  
the keeping of wild animals in  
captivity in zoos, marine parks  
and circuses. Is it not inhumane  
to put wild animals and birds,  
living free and wild in nature, into

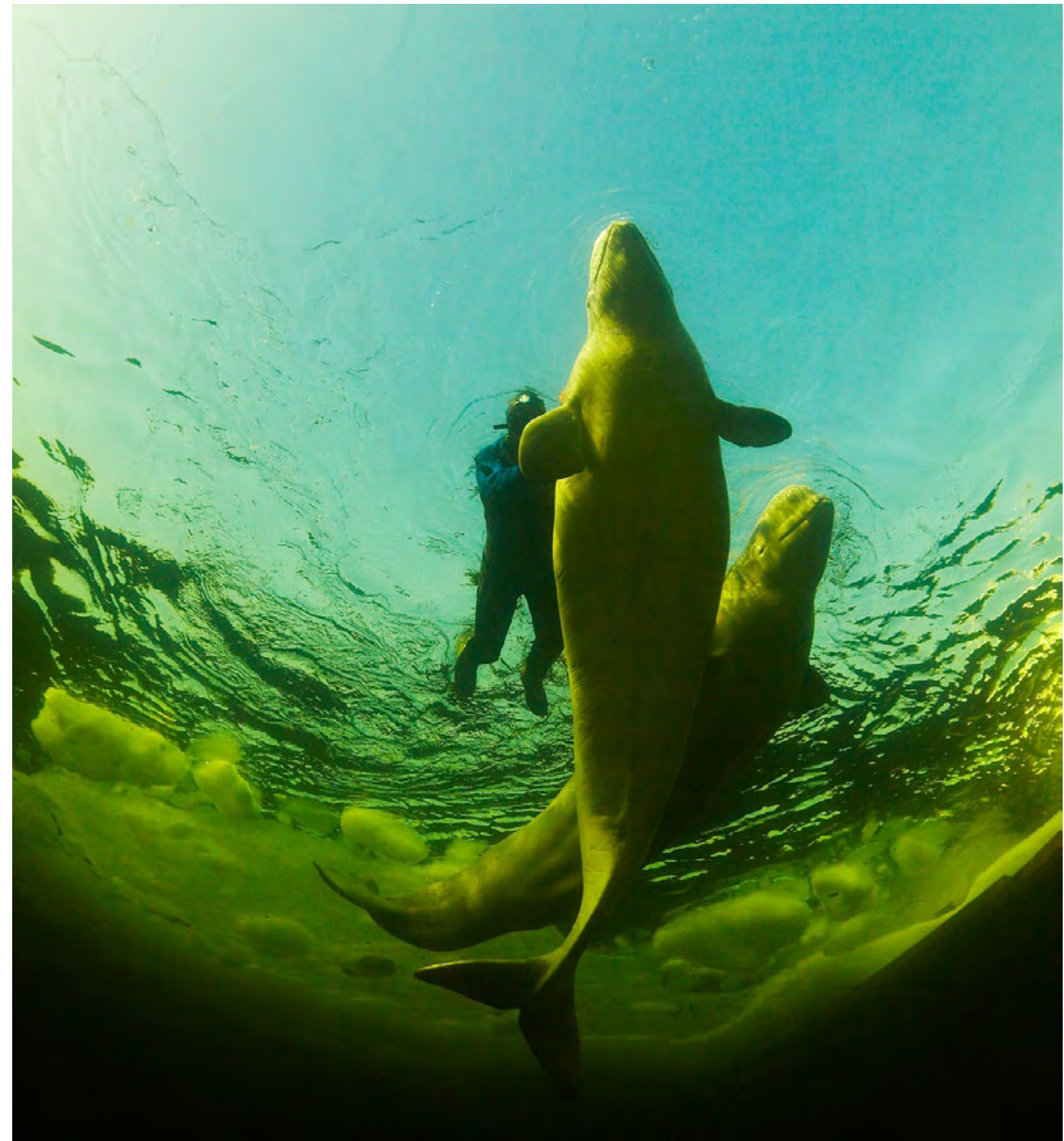
cages? But on the other hand,  
poor, sick animals or babies lost  
from their parents, will die if they  
stay in the wild. That's why these  
kinds of species (not prepared  
for life in the wild) have come  
into the care of some special  
human beings who provide  
nurseries for them.

THIS PAGE: Amazing white whales from White Sea like to play and communicate with people.





White whales feel comfortable even in icy water under thin ice. They just need to have a big enough ice-hole through which they can breath air regularly



In 2006, marine biologists from St Petersburg's department of Utrishsky Dolphins' Aquarium decided to initiate a scientific project to build a natural farm, or nursery, for the breeding of white whales—or *beluhas*, as they are called in Russia—on the White Sea. One of the main aims of the project was to decrease the number of white whales caught from the wild and to exchange them with animals born in natural sea nurseries like this one.

By the way, only two countries—Japan and Russia—continue to catch white whales. It takes a lot of experience and a high level of professional skill.

The second reason for building this new natural aquarium was to make a vacation place, or a spa, for polar cetacians, to bring white whales here from big cities and provide a temporary place for rehabilitating them in

a natural environment of the White Sea waters where they could regain strength, immunity and well-being.

This new generation of natural dolphin aquariums are not built to be circuses, but to provide a new approach to direct communication between humans and sea mammals.

At the end of January 2007, two young white whale males, named Filya and Semen, came to the White Sea as the first residents of the new natural aquarium. In the move, they came back to their home waters, albeit in an open-water cage, near a local dive center called the Polar Circle.

Six years ago, these two males (then aged four years old) were caught from this same White Sea area. They were taken to an aquarium in St Petersburg and trained to give performances on tours to Moscow, Egypt and

Saudi Arabia. During this time, they were in very good and constant contact with people.

It was lucky that both of these dolphins were well-adapted to the human beings in their new home, which made for good contact with scientists, biologists and divers.

The white whales, or *beluhas*, played very well with everyone who came to the open-water cage. With swimmers, they were happy to take each for a spin, and nibbled feet and hands in a very friendly way. But divers made the whales a bit afraid. For a long time, the *beluhas* preferred to take just a quick look at the bubbling persons and then stayed well out of the way.

The whales enjoy freedivers who come to the dive center. One woman was free diving with a monofin. The whales became very happy, perhaps thinking



White Sea belugas  
like to play with kids

## FACTS ABOUT BELUHAS

Belugas (*Delphinapterus leucas*), otherwise known as white whales, are a threatened species. Found only in the northern hemisphere, beluga whales live commonly in the coastal waters of the Arctic Ocean. They can also be found in subarctic waters. When the sea freezes over, Arctic belugas migrate southward in large herds. Sometimes they get trapped by Arctic ice and die, becoming prey for polar bears, killer whales, and for the indigenous people of the Arctic.

Because they have been over-hunted by commercial fisheries, some beluga populations, such as those in the Gulf of St. Lawrence, have nearly collapsed. They were hunted for centuries for their meat, blubber and skins used in products such as soap, lubricants, margarine, fertilizer, and shoes as well as fodder for domestic animals. Currently, 3,000 belugas are still taken each year.

Recovery has been hindered by harbor construction, river diversion and chemical pollution, which affects beluga fertility in some areas. The current estimated population is around 50,000-70,000 animals.

## Characteristics

Beluga whales have an unusual color that makes them stand out from all other whales. Their calves are gray or brown when they are born, a color which fades to white when they reach five years old and become sexually mature. Before the summer molt, their skins take on a yellowish hue. Belugas rub themselves along the sand or gravel of the seabed when their skins begin to molt.

As whales go, belugas are small, ranging from 13 to 20 feet (4-6.1m) in length and can reach a weight of 2,000 to 3,000 pounds (907-1,361kg).

Their foreheads are round, and they have no dorsal fin. They are unique among whales in that they have flexible necks, which enable them to turn their heads in all directions. The soft and flexible blubber around the head gives the white whale the ability to easily change its facial expressions.

## Behavior

In general, belugas live for 35-50 years in the wild and move together in pods, or small groups. Mothers give birth to one calf every 2-3 years with a gestation period of a year. The mothers have close relationships with their calves.

Being quite social and very vocal animals, belugas employ a diversified language of clicks, clangs and whistles. They can also imitate a variety of other sounds. The beluga is sometimes called the Sea Canary because of its high-pitched sounds. Belugas have an advanced echolocation system. They can produce broad-band pulses in a narrow beam, which are aimed from their melon, their bulbous foreheads.

## Feeding

Cousins to the narwhale, or tusked "unicorn" whale, belugas feed on fish (such as herring, salmon and cod), crustaceans, worms and other invertebrates such as octopus, squid, crab, and snails. It is thought that echolocation aids in their search for food and that they used a sucking motion to pull prey into their mouths aided by the flexibility of their lips, a characteristic shared only by one other creature, the Irrawaddy dolphin. A beluga whale has been observed diving underwater for 20 minutes to a depth of 647m during feeding. ■

SOURCE: MARINEBIO.ORG, WIKIPEDIA.COM, NATIONALGEOGRAPHIC.COM

## Beluha



that some of these intelligent beings with arms can live in the water like they do. The four-meter-long whales stayed close with this free diving woman the whole time she was in the water.

A few months later in the summer, the whales started to take interest in scuba divers. They would approach divers who were cleaning the cage and tried to take some of the cleaning tools. They seemed to have stopped worrying about the bubbles coming from the divers' air tanks.

One of the divers described the experience: "It was a sunny day in September. I was standing close to the open-water cage with the belugas and was preparing to dive in. Just in front of me, a huge white dorsal ridge appeared and slowly went back

below the surface of the water. I took a camera and went underwater. In the same moment, Semen bumped his wide forehead into me with a smile in his huge beluga mouth. And his friend, Filya, was trying to taste my strobe. Having made contact, I had become to the white whales a guest, and they started to play with me. I took pictures of the cheerful animals who looked to be really happy here in the natural dolphin aquarium on the Polar Circle of the White Sea. I used up my memory card and the air in my tank very quickly, but didn't rush out of the water because I felt so lucky to see and be so close with these friendly animals."

Special thanks to the Arctic Circle Dive Center staff for the great experience diving with white whales. ■



Pavel Rudenko and white whale after happy dive





# whale tales

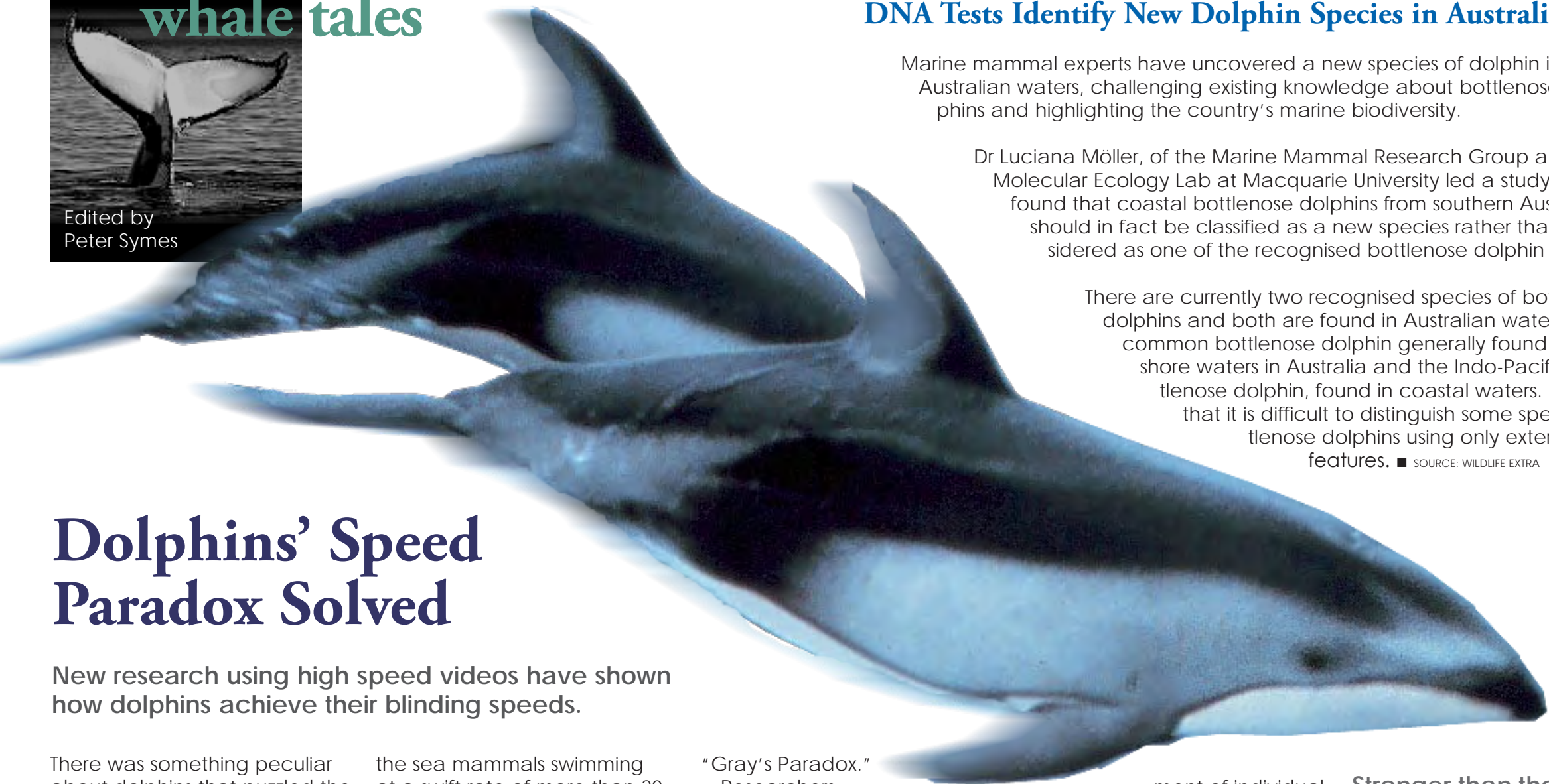
Edited by Peter Symes

## DNA Tests Identify New Dolphin Species in Australia

Marine mammal experts have uncovered a new species of dolphin in Australian waters, challenging existing knowledge about bottlenose dolphins and highlighting the country's marine biodiversity.

Dr Luciana Möller, of the Marine Mammal Research Group and the Molecular Ecology Lab at Macquarie University led a study that found that coastal bottlenose dolphins from southern Australia should in fact be classified as a new species rather than considered as one of the recognised bottlenose dolphin species.

There are currently two recognised species of bottlenose dolphins and both are found in Australian waters: the common bottlenose dolphin generally found in off-shore waters in Australia and the Indo-Pacific bottlenose dolphin, found in coastal waters. Möller said that it is difficult to distinguish some species of bottlenose dolphins using only external body features. ■ SOURCE: WILDLIFE EXTRA



## Dolphins' Speed Paradox Solved

New research using high speed videos have shown how dolphins achieve their blinding speeds.

There was something peculiar about dolphins that puzzled the prolific British zoologist Sir James Gray in 1936. He had observed

the sea mammals swimming at a swift rate of more than 20 miles per hour, but his studies proposed that dolphins simply

do not have the strength to swim so fast. The conundrum came to be known as

"Gray's Paradox."

Researchers at the Rensselaer Polytechnic Institute in the US studied the movement of water around dolphins as they swim using special high speed videos cameras. With these the team tracked the stream of bubbles around a couple of retired US Navy dolphins swimming through a tank filled with millions of tiny bubbles.

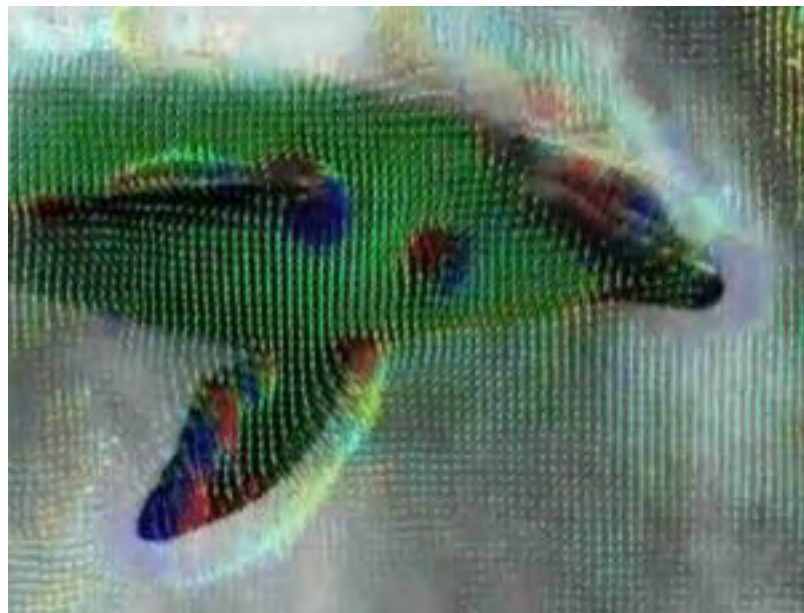
The technique is called digital particle image velocimetry and works by tracking the move-

ment of individual bubbles, determining their speed and direction, and assigning them a colour.

The more prominent the colour, the faster the water is moving. The results show that dolphins can exert as much as 400lbs of force with their tails when they do their signature "tail-walking"—a trick where they keep upright mostly above water with powerful flips of their tails

### Stronger than thought

Gray had supposed they could produce less than a tenth of this amount, and imagined that something about the dolphins' skin allowed them to overcome the force of drag in the water and reach high speeds. "For the first time, I think we can safely say the puzzle is solved," said Tim Wei, the Rensselaer scientist who led the study. "The short answer is that dolphins are simply much stronger than Gray or many other people ever imagined." ■



High speed videos have revealed how dolphins swim so fast. Click on image to see the video (It is a link to our website)

## Fishing Practices Still Have an Adverse Effect on Dolphin Populations

Despite the broad implementations of "dolphin safe" fishing practices, fishing activities have continued to restrict the growth of at least one Pacific Ocean dolphin population.

Populations of dolphins in the Eastern Pacific were expected to increase in abundance after successful regulations and agreements were enacted to reduce dolphin deaths as a result of fishing "bycatch," cases in which animals are caught unintentionally along with intended targets, a new report led by a researcher at Scripps Institution of Oceanography at UC San Diego has concluded.

However a new study, published in the October issue of *Marine Ecology Progress Series*, reveals that negative impacts from fishing activities remain. Instead of reducing numbers through direct mortalities, the study shows that fishing activities have disrupted the reproductive output of the northeastern pantropical spotted dolphin. The researchers note that reproductive output of the eastern spinner dolphin also declined, but a direct link to fishing effort was inconclusive.

"The results of this study clearly show that depleted dolphin populations have failed to recover in part due to a decline in reproductive output, and that fishing has had an effect on reproduction," said Cramer, a graduate student researcher in the Scripps Center for Marine Biodiversity and Conservation. "This shows that the fisheries indeed are still having an impact." ■

*"This shows that the fisheries indeed are still having an impact."*



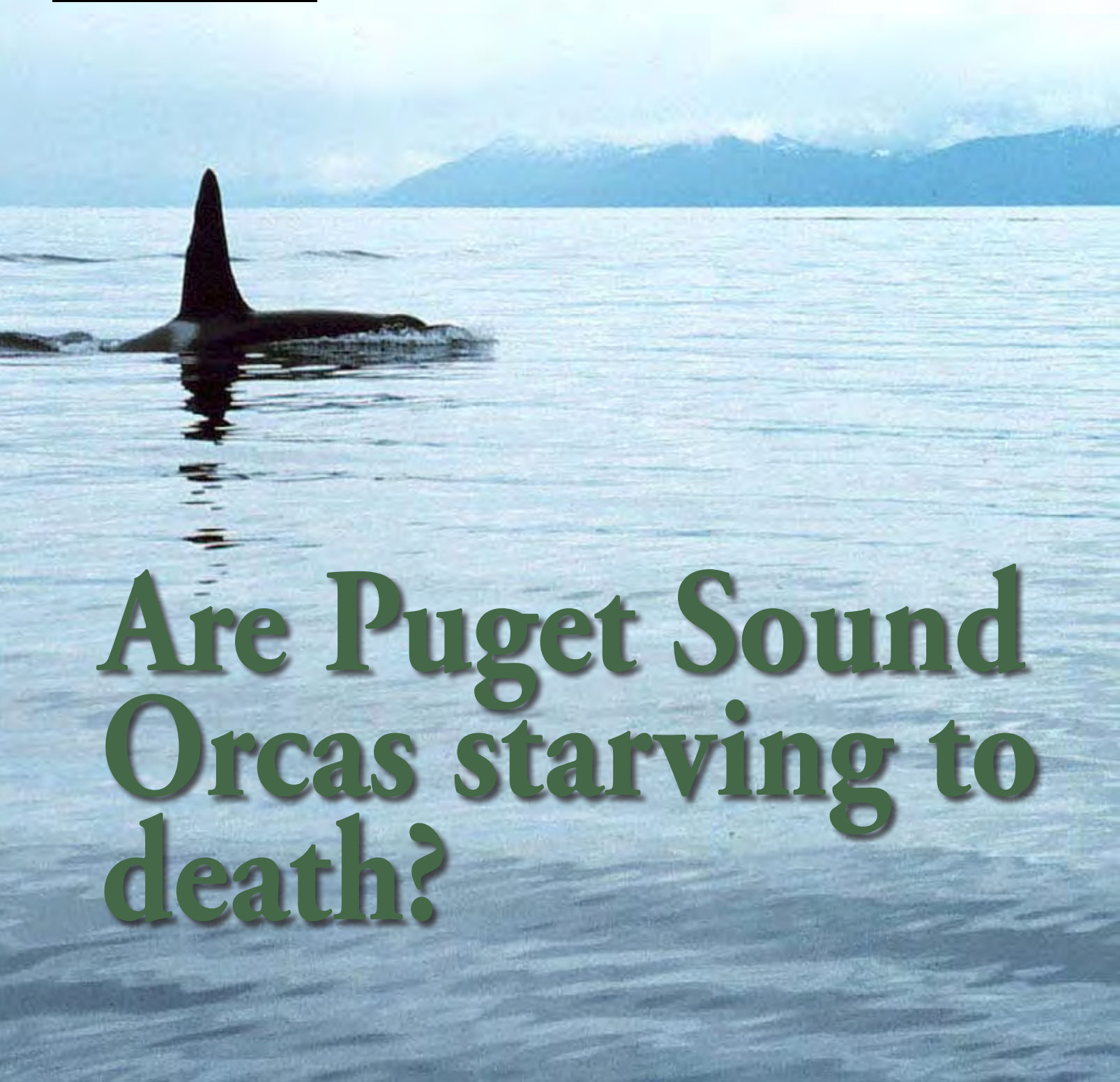




# whale tales

Edited by Peter Symes

*As salmon runs decline, killer whale numbers take their hardest hit since the 1990s. Seven Puget Sound orcas most likely died this year.*



# Are Puget Sound Orcas starving to death?

Two of the resident orca families from Puget sound —L and K pods—have been seen in recent years feeding off the California coast in the winter. That was unheard of before early this decade, leading scientists to speculate they are driven to swim hundreds of miles just to meet their minimum nutritional requirements.

Showing signs of starvation as salmon runs faltered up and down the west coast, Puget Sound's orca population lost seven of its number over the past year, bringing the population to just 83, scientists reported. Experts believe the population of the J, K and L pods that frequent the San Juan Islands and Puget Sound probably originally numbered between 100 and 200.

"Eighty-three is low. The real number that's of concern is that we only have about a dozen reproductive females," said Ken Balcomb, founder of the Center for Whale Research on San Juan Island.

It is conceivable that one or more of the missing orcas might have wandered off on its own and is still alive. But orca scientists doubt that because it's only been documented happening two times in history. Other than that, orcas always have stayed with their families. Researchers are pretty sure all seven are dead—and

it makes sense, because supplies of their favorite food were so low. Two recently deceased females showed signs characteristic of starvation—particularly a depression behind her skull where blubber should be. The condition is known as "peanut head."

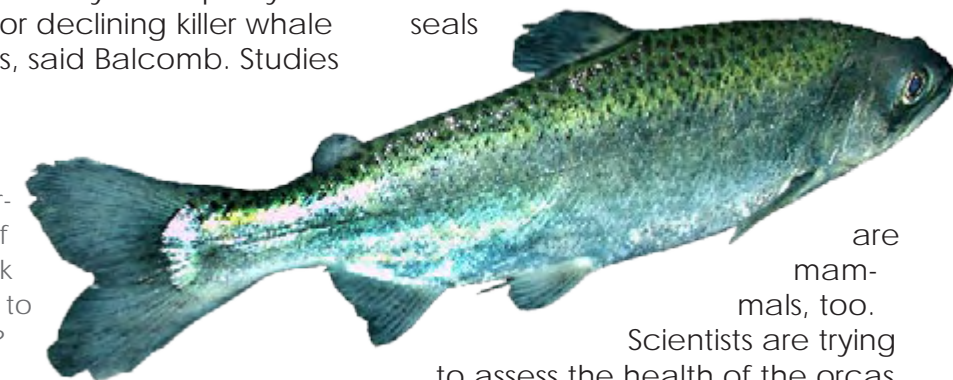
### Chinook salmon

The development marks the biggest reduction in the orca population since a series of bad chinook salmon seasons in the 1990s battered the killer whales' numbers. Revealing the degree to which the orcas are interrelated to a far-flung marine ecosystem, the collapse of California's Sacramento Valley chinook run seems likely to be partly to blame for declining killer whale numbers, said Balcomb. Studies

Is the disappearance of Chinook salmon to blame?

have shown that orcas have a strong preference for chinook salmon, pursuing other prey only when their primary food source is scarce. That makes scientists wonder whether there is something particular about chinook salmon

*Results confirmed that the orcas were under "nutritional stress" this year*



### Chemicals to blame?

Is direct starvation the only reason? There might be something else going on too. In recent years, scientists have noted in the orcas extremely high levels of chemicals known to interfere with reproduction, finding food and other functions. Like humans, orcas begin to burn their fat supplies in times of low food supplies. And the fat is where PCBs and other long-lived industrial chemicals are stored.

Do these chemicals, once freed, have some other effects? Studies on dolphins and Puget Sound harbor seals showed the chemicals caused reproductive problems and made the seals more likely to get sick. Dolphins and seals

are mammals, too. Scientists are trying to assess the health of the orcas by collecting their waste and what's in the breath they exhale through their blowholes.

### What Hormones Reveal

A team from University of Washington measured the levels of two metabolic hormones in fecal samples from Puget Sound killer whales. The results confirmed that the orcas were under "nutritional stress" this year

Graduate student Katherine Ayres said levels of thyroid hormone appeared to be low this year when compared with last year—a year when killer whale

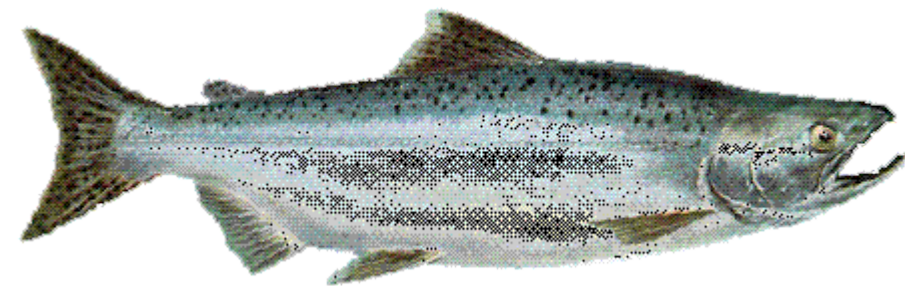


deaths were low. These hormones control a mammal's metabolism and increase or decrease over time, causing less energy to be expended when food supplies are low. Consuming less food causes the thyroid to slow the metabolism and conserve fat reserves, which leads to rapid weight gain when food is restored. It appears the Puget Sound orcas went on an unintended diet this past summer, Ayres said.

Other interesting clues came from the levels of cortisone which is another hormone. Cortisol is a rapidly produced in response to mental or emotional stress. Normally cortisol levels are lowest during July and August when chinook salmon are most abundant and whales are under the least stress.

Because cortisol is produced more rapidly during stressful conditions, Ayres also investigated whether hormone "spikes" could be linked to whale-watching boat. Preliminary findings indicated that cortisol levels were higher after a weekend, when more boats are around, than during the week. "It's premature to talk about the boat effect," she said. "The bigger one we're seeing is the nutritional one."

Ayres also is working on a test to measure the levels of toxic chemicals in feces. Because a shortage of food tends to metabolize fat stores in whales, it is likely that toxic chemicals stored in fat would be released when thyroid levels are low. Toxic chemicals are believed to affect the whales' immune systems and increase their risk of disease.



*Chinook salmon have a higher concentration of fat than other species of salmon and apparently killer whales like that.*

*Killer whales off the coasts of British Columbia and Washington State have an uncanny ability for finding chinook salmon, even in months when chinook are vastly outnumbered by other salmon species.*

### Bacteria or fungi?

Meanwhile other research by biologist, David Bain, and veterinarian, Pete Schroeder, studying droplets emitted from orca blow holes have found drug-resistant bacteria. Puget Sound's orcas collectively harbour more than a dozen different kinds of antibiotic-resistant bacteria—as well as other bacteria known to kill animals that are in a weakened condition. Because some bacteria show resistance to antibiotics, it is likely that they are coming from human sources, possibly stormwater or improperly treated sewage, says Schroeder.

Another concern is that a disease could get into animals on land and spread to Puget Sound. "We don't have an effective barrier to keep it out of the marine environment," Bain said. "It is possible that someone could bring a disease from another continent and expose the whales, causing a significant decline in their population."

For example, a fungus called *cryptococcus gattii* has been implicated in the deaths of dozens of harbor porpoises in the northwest, he said. That same fungus has resulted in the deaths of numer-

ous pets and serious illness for humans. Some researchers believe the fungus was brought to British Columbia in a eucalyptus tree from Australia, where the fungus is native. Spores may have washed into stormwater flowing into the Georgia Basin, which connects with Puget Sound.

### Noise perhaps?

A new study suggest that orcas use their natural sonar to find their favorite fish from a distance. Like other many other marine mammals orcas emit high-frequency clicks that are reflected back when the sound waves strike an object. The animals use sonar information to navigate, hunt, and communicate in murky waters. But orcas may have taken their use of sonar to a level of sophistication where it enables them to select specific types of prey.

Previous research had revealed that some killer whales off the coasts of British Columbia and Washington State have

an uncanny ability for finding chinook salmon, even in months when chinook are vastly outnumbered by other salmon species such as coho and sockeye. "Chinook salmon have a higher concentration of fat than other species of salmon and apparently killer whales like that," said study co-author Whitlow Au, a bio-acoustician at the Hawaii Institute of Marine Biology. Au and his team simulated echolocation clicks resembling those of wild killer whales to measure the echoes produced when the sound waves bounced off the bodies of three kinds of salmon. The team found that each salmon species has a unique echo pattern based on the different sizes and shapes of their swim bladders.

The air-filled sacs show up clearly in the echo images because they have a different density than the surrounding flesh and water. The swim bladder "is responsible for at least 90 percent of the sound energy that is reflected from the fish," said study team member John Horne of the University of Washington. "Think of it as a hard wall."

Although Chinooks on average are larger than the other two salmon species, individual sizes overlap between the three groups, so the team doesn't think orcas are selecting prey solely based on body size. ■

## US Navy agrees to limit underwater explosions in Puget Sound

Already facing lawsuits from two environmental groups over its use of explosives to train in sensitive areas of Puget Sound, the Navy has signed off on an agreement with the US Fish and Wildlife Service to significantly scale back such training through the end of 2009.

The Navy was sued in July by the Public Employees for Environmental Responsibility, PEER, and the Wild Fish Conservancy, arguing that the Navy was ignoring US Fish and Wildlife Service guidelines, and the Endangered Species Act, by conducting underwater demolitions training in environmentally sensitive areas of Puget Sound.

However on November 7, the Navy signed off on the current agreement to limit its training and the power of the explosives it uses, from four to one locations for the next 14 months. The environmental groups said they are confident the lawsuits will lead to a long-term settlement of the issue. The executive director of Wild Fish Conservancy, Kurt Beardslee, said while the Navy obviously needs a training program, the previous program at all four locations was not needed. Under the Navy's consultation agreement with the Fish and Wildlife Service, signed Nov. 7, the Navy's detonations will be cut from four locations to one. The only active location will be in Crescent Harbor east of Whidbey Island, adjacent to the naval air station there.

"We hope that they follow the recommendations of FWS to further reduce or even eliminate all the harm to Puget Sound that they cause," Beardslee said.

The Navy also will maintain a 500-meter zone free of marine mammals and implement a method to monitor the size of fish kills the explosions cause. ■





## Meet the Whale Snot Collectors

Whales are too big to take blood samples so what do you do? Use a remote-controlled toy helicopter to get a sample of whale snot.

"Scientists have always found it difficult to study diseases in whales because of their size," explains Acevedo-Whitehouse a veterinarian and conservation biologist with the Zoological Society of



ZOOLOGICAL SOCIETY OF LONDON

London to New Scientist. "Most studies on whale pathogens have focused on dead, stranded or captive animals, which are hardly representative of the normal population."

After witnessing the sheer power of whale "blows" in the Gulf of California, she realised that this would be the best way of sampling the insides of a live whale in the ocean.

For species like grey and sperm whales that do not mind the proximity of a boat, the researchers attach their Petri dishes to a long pole and hold them out over the blows. With other whales they resorted to using radio controlled model

*"The whales definitely notice the helicopter; they turn on their sides to look at it"*

helicopters. The Petri dishes are attached beneath the metre-long choppers, which are then flown through whale blows.

"The whales definitely notice the helicopters," says Acevedo-Whitehouse, "they turn on their sides to look at it. But they don't seem bothered. We are collecting very relevant biological information without even touching them."

Each time also sampling the background ocean spray as a control. This lets them identify which bugs come from the whales, and which are present in the sea. The samples are taken back to the lab and scanned for specific DNA sequences that identify individual bacteria, fungi and viruses. As well as looking for pathogenic bugs similar to flu or TB, the researchers are trying to build a profile of what microbes a healthy whale normally carries in its lungs.

The team also hope to study how bacteria and viruses spread through whale populations. The team is still analysing its data but enough has been processed to know that different species carry different bacteria. ■

# Whales lose in US Supreme court

The US Supreme Court has removed restrictions on the navy's use of sonar in training exercises near California. The ruling is a defeat for environmental groups who say the sonar can kill whales and other mammals.

The underwater cacophony caused by commercial and military ships has become so intense that it is killing whales, scientists at the World Conservation Congress told the US Supreme Court.

Sounds ranging from the hum of yacht motors to sonar blasts strong enough to destroy a whale's inner ear are wreaking havoc on the ability of these cetaceans to migrate, feed and breed. Many shipping lanes follow the coastal routes that whales have traced for millions of years as they roam the planet's seas. The result is a crescendo of beachings, strandings and collisions as whales and other sea mammals disoriented or physically damaged by noise lose their bearings.

### Noise pollution

Just as air pollution reduces one's field of vision, "noise pollution in the sea reduces the zone in which whales can feed and hampers their ability to communicate," Michel Andre, director of the Laboratory of Applied Bio-Acoustics in Barcelona told AFP. "There is no place in the world's oceans that is untouched from

what I call acoustic smog: the noises generated by ships." Some forms of noise pollution are so powerful that "a whale can be killed outright by the shock," added Carl Gustav Landin, head of marine programmes for the International Union for the Conservation of Nature (IUCN). Sonars used by the military and the oil industry can exceed 230 decibels in volume, and can be deadly within a one or two-kilometer radius, Andre said. Eighty-five decibels—the unit used to measure sound pressure—can cause permanent damage to the human ear.

### Acidification makes it worse

Research published in the United States last week shows that climate change is amplifying the problem. The acidification of oceans caused by rising sea temperatures reduces sound absorption in the water by up to 40 percent, meaning that noise travels much further.

*"a whale can be killed outright by the shock"*

### Military more important

The plight of the whales ended up before the US Supreme Court. The dispute involved 14 training exercises off the California coast that began in February 2007 and are scheduled to end in January 2009. A federal judge's injunction had required the US Navy to take various precautions during submarine-hunting exercises. On November 12, the US Supreme Court fully reinstating the use of sonar and removed restrictions set by the lower court on the navy's use of sonar in training exercises near California.

In its 5-4 ruling—which is a defeat for environmental groups who say the sonar can kill whales and other mammals—the Supreme Court said the navy needed to conduct realistic training exercises to respond to potential threats and even if the sonar harms the giant sea mammals, national security would take priority. Writing for the majority, Chief Justice John Roberts



said overall public interest was "strongly in favour of the navy". "The most serious possible injury would be harm to an unknown number of the marine mammals," Chief Justice Roberts wrote. "In contrast, forcing the navy to deploy an inadequately trained anti-submarine force jeopardises the safety of the fleet."

Claudia McMurray, US assistant secretary of state for oceans, environment and science and head of the US delegation at the congress in Barcelona, acknowledged it was hard to reconcile security and environmental interests. "It is a delicate balance for us," she told AFP.

But Andre insisted solutions are available. "Technology exists that would allow military to continue their activities without putting the future of whales in peril," he said. "It is a shame this is not happening." ■

## Chilean Waters Become Whale Sanctuary

Chile shows the way by turning all of its Pacific Ocean territorial waters into a whale sanctuary.

President Michelle Bachelet has signed into law a measure that bans all whale hunting off Chile's 5,500-kilometer coast. The law bans whale hunting both for commercial and scientific purposes.

Bachelet calls the law "a big step ahead in the protection of nature and a major legacy to future generations."

Chile has not hunted whales for about three decades, but the gov-

ernment sought the law to emphasize its decision to protect whales in its waters. Argentina, Brazil, Costa Rica, Mexico and Panama already ban whale hunting. A whale sanctuary exists in Antarctica. ■

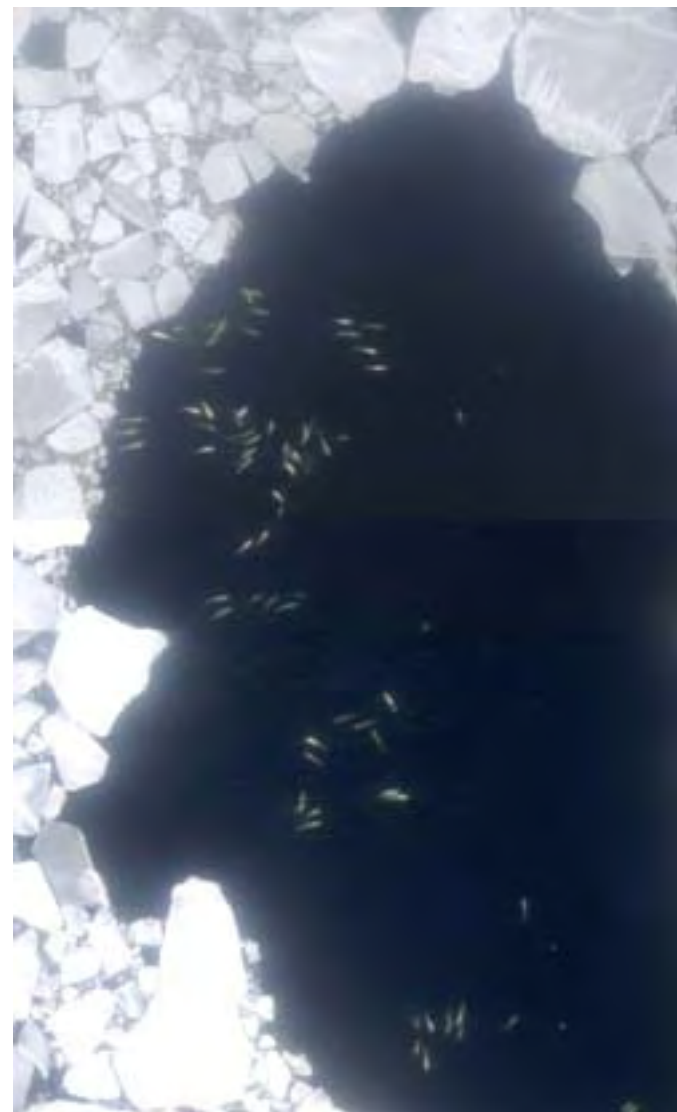






# Alaskan Beluga Whales Gains Protected Status

The beluga whales of Alaska's Cook Inlet are endangered and require additional protection to survive, the US government declared on Oct 17, contradicting Alaska governor Sarah Palin who has questioned whether the distinctive white whales are actually declining.



Aerial photo of beluga whales gathering along the sea ice off Alaska

The US federal government put a portion of the whales on the endangered list, rejecting governor Sarah Palin's argument that it lacked scientific evidence to do so. The National Oceanic and Atmospheric Administration announced that the Cook Inlet beluga whale population near Anchorage is in danger of extinction, and has been listed as an endangered species. The agency said that a decade-long recovery program had failed to ensure the whales' survival.

"In spite of protections already in place, Cook Inlet beluga population declined by 50 percent between 1994 and 1998 and is still not recovering despite restrictions on the number of whales that Alaska's native population can kill for subsistence," said James Balsiger, NOAA acting assistant administrator for NOAA's Fisheries Service. He added that recovery has been hindered by development and a range of economic and industrial activities including those related to oil and gas exploration.

## Palin's objections

The decision means that before federal agencies can issue a variety of commercial permits, they must first consult with the National Marine Fisheries Service to determine if there are potential harmful effects on the whales.

That has the potential to affect major Alaska projects including an expansion of the Port of Anchorage, additional offshore oil and gas drilling, a proposed US\$600 million bridge connecting Anchorage to Palin's hometown of Wasilla and a massive coal mine 45 miles south of Anchorage.

The state does have serious concerns about the low population of beluga whales in Cook Inlet and has had those concerns for many years, Palin said in a statement. "However, we believe that this endangered listing is premature," she said.

Palin in April successfully lobbied for a six-month delay in a listing decision until a count of the whales this summer could be included in deliberations. That count showed no increase over 2007 numbers—375

whales, compared with a high of 653 in 1995. Federal regulators and conservation groups said further delay would be harmful. The National Marine Fisheries Service "will identify habitat essential for the conservation of the Cook Inlet belugas in a separate rule-making within a year," the agency said.

The federal decision pleased environmentalists. ■



Governor Palin: "We believe that this endangered listing is premature."



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# No Flash



Text and photos by Kurt Amsler  
Translation by Arnold Weisz

**Taking photos underwater without a flash is not common, but it actually is easier than using a flash. I have a few tips and advice for getting good results.**

Underwater photography can be challenging. It is not easy. On dry land, you don't encounter too many obstacles, but under water, you have to 'fight' for every single ray of light. Not only is light diffused by the water but also absorbed by particles and scattered everywhere. These are reasons good enough to invest and bring your own sunshine with you, in the form of a strobe. However, a good strobe often costs much more than a digital camera. On the other hand, if you have clear water and adequate natural light, you can produce nice images as well.

*Natural light photography can be divided in two categories. The first category affects the motive, in which colour is subordinate - for example when you shoot wrecks and backlit images. The second category affects shooting in shallow water (less than 3 metres depth).*

## Subjects

Natural light photography can be divided into two categories. The first category affects the subject in which colour is subordinate—for example, when you shoot wrecks and backlit images. The second category affects shooting in shallow water (less than three metres depth). Ideal models are marine mammals and all animals that usually hang around just below the surface. In addition, good subjects can also be offered by coral landscapes, reflections, snorklers and freedivers.

## Techniques

Natural light photography is much less complicated than flash photography. For the best results, select

the aperture priority auto mode. Shutter speed priority you can use when you know the speed of the subject.

Be careful photographing dark subjects. If the subject doesn't fill at least 60 percent of the image,

Even at 20 meters depth, images taken with a "magic filter" and no flash can turn out great





# photo & video

THIS PAGE: Ideal conditions for working in shallow water (below) or with wrecks (right), are good sunlight and clear water

the brighter parts will influence the aperture, and the subject will appear even darker. In those situations you should overexpose.

The better cameras usually give you the possibility for exposure correction. Set your camera on +1/3 or +2/3. In your manual this is sometimes referred to as exposure compensation. If you don't have this option, there is a little

trick that will achieve the same effect. Lower the sensitivity setting—the ISO setting—from 100 to, for example, 85 or 65. Analogue photographers should always make several exposures with different settings.

### Filters

On land, you can use UV-filters, skylight or a polarizing filter, but underwater



anything but a magenta or red filter is useless. These filters enhance the red colour in the water, and under good conditions, also the blue tones. An ideal solution is the so-called "magic filter".

The principles for filters are the changing the colour temperatures and smoothing out the colours. The magic filter is not meant for balancing the absorption of colours under water, but for compensating for the missing colours. However, be aware that the filter works only on digital cameras and can not be used together with strobes.

### White balance

To get good results at any depth, it is essential to get your white balance right. You have to change your white balance whenever you are changing depth or angle relative to the sun. Filters work best in clear water and by strong sunlight. For the best contrast between the subject and the background, try to capture the subject in open water. If you keep this in mind, you will be able to make colour-saturated images

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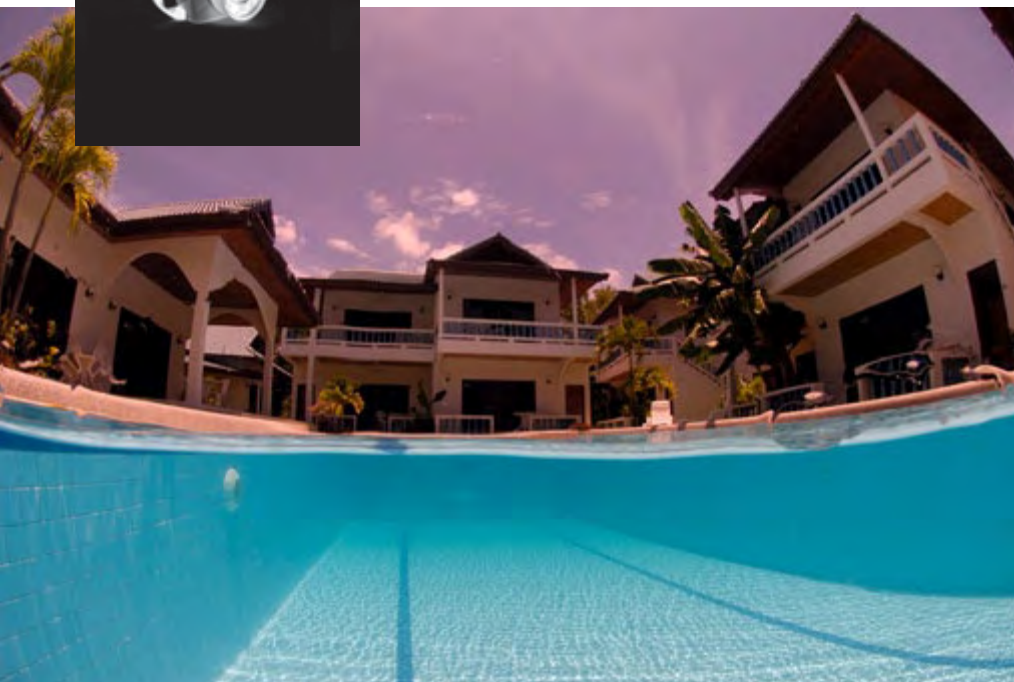
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LEFT: Using a filter for half over and half underwater images doesn't work because of the colour adjustment. Your hand is perfect for adjusting the white balance (bottom left)



### Tips

- Visibility and light conditions are the most important aspects of natural light photography. On cloudy days, it's better to use strobes to get sufficient illumination for contrast and colours in your images.
- With the exception of back-light photography, you should always have the sun in the back or slightly in from the side.
- When diving in water that is full of particles, direct sunlight will also expose these particles just as a strobe would.
- In natural light photography, it is important to get a good contrast between the subject and the background. The farther the background is from the subject, the better the contrast and the focus of the subject.
- For optimum results, always

adjust the white balance according to depth. Any change in depth or new angle relative to the sun, needs to be followed by adjustment of the white balance.

- Bring a white plastic slate to adjust the white balance. Keep it handy on at the end of a retractor line.
- It is also possible to use the palm of your hand for adjusting the white balance. Just remember, in order to get the correct readings, you need to fill at least 60 percent of the viewfinder.

• To avoid blurred subjects due to movements, set your shutter speed accordingly. For moving subjects, you should use minimum 1/125 or quicker. For stationary subjects you can use 1/60 or slower.

• For natural light photography, keep your shutter on auto.

• If you use a "magic filter", you don't need to process the images afterwards if you used the correct white balance and exposure. If you still need to make any adjustments, do it in the RAW format or format the images from jpeg to tiff. ■



Depending on your subject, you either attach the filter in front of the lens (right), or you trim it to fit to slide in behind the lens (top)

down to 15 meters. This seems to contradict the laws of known physics, but it works. You can get filters for most fisheye and wide angle lenses ([www.magic-filters.com](http://www.magic-filters.com)) and for most compact digital cameras as well. Images done with the magic filter don't need to be processed afterwards, if you remembered to get the white balance and the exposure right. The only disadvantage with filters are that they only work with digital cameras. ■

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### Bluefin

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### Remora

Fantasea Line is pleased to announce the addition of a new flash, that has been especially designed for compact digital housings. The new Fantasea Remora Flash features four different pre-flash settings, to cover the needs of all compact digital cameras in the market, including Nikon, Canon, Sony, Olympus, Fuji, Kodak, Panasonic and more. It features a guide number of 20, and therefore is compatible for both macro and wide angle shots. The power output can be manually adjusted to provide the most accurate amount of light in all conditions and a short recycle time ensures quick responsiveness even when using the maximum power output. The Fantasea Remora Flash also features a built-in Y-S Mount for attaching a focus light on top of the flash, sparing the need for an additional arm. [www.fantasea.com](http://www.fantasea.com)



### HugyCheck

Text by Scott Bennett

Hugyfot's new HugyCheck system that enables underwater photographers to check whether their housing has been closed properly and whether the o-rings are in good condition prior to a dive. The inside pressure is reduced to 0.8 bar by means of an electrical vacuum pump and a one way valve, which fits inside a standard Nikonos bulk-head. A pressure sensor inside the housing along with a red and green LED on the camera's hot-shoe measures and displays the actual pressure inside the housing. When a vacuum is present, the green LED lights up or in case of a pressure loss (housing not closed properly) the red LED takes over. When used approximately 30 minutes prior to



a dive, the system should eliminate most problems.

An additional benefit is the fact that the vacuum squeezes the o-rings in the best possible sealing position prior to entering the water. As an o-ring needs pressure to seal off properly, this is only achieved at a depth of 6 metres when the water pressure squeezes the o-rings into position. With the HugyCheck system, the housing the o-rings are already in place on land. This revolutionary system offers divers the peace of mind to take their expensive equipment underwater without worry of flooding. ■

### D3X has landed

Nikon has announced the D3X, its latest high-resolution professional DSLR. Sporting an imaging sensor with double the number of photosites of the popular D3, the 24.5 megapixel D3x includes similar features such as a 3.0", 920,000 dot LCD monitor with Live View, 51-point autofocus, EXPEED image processing and HDMI output. To keep up with the demands of stock photography the camera produces 50MB 14-bit RAW files that can be processed to produce 140MB TIFFs. It also supports Nikon's wireless system and is compatible with Nikon's new GP-1 GPS unit. [www.europe-nikon.com](http://www.europe-nikon.com)







## New Ikelite Video Light

The Pro-V8 LED is the easiest and most affordable way to add valuable light to your video system.

Three 5-watt LEDs are arranged behind a special optical lens to give an exceptionally even 45 degree beam completely free of hot spots. The color temperature is daylight balanced for warm, beautiful tones. Light output is the same over its entire 10 hour burn time, providing more than enough light for an entire week of diving from one set of eight "C" cell alkaline or NiMH batteries. A lightweight and flexible pop-bead arm provides versatility in aiming without adding bulk. [www.ikelite.com](http://www.ikelite.com)



## Olympus and PADI team up

The partnership provides the more than 175,000 PADI Diving Society members with direct access via events to Olympus cameras for learning underwater photography skills and earning a PADI Digital Underwater Photographer Specialty certification. It also enables Olympus and PADI to co-brand their underwater photography offerings at PADI Diving Society events around the world, including the recent PADI Photo Safari hosted in Bonaire as well as the 10th Annual Total Submersion Dive Festival and the Tahiti Dive Festival scheduled for 2009. Additional details are available at [www.olympusamerica.com/underwater](http://www.olympusamerica.com/underwater) and [www.padi.com](http://www.padi.com) ■

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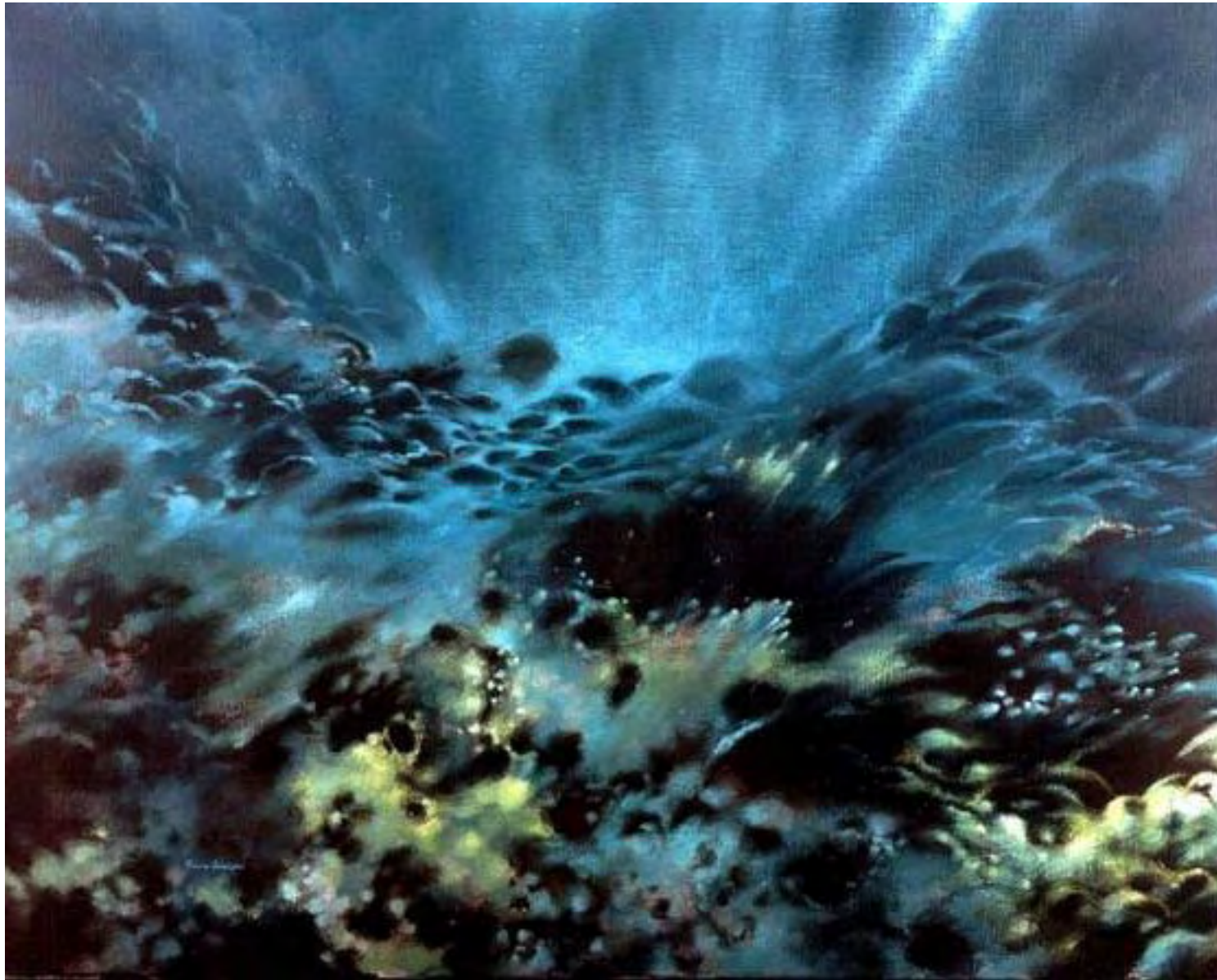
# Pierre Sentjens



P O R T F O L I O

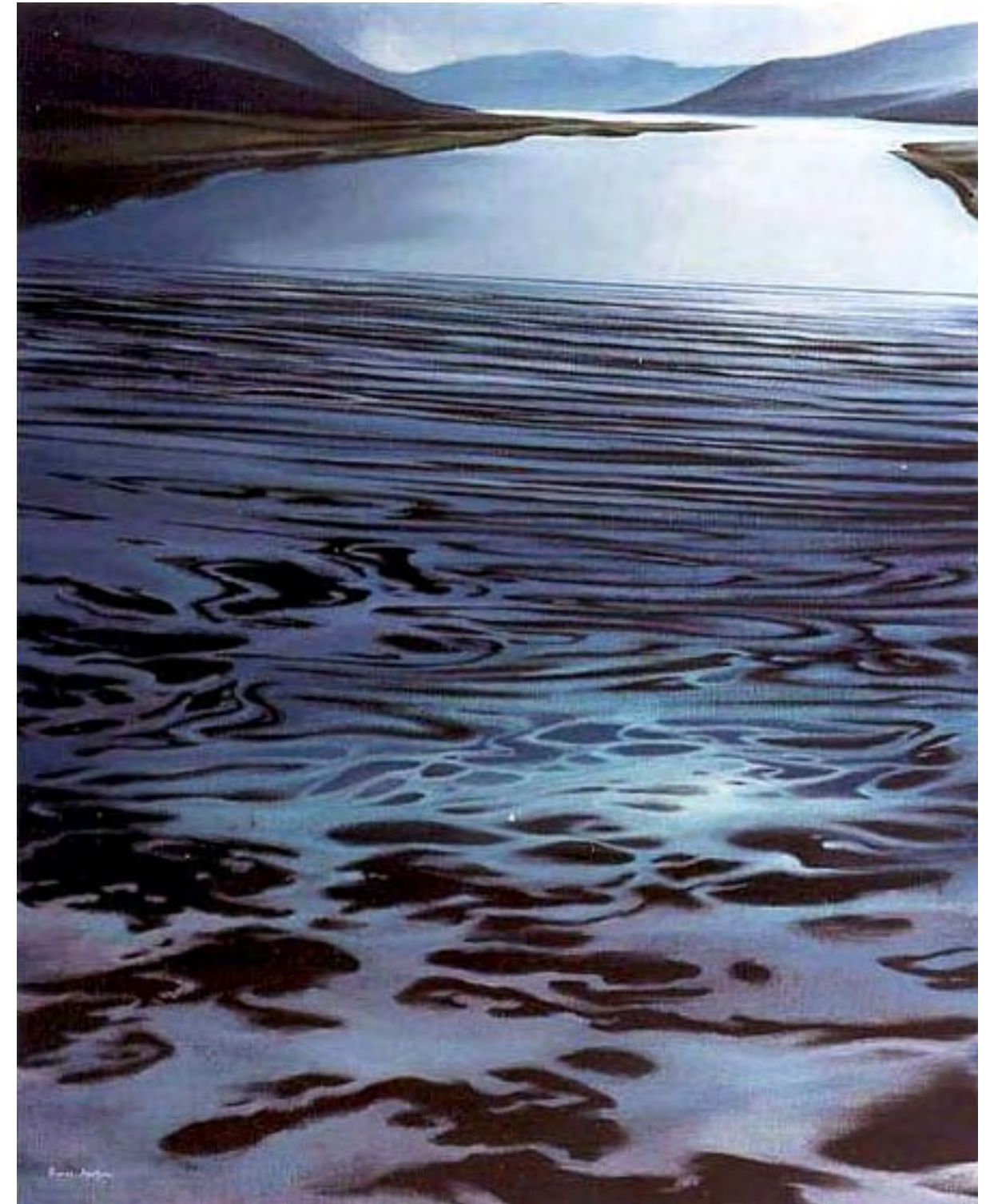






*Sous-marine (Undersea)* by Pierre Sentjens. Acrylic on canvas, 80 x 100cm

PREVIOUS PAGE:  
*Tsunami*  
by Pierre Sentjens  
Acrylic on canvas  
80 x 100cm



*Remous (Eddy)* by Pierre Sentjens. Acrylic on canvas, 100 x 80cm

Edited by Gunild Symes  
All images by Pierre Sentjens

*Pierre Sentjens is an artist and painter living in Brussels, Belgium. X-RAY MAG caught up with him to find out the secrets behind his luminous paintings of the sea.*

*XRM: What made you go into art and become an artist, and where did you receive your education and training in art?*

PS: I owe my first encounter with art and the sea to my grandfather, who was a decorator as well as a sailor and a fisherman. I was five when he started taking me regularly to the seashore, on the

breakwaters, to watch the North Sea, and he taught me a lot of things about tides, currents and safety. Often I sat on his lap to draw ships and the flora and fauna.

Later, I studied art at the Royal Academy of Arts in Brussels. After graduating in 1970, I began to teach plastic arts in secondary schools. Today, I lead watercolour workshops in one of





*Houleuse*  
(Stormy)  
by Pierre Sentjens  
Watercolor on paper  
40 x 50cm

*La Rebelle*  
(Rebel) by Pierre Sentjens  
Watercolor on paper  
100 x 70cm



*Les Traces* (Traces) by Pierre Sentjens. Watercolor on paper, 40 x 50cm



# Pierre Sentjens

the leading Belgian Art shops. I have also bought and restored a sailboat to escape everyday life and enjoy the swell and spray.

Art has always been my first interest, and therefore, I made it a career. I started with oil painting, but I soon preferred the natural side of water. That's why I chose watercolour as well as acrylic paint as my media.

*XRM: Where do you find your inspiration and materials?*

PS: From time to time, I happen to gather "relics", kinds of collections of driftwood and forgotten tools, polished and worn away by the sea. These "relics" are a kind of link between environment, man and the flora and fauna, as they all share the same destiny of life and death.

Sometimes, to follow in my grandfather's footsteps, I decorate tables or walls, preferably with marine life elements.

*XRM: Is there an artist, movement or idea that inspires your work?*

PS: I'm often considered an unclassifiable artist. I would say that, together with photography and Land-Art, nature, more than anything else, influences my work, especially in its most spectacular phenomena, such as storms, avalanches, volcanic eruptions, earthquakes ... I'm said to swing from heat to cold, from entrancing calm to roaring storms.

*XRM: Why did you choose the*

*subject matter you paint?*

PS: I've always had a special relationship with water. Wherever I travel, I'm attracted to the sea, to rivers, lakes or lochs, especially in areas where man is unobtrusive or where bad weather puts off tourists.

*XRM: What is your artistic statement or philosophy?*

PS: My whole life is based on artistic creation. As I marvel at nature and I'm deeply interested in its conservation, I'd like

to aim at the younger generation, at those children who will live in a future where our world may have lost its most valuable assets. Here are my two mottos:

1. Only your own footsteps are harmless.
2. When you retrace your steps, the world will have changed.

*XRM: Tell us your thoughts about the sea and the underwater world.*

PS: I love and respect the sea. I've been fascinated by





Esclaves, Bas-relief on board, 60x50cm



Le repas du naufragé, Bas-relief on board, 60x50cm



Rebus, Bas-relief on board, 40x30cm



Chorégraphie, Bas-relief on board, 60x50cm



Offrandes, Bas-relief on board, 50x40cm

the sea since I was a child. All the seas I crossed appealed to me—the winds of the Orcads in the North of Scotland, the emerald waters of the Caribbeans, the deep blue of the Mediterranean Sea, the unfathomable Atlantic, the volcanic shores of the Canaries where water and fire fight so beautifully, or simply the loneliness of the long misty beaches of the North Sea. I have sailed, swum and fished. I have liked seamen all over the world and shared their meals, supplied by the sea, with delight.

I hope my art can contribute to ocean conservation, as all my paintings express

the same message, namely “Wondering is the first step towards respect”.

*XRM: Are you a scuba diver?*

PS: I'm not very good at diving, but I'm used to scuba diving. With a mask and a pair of flippers, anyone can discover a part of the underwater beauties. I've been deeply moved by the corals of Bocas del Toro in Panama or the Cunas Indians on San Blas Islands. I've fallen in love with the Canarian volcanic cliffs, particularly those of Punta Restinga on Hierro, one of the favourite spots of accom-

plished divers.

*XRM: Where would you like to dive next and what would you like to see underwater?*

PS: My dream would be to meet wild whales (before the Japanese fleet exterminates them!)

*XRM: What is your next project, or projects?*

PS: I've written and illustrated two books, and my next project is to have them pub-

lished.

The first one is about the sea and is intended for holiday-makers. It contains all they should know about natural phenomena, nature conservation, safety, jobs of the past, wildlife, fishing and also some of the most famous recipes of sea fish, shells and seafood from the North Sea and the Atlantic.

The second book is a collection of quotations and texts by well-known people who have devoted their lives to the conservation and the glorification of every biotope on our planet. This book also reminds us of the wisdom of all these eth-

*Vestiges (Relics)* by Pierre Sentjens. Art critic, Stéphane Rey, states on Sentjens' website that in *Vestiges*, Sentjens confides in us the secrets of his paintings, his secret joys of the sea and souvenirs from the ocean. A new dimension is found in the work with things found by one who strolls along abandoned beaches, curious of little lost heavenly places. There is a profound emotion in a piece of flotsam, a piece of string, a rusty chain link, a stone rounded by sand over the centuries. *Vestiges* is the modest eyewitness to treasures swallowed by the sea, things the mysterious sea has touched and then abandoned. The simple unidentified relics are the small marvels of a great unknown.





*La vague*  
by Pierre Sentjens  
Watercolor on paper  
70 x 100cm

*Résonance*,  
by Pierre Sentjens.  
Acrylic on canvas  
120 x 150cm



## Pierre Sentjens



*Les Murmures (Murmurs)* by Pierre Sentjens  
Acrylic on canvas, 100 x 80cm

nic groups who were able to live in perfect harmony with nature.

*XRM: Tell us about your classes and workshops.*

PS: I share my passions through my works and art classes. Through watercolour, I make people dream of far away places. I teach how to observe and to appreciate in order to understand and respect people and their environment.

*XRM: How can people take part in your classes and workshops?*

PS: To take part in an art class or a workshop or to arrange an exhibition of my work, people can contact me on my website [www.pierresentjens.be](http://www.pierresentjens.be) ■

## IN OUR NEXT ISSUE

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