



GLOBAL EDITION
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Egyptian Cave
Ras Muhammad

Italy's
Elba

Siberia
**Lake
Baikal**

Ecology
**Sex on
the Reef**

Profile
Richard Pyle

Portfolio
Todd Essick

PAPUA NEW GUINEA
Tawali

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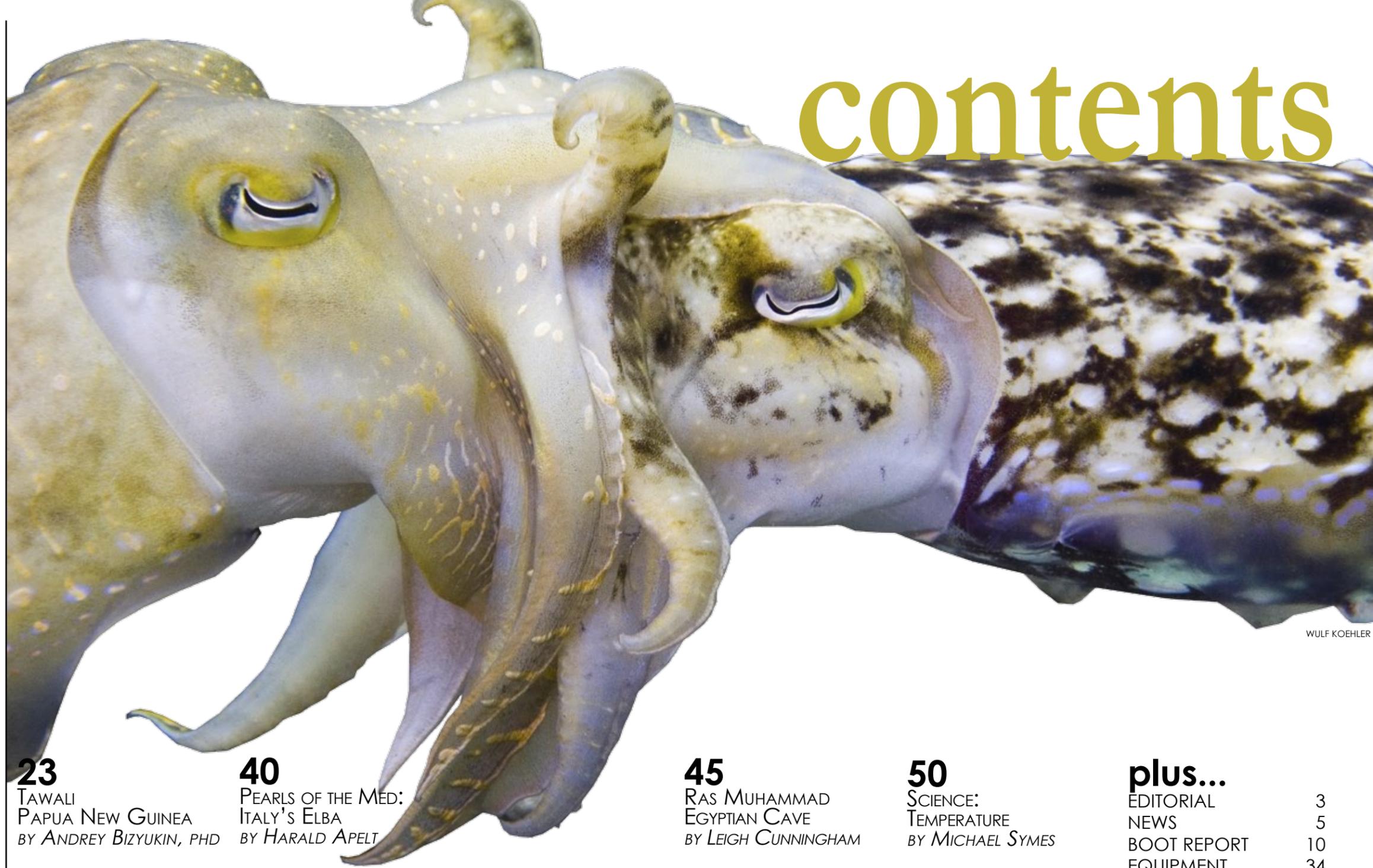
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COVER PHOTO
Mediterranean Wreck, Elba, Italy, by Wolfgang Pölzer
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Dilemma

Editorial

I like airplanes. I think they are cool, and I still marvel at how these wonders of human ingenuity seem to defy gravity as they accelerate their massive hulls and precious cargo down the runway and commence their graceful lift and climb in seemingly slow motion upwards into the skies, carrying hundreds of people across oceans and continents in almost perfect comfort.

I love travelling. Watching the landscapes pass underneath the plane on the way to my destination is part of the adventure.

There is this one thing that has been bothering me a lot of late.

Through this magazine, we are advocates for ocean awareness and conservation efforts, and we encourage going diving as a means of gaining understanding and experiencing the blue wilderness at first hand. Yet, going on a dive trip often involves embarking on a lengthy flight spewing out a lot of greenhouse gases.

What a contraction in terms that is.

Like most others, I am deeply worried about the peril the planet is in. I also want to be able to go on dive trips once in a while, like once or twice a year. In these two respects, I am probably not much different from the bulk of this magazine's readers. Yet, I cannot just be a hypocrite and go on preaching about conservation issues and not do something about my own carbon footprint. The carbon footprint is a personal measure of how much carbon dioxide each individual creates and how much each contributes to climate change.

New and more environmentally friendly technologies and improved efficiency seems to be lurking on the horizon, enabling us as individuals and societies to eventually reduce our carbon footprints to levels Nature can cope with.

Whereas cars, trains and other means of land transportation can possibly be electric, or run on sources other than fossil fuels, it appears that there are no real alternatives for commercial aircraft in sight.

The airline industry is obviously painfully aware of what this does to its image. Just days ago, we got a press release from Airbus, about how their new super-jumbo jet, the A380, is "Greener, Cleaner, Quieter, Smarter" and can run on alternative fuels. (It is now posted on our website). All very commendable, but don't be fooled. Don't take it as an excuse that everything is honky dory—it's all about spin and the result on the bottom line. "Greener" is not the same as "green", and every flight will still generate tonnes of harmful gasses. It is but a little step in the right direction, but most of the journey in making transportation CO₂ neutral still lies ahead of us, and it looks like a long walk.

So, if we want to continue fly out to the Maldives, Red Sea, Caribbean and other faraway places, it appears we also need to make some concessions elsewhere. Nature can only process about half the CO₂ we currently emit, so while there is room for some emissions in our relationship with Nature, we need to cut back drastically.

That made me think. In the United Kingdom, for example, 40-45 percent of the carbon emissions there are directly linked to what we do as individuals, such as heating and using electricity in our homes and



driving vehicles. Flights are the next biggest source of individuals' CO₂ emissions.

That means, if we, as individuals, could lower our personal emissions by 25 percent, that would affect the total by 10 percent. That is a good start, and 25 percent sounds feasible to me, if we each do a little here and there by adjusting daily habits, replacing wasteful technology, and choosing greener alternatives. Going on a bicycle once in a while, or carpooling to work, won't kill you.

Using the new low energy electric bulbs and shutting down all the many domestic appliances that run on standby over night doesn't require much of an effort either. Eating less meat would perhaps be a bit of a sacrifice, but according to some of the carbon footprint calculators that are now everywhere on the internet, all other things being

equal, it makes a huge difference whether you are a heavy meat-eater, a regular meat-eater or an occasional meat-eater. If other parameters are low, a heavy-meat eater has twice the carbon footprint of a vegetarian. Now *that's* food for thought.

Some fish sold at supermarkets have been sent on a 30,000 km journey before they end up on your dinner plate. Fish caught off Antarctica can first go around China for filleting and packaging before being sent to Europe or the US—another long trip that in turn causes additional and essentially unnecessary CO₂ emissions. Do we really need to send fish all the way to Asia for filleting just because labour is cheaper in the Far East? What is the ultimate price for saving half a buck? So, please read the labels and shop wisely.

What else can you do?

Donate your air mileage bonuses to disaster relief or reforestation charities, take action in the way you live, use wind or solar to power your home and office, plant a tree or donate to tree-planting charities, encourage governments and industries to aid tropical countries in not cutting down their rainforests but in becoming diligent stewards of our planet's oxygen fields, spread the word to others. See how below:

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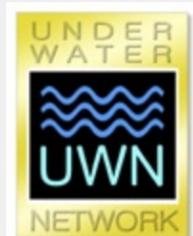


Post scriptum:

Virgin Atlantic aims to be the first commercial airline to use biofuel in a demonstration flight planned for this month. The airline will fly one of its Boeing 747 aircrafts on a sustainable type of biofuel from London Heathrow to Amsterdam in a bid to demonstrate what the aviation industry can

achieve using clean-fuel technology to reduce carbon emissions. No passengers will be on board for the demonstration flight.

Virgin Atlantic president Sir Richard Branson stated: "The demonstration flight next month will give us crucial knowledge that we can use to dramatically reduce our carbon footprint."



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X-RAY MAG is a member of Diving Equipment & Marketing Association: www.dema.org

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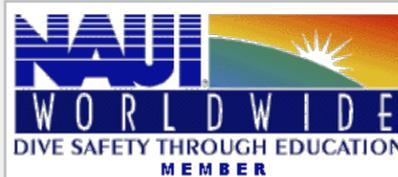
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NEWS

Sea Cucumber “New Malaria Weapon”

Climate change not to blame for North Atlantic warming

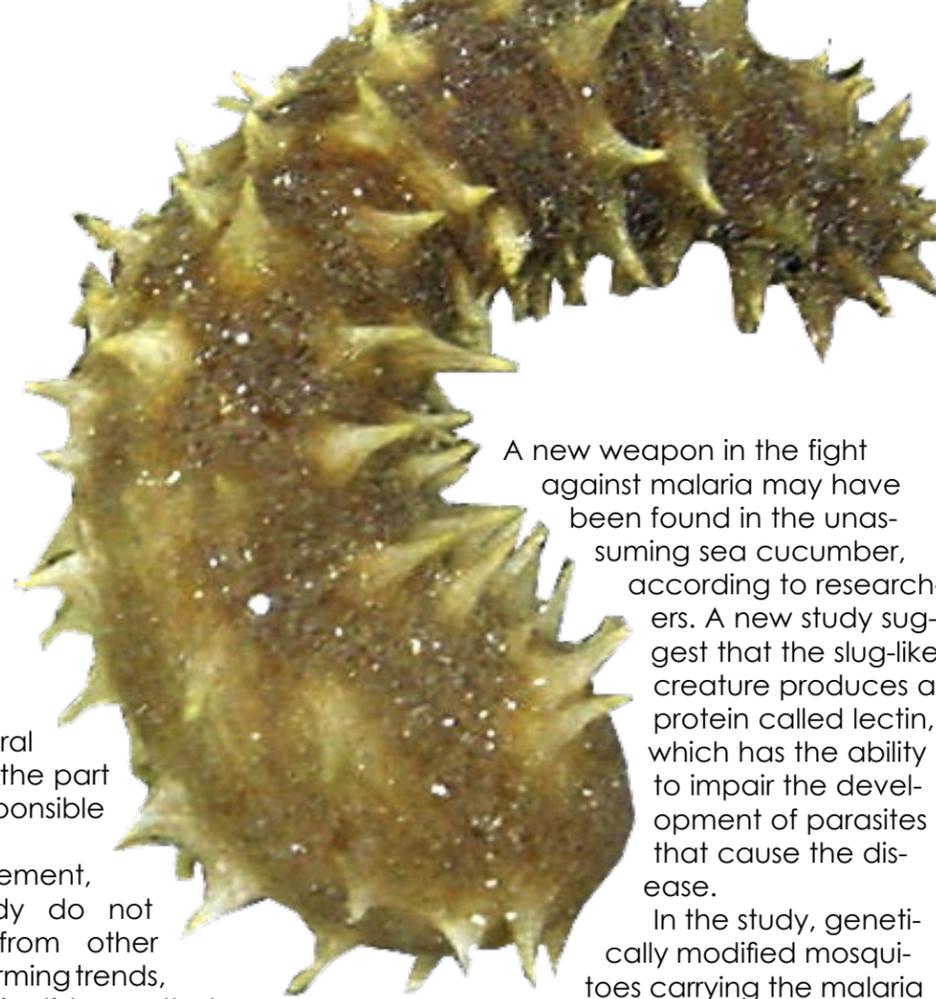
A new study published in the journal *Science* suggests that temperatures in the North Atlantic Ocean have risen, in the past 50 years, in an inconsistent manner across various areas, with cooling subpolar regions and warming tropical and subtropical regions.

The North Atlantic Oscillation (NAO), a natural and cyclical wind circulation pattern, is the explanation behind the temperature changes according to the study's authors.

Lead author of the study, Susan Lozier, a professor of physical oceanography at Duke University, told *Science*: “The winds have a tremendous impact on the underlying ocean. The take-home message is that the NAO produces strong natural variability. The simplistic view of global warming is that everything forward in time will warm uniformly. But this very strong natural variability is superimposed on human-caused warming. So researchers will need

to unravel that natural variability to get at the part humans are responsible for.”

Despite this statement, results of the study do not undermine data from other oceans showing warming trends, say researchers. Scientists say that any warming in the North Atlantic caused by human activity is being masked by the natural variability of NOA. ■ SOURCE: SCIENCE



A new weapon in the fight against malaria may have been found in the unsuspecting sea cucumber, according to researchers. A new study suggests that the slug-like creature produces a protein called lectin, which has the ability to impair the development of parasites that cause the disease.

In the study, genetically modified mosquitoes carrying the malaria parasite, were engineered to produce lectin in their gut while feeding. Lectin disrupts the growth of the parasites in the insects' stomachs. Results showed that lectin was poisonous to several of the parasites that cause

malaria. It is when the parasites are in their early stage of development called the ookinete, that Lectin can be effective, according to researchers.

Malaria kills over one million people each year and causes severe illness in over 500 million world wide. Estimates report that over 40 percent of the world's population are at risk of contracting the disease. So, the stakes are high.

The technique of genetically engineering mosquitoes so that the malaria parasite cannot grow inside them is not without its challenges. Professor Brian Greenwood of the London School of Hygiene and Tropical Medicine, told the BBC: “The key factor that will determine whether these approaches will ever become a practical malaria control tool is finding a way of ensuring that the genetically engineered mosquitoes take over from the wild ones.” ■

SOURCE: BBC



First Time On Record: Northwest Passage Clear of Ice

For the first time since monitoring began in 1978, the Northwest Passage is clear of ice, according to the European Space Agency. Due to unprecedented shrinking in this year's summer reduction, the ice cover has steadily retreated to leave the passage on open shipping route.

Researchers have linked global warming to the retreat of the ice

cover and report that it is progressing more quickly than expected.

One of the most fabled sea routes on Earth is the Northwest Passage, which served as a short cut for ships travelling between Europe and Asia through the Canadian Arctic. Now, disputes over the control of the passage are being raised by Canada, the European Union and the US.

The BBC reports that Canada considers the passage Canadian territorial waters, while the EU and the US view it as an international waterway open to all.

International research teams will continue to study the ice reduction and historical markers that might shed light on the future of the passage. ■

SOURCE: BBC, ESA

Anti-Cancer Discovery: Key Trigger in Marine Product

A chance discovery in marine biomedicine has led to key information about the production of a cancer fighting substance in a marine organism, according to researchers at the Scripps Institution of Oceanography at UC San Diego in the US. New applications of the natural product in the treatment of human diseases could result from the finding.

The discovery involves the enzyme, SalL, found by a research team led by UCSD professor, Bradley Moore, inside a marine bacterium, *Salinispora tropica*, identified by Scripps researchers in 1991.

The key triggering ingredient for strong cancer-fighting natural products is a chlorine atom. The marine bacterium incorporates this atom in a different way. It uses a substitution method em-

ploying non-oxidized chlorine, which is found in nature in, for example, table salt.

Moore told ScienceDaily: “This was a totally unexpected pathway. There are well over 2,000 chlorinated natural products and this is the first example in which

chlorine is assimilated by this kind of pathway.” ■

Salinispora tropica



IMAGE COURTESY OF UNIVERSITY OF CALIFORNIA - SAN DIEGO



Divers Find New Species in Aleutians

Two of the species are sea anemones, the kind of sea anemones that drift across the seafloor as they feed. They range from the size of a softball to the size of a basketball.

The third one is a kelp or brown algae, dubbed "Golden V Kelp". Measuring up to ten feet long, the kelp may represent a new genus or even a new family of the seaweed. It was discovered near thermal vents.

The three species were discovered by a team of scientific divers from the University of Alaska Fairbanks. According to Stephen Jewett, a professor of marine biology and the dive leader, the scientists are reasonably sure that the kelp is a new species, while more work needs to be done to confirm that the sea anemone species are completely new to science.

The organisms were found while surveying more than 1,000 miles of rarely-explored coastline, from Attu to the Tigalda Islands. Logging more than 300 hours underwater, the divers collected hundreds of water, biological and chemical samples over 440 dives.

Armed with underwater cameras and video cameras, they took hundreds of photographs and dozens of short movies of the creatures that inhabit the coast of the Aleutians.

"Since the underwater world of the Aleutian Islands has been studied so little, new species are being discovered, even today," said Jewett. He adds that even more new species may be revealed as samples collected during the dives continue to be analyzed. ■



Is This a New Species of Frogfish?

Maluku Divers has rediscovered a very interesting frogfish in Ambon Bay

During a dive on Laha, which is just 15 minutes from the resort on the southern coast of Ambon in the village of Latahalat, dive-master Toby Fadirsyair and owner Buck Randolph were incredibly excited to spot this little specimen. Toby has been diving this region for over 18 years and, after

surfacing, said he had only seen this species once before, and that was 15 years ago. They realised that they couldn't identify exactly what type of frogfish it was and contacted several top fish identification experts to see if they could establish the scientific details of the specimen. The frogfish

is one of a pair and is about 10cm long. Now, with photographic evidence, a proper identification may be possible. Anyone with suggestions as to the scientific name of this specimen, please email Maluku Divers to help in their identification quest. ■

New Species of Scorpion Fish Discovered Off Hawaii

Scientists in Hawaii have returned from a pioneering expedition, the first of its kind, to a coral reef over 30 miles deep off the coast of Maui. In five dives over six days, scientists from Bishop Museum at the University

of Hawaii and several federal and state agencies, employed the pisces submersible to explore the reef. Located in the Au'au channel southwest of Maui, it is one of the deepest known coral reefs in the world. A

bonus of the trip was the discovery of what looks to be a species of scorpionfish new to science, and this is just the beginning. Exploration of these depths by the team will continue over the next three years. ■



Say hello to ... "Mick"

A fish called Mick

Scottish scientist discovers six new species on a research mission to the southern Indian Ocean.

He was probably expecting some aftershave, but one Scot got an early Valentine's gift when his fiancée named a new species of fish in his honour. When Dr Nikki King discovered the 42cm long brown eelpout at the bottom of the Southern Indian Ocean, her boyfriend seemed to have sprung to mind. Now, geophysicist Mick Cousins has the dubious honour of lending his name to the *Pachycara cousinsi*. The species was found along with five other 'new' specimens during deep sea research. Dr King of Aberdeen University was working on board the royal research ship, *Discovery*, at the time, and had originally been investigating the waters around a small sub-Arctic archipelago. However, her success rate increased as she moved to warmer waters. Dr King's finds were confirmed after painstaking tests at her base. Both Dr King and Professor Monty Priede are quoted in the article. ■ SOURCE: UNIVERSITY OF ABERDEEN

"Happy Valentines, Dear"



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Got algae smothering the reefs?

Roll out the *Vacuum Cleaner*

Hawaii's radical solution to the problem with seaweed smothering coral is a huge but gentle vacuum. The lowly sea urchin will then make short process of the rest

Algae have smothered at least half the reefs in Kaneohe Bay on Oahu's west coast and have begun to spread to waters beyond and threaten coral reefs and the fish, turtles and other sea life that depend on them. After years of trial and error, scientists believe they have arrived at a solution.

It involves a giant underwater vacuum that they call the Super Sucker. The suction is created by back-pressure from a special vacuum pump that doesn't damage any animals inadvertently scooped up—and it doesn't chop the algae into bits, which could make the effort futile. Even

the smallest seaweed fragments flushed back into the water reseed the reef with the aggressive algae.

No one knows that better than Eric Conklin, a doctor of zoology who has spent hours and hours feeding clumps of "gorilla ogo" and "smothering seaweed" and other invasive algae into the Super Sucker.

"If all we were doing is vacuuming the reef, it would come back and we'd be back at it again," Conklin said. "Our plan is to knock back the growth, so it won't spread and give our long-term solutions a chance to take hold."

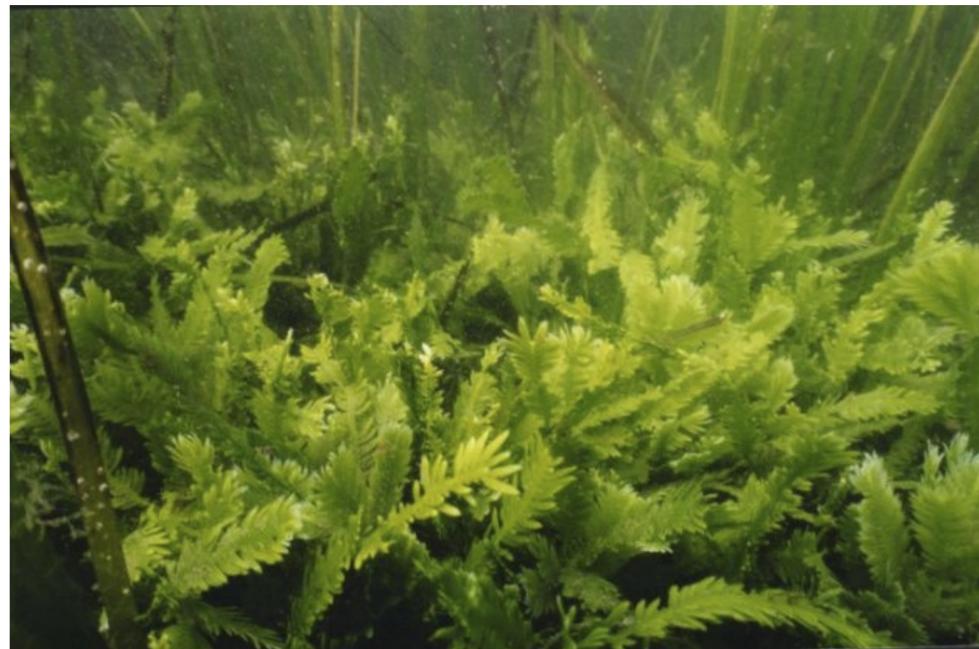
The hopes of long-term solution rest largely on the sea urchin, which eats the invasive algae.

One of the problems is that the populations of urchins around Hawaii have plunged because of excessive harvesting. They are collected for their gonads, which are prized as uni by sushi-bar patrons. At the lab on Coconut Island, university researchers are learning how to propagate one species, the collector urchin, so they can scatter baby urchins on freshly vacuumed reefs.

The strategy has worked in small test plots, where thumb-sized nubs of corals have rebounded. Now the university, working with the Nature Conservancy and Hawaii's Department of Land and Natural Resources, is scaling up the program to attack the invaders a reef at a time.

Invasive seaweed is not unique to Hawaii. Vast areas of the Mediterranean seafloor have become swaying fields of a killer algae called *Caulerpa taxifolia*, which was mistakenly released into waters by the Oceanographic Museum of Monaco. The fernlike *Caulerpa* was popular in saltwater aquariums because it's easy to grow.

The article in X-RAY MAG #17, "Why & How: The Structure of Ecosystems", has further explanations of the dynamics between algae, corals and sea urchins. ■



Caulerpa taxifolia is a species of seaweed, native to the Indian Ocean, commonly used as ornamental plant in aquariums. It has turned into an invasive species threatening to alter the entire ecosystem by crowding out corals while being inedible to animals

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Sunscreen is Lethal to Coral

Avoid sunscreen before your dive. A new study has found that four commonly found sunscreen ingredients can be lethal to corals

The chemicals in sunscreen are capable of awakening dormant viruses in the symbiotic algae called *zooxanthellae* that live inside reef-building coral species. These viruses replicate until their algae burst open, spilling virus particles into the surrounding seawater causing the infection to spread to neighbouring coral communities.

Seawater surrounding coral exposed to sunscreen has been found to contain up to 15 times more viruses than unexposed samples.

Normal coral (left) exposed to ultraviolet filters found in sunscreen "bleaches" white (right) when the algae living inside it die

The researchers estimate that 4,000 to 6,000 tons of sunscreen wash off swimmers annually in oceans worldwide, and that up to 10 percent of coral reefs are threatened by sunscreen-induced bleaching. Even low levels of sunscreen, at or below the typical amount used by swimmers, could activate the algae viruses and completely bleach coral in just four days, the results showed.

Several brands of popular sunscreens were tested and all had four ingredients in common: **paraben, cinnamate, benzophenone and a camphor derivative**. The study appeared online in the journal *Environmental Health Perspectives*. ■



DEPARTMENT OF MARINE SCIENCE, POLYTECHNIC UNIVERSITY OF MARCHE, ANCONA, ITALY





A lemon-yellow bamboo coral tree discovered in the Pacific

Researchers Find New Deep Water Corals

Researchers have discovered what they believe is a new deep water coral and unique sponge beds several thousands of meters below the ocean surface in the Papahānaumokuākea Marine National Monument. Samples of the corals and sponges were collected for taxonomic identification and DNA analysis by the *Pisces V* submersible operated by the Hawaii Undersea Research.

Christopher Kelley, the principal investigator of the project, said the monument is potentially protecting so many new species and new records of spe-

cies that many will not be revealed for decades to come. The vast national monument, nearly 100 times larger than Yosemite National Park, was created by President Bush last year out of the Northwestern Hawaiian Islands, which stretch out 1,000 miles from the main Hawaiian Islands.

"Most of the monument is below scuba diving depths," said Randy Kosaki, the National Oceanic and Atmospheric Administration research coordinator for the monument. "It's important to find ways to explore these deep water ecosystems where the inhabitants are virtually unknown." ■

Scientists with the University of Washington have found glass sponges about 30 miles west of Grays Harbor. This is a significant find because until recently, they were thought to be extinct for 100 million years. The first discovery of the glass sponge was found in protected waters of Canada's Georgia and Hecata straits

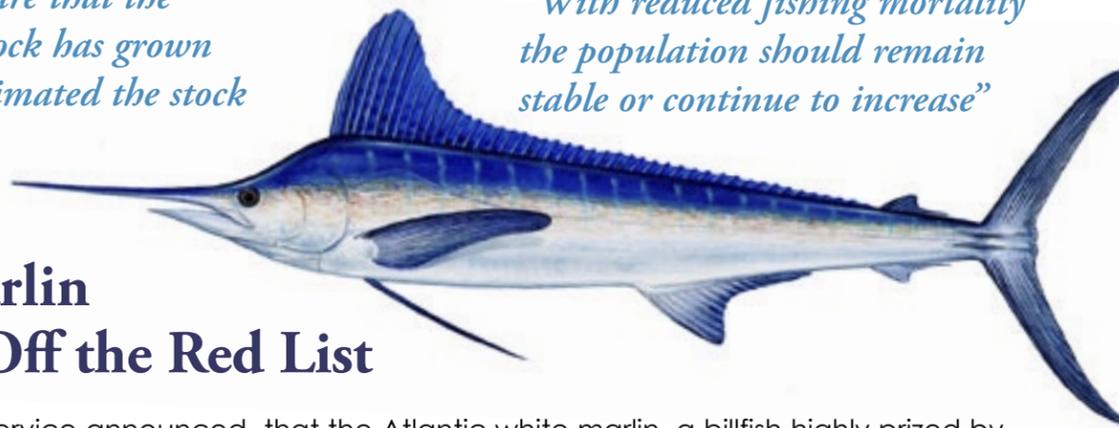


UNIVERSITY OF VICTORIA

All indications are that the white marlin stock has grown since we last estimated the stock size in 2002

White Marlin Makes It Off the Red List

NOAA's Fisheries Service announced that the Atlantic white marlin, a billfish highly prized by recreational anglers, does not warrant listing as threatened or endangered under the Endangered Species Act anymore. Based on the biological status of the species the species is not in danger of extinction. Population is expected to remain "stable or continue to increase". ■



"With reduced fishing mortality the population should remain stable or continue to increase"



Loss of deep-sea species' could lead to oceans' collapse

The loss of deep-sea species poses a severe threat to the future of the oceans.

In a global-scale study published in the January 8th issue of *Current Biology*, the researchers found some of the first evidence that the health of the deep sea increases exponentially with the diversity of species living there.

"This shows that we need to

preserve biodiversity, and especially deep-sea biodiversity, because otherwise, the negative consequences could be unprecedented," said Roberto Danovaro of the Polytechnic University of Marche in Italy.

"Deep-sea ecosystems provide goods (including biomass, bioactive molecules, oil, gas, and minerals) and services (climate regulation, nutrient regeneration

and supply to the upper ocean, and food) and are essential for the sustainable functioning of our biosphere and for human wellbeing," the researchers concluded.

"Our results suggest that the conservation of deep-sea biodiversity can be crucial for the sustainability of the functions of the largest ecosystem" on the planet. ■



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Fish have good memory

Researchers at the National Marine Aquarium in Devon, United Kingdom think they have disproved the age-old theory that fish have bad memories.

Whether it's good memory or a good appetite, the resident humphead wrasse, Bentley, has been obediently coming to food when a dinner gong is sounded. He even remembered the sound after a four-month break and raced to his favourite meal of squid and prawns.

Now, the aquarium is going to test its experiment further with sharks.

Kelvin Boot from the aquarium said: "There is a popular misconception that fish are not very bright and that they do not have long memories. But we are finding that this is just not true at all." ■

SOURCE: BBC



Sand Fiddler crab (*Uca pugilator*). Male fiddler crabs, renowned for having one oversized claw, sometimes build small sand hoods that hide the entrance to their burrows. During courting season, they come out of their burrows and wave their large claw, in an attempt to attract females

Size Doesn't Matter

In the world of the fiddler crabs, having the home advantage makes it a near certainty that you'll win a battle against an intruder—regardless of your opponent's size.

Male fiddler crabs have been found to have an "owner advantage" when defending their burrow that equates to a 92 percent success rate. Dr Patricia Backwell from the Australian National University said that previous theories include the possibility that owners might be inherently better fighters or that established crabs could call in support from neighbours, but she said these had less of an effect than having access to the burrow during a fight.

"The key factor seems to be the strength of the mechanical advantage gained by owners having access to the burrow during fights," Dr Backwell said. "Something must happen when crabs become homeowners that changes how they fight. It could be that being able to position yourself in the burrow provides a biomechanical advantage when grappling with opponents, or perhaps by retreating into the burrow it makes it harder for the opponent to fight without expending energy digging you out."

Fiddler crabs—which can be recognised by the single oversized claw of males—have to retreat into their mangrove mudflat burrows as the high tide approaches. Those without homes—floaters—become prey to sea predators. But the floaters have little chance of protecting themselves and securing a ready-made burrow when owners win almost all fights.

■ SOURCE: THE AUSTRALIAN NATIONAL UNIVERSITY

Having a Nice Home Does

"Hoodie" Increases a Fiddler Crab's Chances of Sex

A "hoodie" increases your chances of having sex, if you're a male fiddler crab living in a neighbourhood plagued by predatory birds, say researchers.

Female fiddler crabs visit the burrows to assess the suitability of their owners and eventually choose a mate. They are known to be very choosy, but their criteria checklist is still a topic of debate.

"Their choice is based on various cues including claw size and waving rate," says Tae Won Kim at Ewha Women's University in South Korea. The size of a male's burrow is also known to play a role, and females from at least two species of fiddler crabs seem to prefer males with hooded burrows.

The females' preference for hooded burrows is entirely based on self-preservation. Her choice appears unrelated to whether or not the males will prove better mates in terms of providing for her or her future progeny. The researchers attracted predatory birds to a sand flat at the entrance to the Panama Canal. They found that the female crabs showed an even greater preference for hooded burrows when they were at greater risk of being eaten. ■

SOURCE: PLOS ONE (DOI: 10.1371/JOURNAL.PONE.0000422)



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BOOT 2008

Snorkel und Schnitzel

& cigarette smoke



In an otherwise turbulent and ever changing world, it's almost reassuring to visit the massive BOOT expo in the Ruhr district, Germany's industrial heartland. This behemoth of a trade exposition not only sets its mark on the city of Dusseldorf, where it is held, with promotional banners draped all over the city. Of course, it is not just a dive show. It is really a boat show—as the name implies—which drags in the big audiences and tugs the dive part along as a side dish. It also sets its mark on the exhibitors, since the expo lasts

Photographer and X-RAY MAG contributor Kurt Amsler in the Seacam booth

for a whopping nine days. Obviously, those who have to haul those mega-yachts into the hall for display, from perhaps across the world, need a little more than a wee weekend to make the effort worth their while, and so the dive expo has to go along for the full duration.

For a one or two day attendee, this may not make much of a dif-



ference aside from having more dates to choose from, but it is only obvious that the duration takes its toll on the booth-holders. Every late afternoon, you could just watch how the exhibitors gradually drooped out off the race and hung in their booths, absent-minded and glazed-over with exhaustion. So, if you want them all perky, come early.

Overall, it is a good and vibrant show—and it is, not to forget, by far the biggest consumer dive show in Europe. Just in the dive section, you can spend days walking the aisles. So what sets this expo apart from other dive shows? First of all, aside from the sheer size of it, the whole backdrop is German and different from the usual Anglo-Saxon ambi-

X-RAY MAG co-publisher, Harald Apelt, got chummy with the German Navy's elite frogmen. Don't ask what went into that witches' brew of theirs. Egg, vodka and... well, never mind

ence, but that just adds a little spice. Who would have thought that German would be a bit exotic?

The many present international booth-holders have English either as their native or preferred second language. The Germans are generally good at English, so the language barrier is just perceived, but not really there, making the place ideal for networking.

It's also good for the general public outside Germany, as so many overseas resorts are here in one place. And the distances to the expo are not really that bad. Colleagues from southern England made it here in as little as four hours by car, and others drove up from Austria in just seven. It is a good meeting place and a good place to take a look at dive travel.

It is just on the equipment side of matters that the show seems

The fairgrounds by the river Rhine are easy to get to by rail, motorway (goes right by) or plane (airport is in the background)



a bit lame. That is not to say that there wasn't a lot of equipment there—there is, and the manufacturers had a lot of new gear on display. It's just not at this venue that they unveil their new products with trumpets and all the fireworks. That predominantly takes place at DEMA in the US. But you can see it here.

I do have one thing that really bothers me about this otherwise good show—the constant indoor smoking. It says on big signs everywhere that smoking is prohibited.

Yet, filled ashtrays are seen too often behind the booth counters, and it is beyond me why the show management doesn't police the matter much more strictly. The air inside the halls was pretty yucky by the end of the day. I have been informed, though, by next year all smoking in public places will be outlawed in Germany, too. So, don't let the issue with smoking keep you from going in 2009. And, oh, the shopping in Dusseldorf is good, too, and there are a lot of good restaurants. ■





Paul Watson and Terri Irwin in front of ship

Sea Shepherd Renames Ship 'Steve Irwin'

Terri Irwin has granted the Sea Shepherd Conservation Society permission to rename its ship currently known as *Robert Hunter* in honor of her late husband, Steve Irwin. Captain Paul Watson, founder and president of Sea Shepherd and Terri Irwin officially announced the new name for the ship *Steve Irwin* at a press conference at 12:00 on December 5th at Victoria Docklands in Melbourne, Australia. ■

Terri Irwin to launch whale research

Terri Irwin will launch non-lethal research of whales in Antarctic waters next year in hopes of showing that Japan's scientific whale kill is a sham.

Tokyo has staunchly defended its annual cull of more than 1,000 whales as crucial for research, saying it is necessary to kill the whales to properly gather information about their eating, breeding and migratory habits.

Environmentalists and anti-whaling nations say the slaughter is commercial whaling in disguise, because much of the meat from the whales ends up being sold commercially. ■




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Amy Winehouse has taken up scuba diving and is enjoying her new hobby with Bryan Adams, according to reports

Winehouse 'Saved' By Scuba-Diving

Troubled singer Amy Winehouse credits Caribbean scuba-diving trips with Bryan Adams for helping her battle her drink and drug addictions.

It's a different world down there. I can look at things in a new way.

The Rehab hitmaker spent Christmas and the New Year with the rocker at his home in Mustique. And the star insists the trip has changed her outlook on life. She says, "I've learned to appreciate the simple things, like the beauty of nature. And it's taught me to face my fears. It's a different world down there. I can look at things in a new way. I've come to the realisation that life is too short; I want to make sure I live every minute of it." ■ SOURCE: WWW.PR-INSIDE.COM



FESTIVAL EUROCKÉENNES

More Gore

A spokeswoman for former Vice President Al Gore has suggested that scientists cited in a new Senate minority report that calls global warming worries "entirely without merit" have been bought off.

The U.S. Senate report documents hundreds of prominent scientists—experts in dozens of fields of study worldwide—who say global warming and cooling is a cycle of nature and cannot legitimately be connected to man's activities.

But Gore spokeswoman, Kalee Kreider, told the Washington Times that after a quick review, about 25 or 30 of the scientists cited in the report may have received funding from Exxon Mobil Corp.

However, Mobil spokesman Gantt H. Walton dismissed the claim, telling the newspaper the company is concerned about climate change reports, and doesn't pay scientists to "bash global-warming theories." ■ SOURCE: WORLDNETDAILY.COM

Chinese Frogmen to Guard the Olympics

A contingent of 78 naval frogmen will surveil open water areas for Beijing Olympics 2008.

The divers from a search and rescue troop of the People's Liberation Army (PLA) Navy are believed to take the responsibility of clearing underwater security threats for Olympic water sports venues, the PLA Daily reports submarine from 86 meters below the sea surface, the newspaper reported. ■

Militants Cross the Indian-Pakistani Border Underwater Using Air Pillows

Infiltrators on the Indo-Pakistani border are thinking out-of-the-box in their efforts to make it across to India.

"We have found that militants use seemingly ordinary air pillows, which fitted with a small rubber tube, acts as primitive scuba tank allowing its user to breathe underwater and swim across the border. Whenever there is patrolling, they dip into the water bodies and breathe easily through these pipes," a Defence spokesman explains.

Even though the border fence has been a deterrent for infiltrators, they have been trying new ways to sneak in, and this improvised air pillow is a cheap and a steady option, which police say was used in two recent infiltration attempts.

Security forces say rivers like the Munnawar Tawi and the Chenab form natural gaps along the Line of Control and the international border. The militants are increasingly using these gaps.

■ SOURCE: WWW.IBNLIVE.COM



Via Coral Reef Alliance

Tiffany & Co. Foundation says coral is "Too Precious To Wear"

You don't have to dive in an exotic location to see the very real impacts of reef destruction. Just take a look at the brilliant red and pink coral products in souvenir and jewelry stores.

A new campaign to increase awareness in the fashion and design industry—aptly titled "Too Precious to Wear"—has been launched by SeaWeb, one of CORAL's allies in the reef conservation movement. This high-profile campaign is all the more important in light of the recent failure to obtain a certification under the Convention on International Trade in Endangered Species (CITES) for threatened and endangered corals.

Tiffany & Co. Foundation, who partially funded the campaign, also funded an information signage project currently being prepared by CORAL staff in Marine Life Conservation Districts in Hawaii.

CORAL's work helps people connect the dots. What we do in our own communities—and what products we buy—have a very real, tangible effect on places many of us enjoy and upon whose sustainability the world depends. Every purchase of coral contributes to the destruction of habitats and livelihoods. ■

Via Coral Reef Alliance

Sticklebacks Let Prawns Lead Them to Good Places to Dine

Research into the behaviour patterns of sticklebacks highlights the fact they use prawns to determine the best place to be.

It is a common experience for most of us to look at what other people are doing when we ourselves are not sure of what to do next. One of the benefits of being a social species is that we can tap into the expertise of our fellow humans to improve our own chances of success when circumstances are uncertain. Sticklebacks use another species to find the right place to be.

Sticklebacks occur alongside common prawns in the brackish waters of many of the estuaries in British Isles and forage together within the same areas of shallow water. Experiments demonstrated that when a stickleback on its own was put in a position where it could either join a group of prawns that had been kept in the same environmental conditions as itself or a group that had been kept in different conditions, the fish spent more time with the prawns from its own environment.

A further experiment showed that this choice could have important

implications for feeding. When strange and familiar groups of prawns were accompanied by a swarm of water fleas that the fish could see but not capture, the subject stickleback made more attacks at the water fleas nearest to the familiar group of prawns. The implication is that choosing to be near prawns from their own habitat influences not only where sticklebacks go, but also where they feed, and what they might end up feeding upon.

In contrast, the prawns cannot use sticklebacks to find the right place to be. Prawns are attracted to other prawns that come from the same habitat as themselves, but not to sticklebacks from the same habitat. As a result, the relationship between the species is asymmetric, and sticklebacks could be said to be exploiting the information contained in the presence of prawns from their habitat. The prawns are signals that combine together with chemical cues to provide information to sticklebacks on where to be. ■

Finally, some good news

Variable Weather May Save Corals

According to a new study by the Wildlife Conservation Society, corals living in variable temperatures are better able to survive warmer seas due to climate change.

Researchers discovered that coral reefs in sites with varying seasonal temperatures are more likely to survive the "hot pulses" of Climate Change. Conversely, reefs living in environments with stable but higher temperatures are more susceptible to "bleaching," a global phenomenon where beneficial algae are "evicted" by corals, ultimately leading to the reef's demise.

The researchers also discovered that the coral reefs in sites with the most temperature variation were in the "shadow" of islands, protected from the oceanic currents that reduce temperature variations in reef ecosystems. According to the authors of the study, the results suggest that corals in these locations are bet-

ter adapted to environmental variation. Consequently, they are more likely to survive dramatic increases in temperature.

"The findings are encouraging in the fact that at least some corals and reef locations will survive the warmer surface temperatures to come," said Dr. Tim McClanahan, Senior Scientist working for WCS' Coral Reef Programs and lead author of the study. "They also show us where we should direct our conservation efforts the most by giving these areas our highest priority for conservation."

The study, which appears in the latest edition of the journal *Ecological Monographs*, presents the results of an eight-year study on the reefs of East Africa. ■

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Tailgating the lone dugong, KAT, on Cocos (Keeling) Islands. Photographed by Karen Willshaw ~ underwater.com.au member



PIET SPAANS

PETER SYMES

Oceanography

Sub-glacial System Under Antarctic Ice Teeming With Life

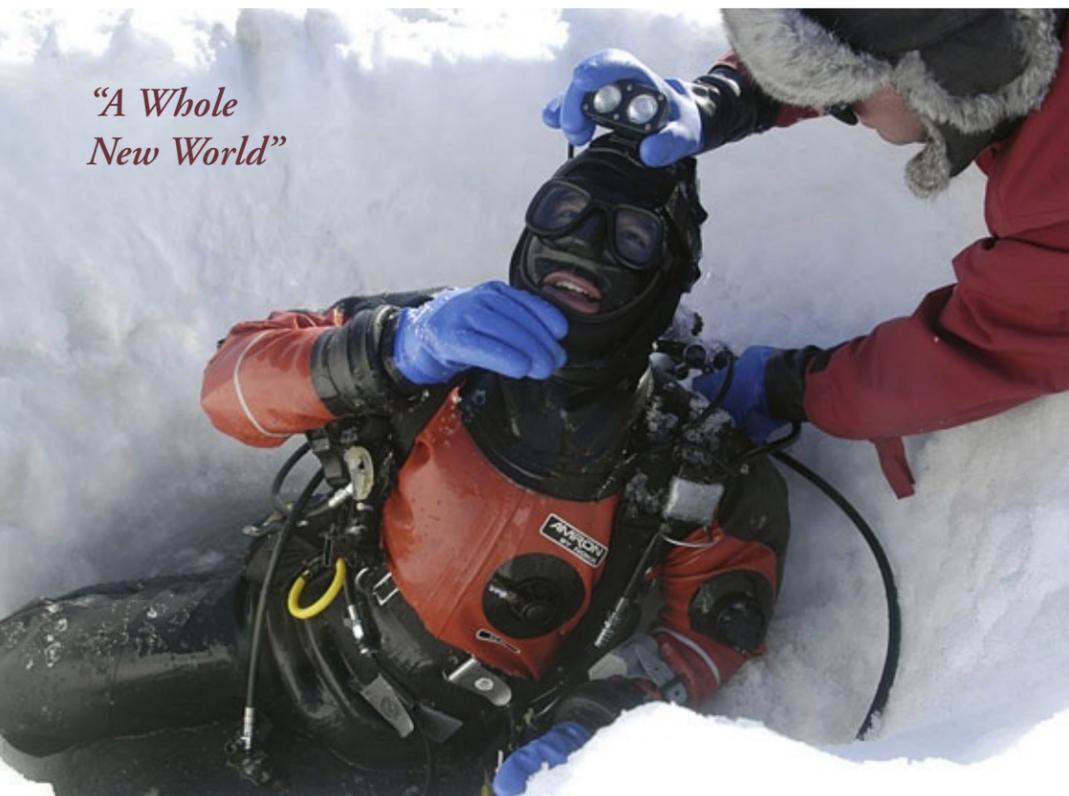
The complex sub-glacial system under the Antarctic ice might be teeming with life in the form of mineral-hungry microbes. According to a report in the National Geographic News, the watery environment under Lake Vostok, might be more than one-and-a-half times the size of the United States, making it the world's largest wetland.

The lakes may also hold an untapped wealth of climate records that could improve our understanding of how life evolved,

but the most important find is the evidence that microbes can live in the subglacial lake, deriving energy from minerals, the report states.

Lakes in Antarctica have been isolated from the atmosphere for more than 30 million years, ebbing and flowing as they empty into the polar sea. The reason for their fluid state is because the ice sheet above acts like a gigantic down blanket, trapping heat rising from Earth's interior. ■

"A Whole New World"



Diver Henry Kaiser helps his colleague, David Huang, prepare to leave the dive hole

PETER WEST, NSF



A "touch tank" in the Albert P. Crary Science and Engineering Center at NSF's McMurdo Station on Antarctica contains some of the creatures found in McMurdo Sound. Researcher Sam Bowser is holding a sea spider

PETER WEST, NSF

Antarctic Creatures Yield Clues to New Technology

Understanding how *Foramifera* build their shells could lead to stronger biological adhesives

Among the most abundant organisms in the oceans, the scientifically interesting aspects of *Foraminifera*, or forams for short, far exceed their physical size. From a global perspective, the drive to understand these creatures is, in part, a result of their role in recycling nutrients in the oceans. Because of the huge numbers of *Foraminifera* in the seas, when they make their calcium carbonate shells, they act as a "carbon sink," absorbing carbon from the water. Scientists are very interested in knowing how this contributes to balancing greenhouse gases such as carbon dioxide in the atmosphere.

When these tiny organisms build their miniscule, but sophisticated, shells out of grains of sand they are also using an extremely effective underwater adhe-

sive. The foundation of the adhesive appears to be a protein, which in turn is heavily coated with sticky carbohydrates. The cells secrete the different components from distinct organelles into a membranous pocket, and then draw the composite into a sticky fiber. If the effort reveals the chemistry underlying the naturally produced glue, the research could lead to the development of stronger biological adhesives that could be a boon in fields as diverse as dentistry, neurological surgery and the development of artificial arms and limbs. ■

A SEM micrograph of a foramifera



Could a Net of Underwater Pipes Help Curb Global Warming?

Two of Britain's best known scientists proposed to curb global warming by sowing the world's oceans with thousands, perhaps millions, of giant vertical pipes

Water pumped up pipes—say, 100 to 200 metres long, 10 metres in diameter and with a one-way flap valve at the lower end for pumping by wave movement—would fertilize algae in the surface waters and encourage them to bloom. This would pump down carbon dioxide and produce dimethyl sulphide, the precursor of nuclei that form sunlight-reflecting clouds.

"Emergency treatment could come from stimulating the Earth's capacity to cure itself."

"We need a fundamental cure for the pathology of global heating," wrote James Lovelock, originator of the Gaia hypothesis that the Earth itself is a type of living organism, and Chris Rapley, director of the Science Museum in London, in a recent letter in Nature. "Emergency treatment could come from stimulating the Earth's capacity to cure itself."

"We thought a small scale test at a tropical island with a coral reef would do for a start," Lovelock told AFP. If that worked, the scheme could be extended to a larger area, such as the Gulf of Mexico, which might need 10,000 to 100,000 pipes at least 100 metres long. ■



Our World Underwater and Rolex Offer Scholarships to Youth

In April 2008, young people will be awarded one-year scholarships sponsored by Our World Underwater and Rolex. The grants are designed to help qualified individuals acquire experiences in a wide range of marine-related fields. With over 35 years running in the US, these scholarships are now available for a second year in the Australasian region (Australia, New Zealand, South Pacific islands) and have been available for seven years in Europe. From each of the three regions, one scholar is selected to work with leaders in the underwater fields in order to get hands-on experience in aquatic-related endeavors. For more information, see www.owuscholarship.org ■

New Educational Foundation Named After PADI Co-Founder

An educational foundation has been created in memory of the late Ralph Erickson, co-founder of PADI, who passed away in 2006. The newly formed organization reflects Erickson's dedication to diver education.

Erickson was a pioneer in diver education during a time when there were no rules and diving was considered an extreme sport for a few adventurous types. He revolutionized the industry with his ideas on dive education and the founding of PADI with his business partner, John Cronin. Erickson opened a PADI Instructor training Center with Patrick Hammer in 1987 where he continued to

educate divers until 1990, when he moved to Texas and lived with his family until his death in May of 2006.

The foundation was formed by Patrick Hammer and Karen Erickson. Its mission is to assist underprivileged divers begin their careers through a grant program. The founders believe that people with a passion for diving should have the opportunity to pursue their dreams despite financial difficulties.

For more information and application forms, visit www.reefoundation.org or mail: Ralph Erickson Educational Foundation, 16336 S. 104th Avenue, Orland Park, IL 60467 ■

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Picture courtesy by RICHARD NG (MIDE AMBASSADOR)



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SDI Recognized by RSTC Europe

SDI has formally been accepted into RSTC Europe. The vote to accept SDI into this prestigious organization took place at the RSTC Europe yearly meeting and was unanimous.

RSTC Europe (Recreational Scuba Training Council) was founded in 1994, and members affiliated with the organization include: ACUC, BARAKUDA, NASDS, PSS, SNSI, IDEA Europe, IDD, PADI and SSI. The influence of these member agencies covers all European countries as well as most of the Red Sea and the Maldives. The aim of RSTC is to support the diving industry and to present a professional forum that is both respected and recognized throughout the world of recreational diving. Members of RSTC Europe provide a non-prejudicial code of diver safety practices for governmental bodies working to improve diving and diver safety standards. ■

New Rebreather Training Organisation Offers Recreational CCR Courses

Rebreather Association of International Diving (RAID) is a new dedicated, e-learning oriented, recreational rebreather training programme intended to cover a range of rebreathers under one standardized system

In response to the lack of general and standardized recreational closed-circuit rebreather training programmes, RAID has instituted a set of minimum standards for education from Level 1 to Instructor Trainer. This has meant collaboration with manufacturers and obtaining agreements to minimum equipment conformity without jeopardizing innovation and safety. Divers, who have been trained in the unique and progressive RAID programme, will be able to comfortably and safely dive a closed-circuit rebreather from any of the accredited manufacturers.

Another need RAID identified is continued education for recreational closed-circuit rebreather divers. After open water training, there was nothing more provided unless you want to go the way of technical diving.

PADI Launches 2008 Go Pro Challenge!

PADI is once again inviting dive professionals to share their most compelling reasons for becoming a PADI Pro and challenging them to expand and share their dive knowledge through the launch of the 2008 Go PRO Challenge. PADI's Go PRO Challenge is one of several innovative marketing campaigns designed to increase business for PADI dive centers and resorts. As in 2007, there is a US\$10,000 worldwide prize. The Go PRO Challenge Testimonial Contest deadline is 15 September 2008. ■

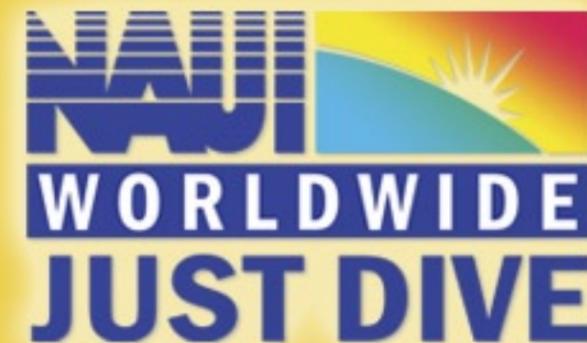
Consequently, RAID has taken the step to formulate a dynamic recreational closed-circuit rebreather training programme to embrace all levels, from beginners to Instructors. The programmes will provide for individuals who have never dived before, all the way through to an existing qualified rebreather and/or open circuit diver, from any of the recognized agencies.

RAID's electronic academic learning allows for flexibility and up-to-the-minute information, whilst at the same time providing practical, thorough training with a RAID Instructor.

So far, the following Closed-Circuit Rebreathers is RAID Registered:

- Poseidon Cis-lunar "Discovery"
- Ouroboros "Sentinel"

More info: www.diveraid.com ■



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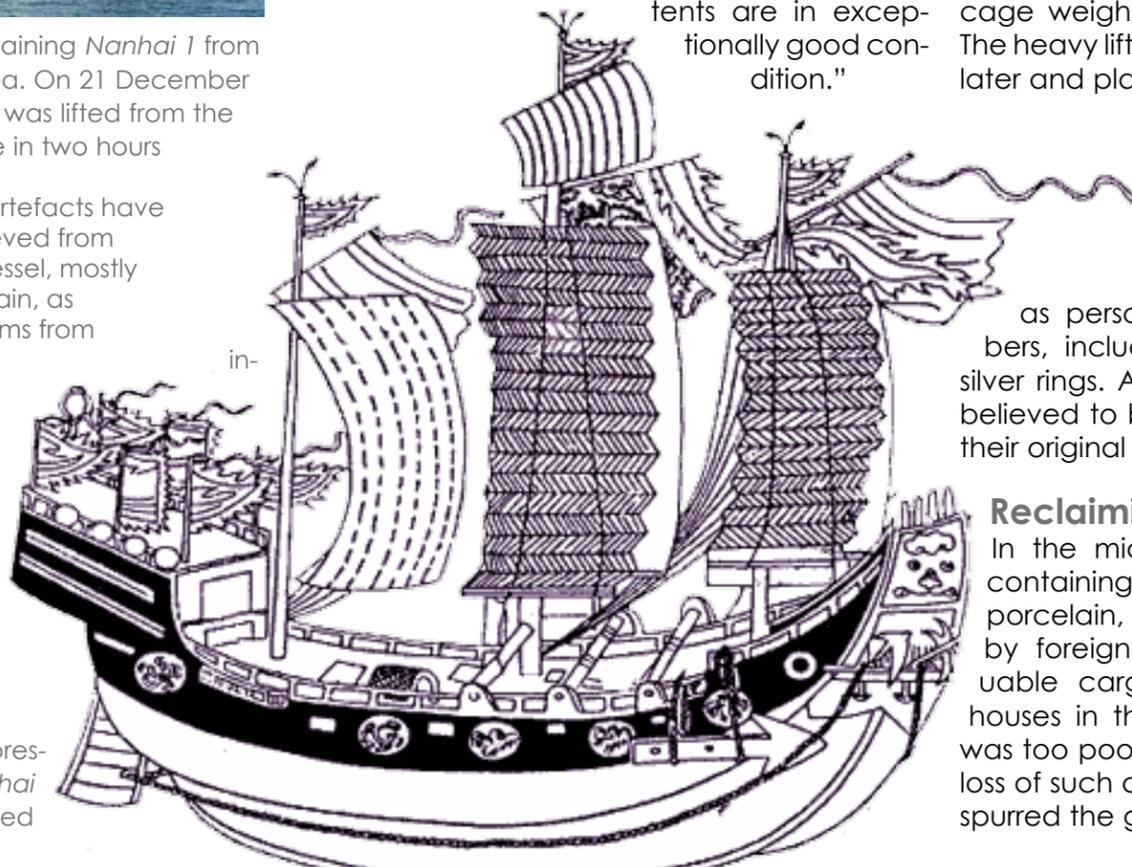
wreck rap



Ship lifts cage containing *Nanhai 1* from the South China Sea. On 21 December 2007, the *Nanhai 1* was lifted from the seabed by a crane in two hours

As many as 6,000 artefacts have already been retrieved from the 13th century vessel, mostly bluish white porcelain, as well as personal items from crew members, including gold belt buckles and silver rings. A further 70,000 artefacts are believed to be still on board, many still in their original packing cases

An artist's impression of how *Nanhai 1* may have looked



China's Guangdong provincial government has come up with a novel way of putting the *Nanhai* on display for the public—by building an underwater museum. Visitors will be able to view sections of the wreck, which, by virtue of its submersion, will not require the usual conservation techniques required to stabilise a structure exposed to air. The museum, thought to be the first of its kind in the world, will involve a five-hall layout costing an estimated £10 million. The museum is expected to open around mid-2008

Nanhai 1 now raised from South China Sea

Chinese archaeologists have raised a merchant ship that sank in the South China Sea 800 years ago while transporting a cargo of precious porcelain, gold and jewel exports. Dubbed the "Titanic of China", the *Nanhai 1* treasure ship, built during the Song dynasty that ruled China from 960-1279, is believed to contain one of the largest discoveries of Chinese artefacts from that period.

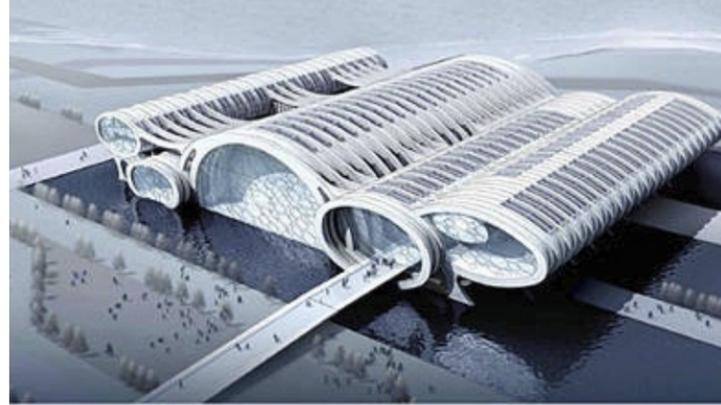
"It's the biggest ship of its kind to be found," said professor Liu Wensuo, and archaeologist from Sun Yat-sen University. "It lay in about 25m (82ft) of water and was covered in mud—perfect conditions for preservation. Both the ship and its contents are in exceptionally good condition."

The salvage team began building a massive steel cage around the 30m long vessel in May in order to raise it and the surrounding silt. The cage was made up of 36 steel beams, each weighing around 5 tonnes. Together with its contents, the cage weighed more than 3,000 tonnes. The heavy lifting was completed two hours later and placed on a waiting barge.

As many as 6,000 artefacts have already been retrieved from the 13th Century vessel, mostly bluish white porcelain, as well as personal items from crew members, including gold belt buckles and silver rings. A further 70,000 artefacts are believed to be still on board, many still in their original packing cases.

Reclaiming history

In the mid-1980s, a number of ships, containing enormous hoards of Chinese porcelain, gold and silver, were found by foreign treasure hunters. Their valuable cargoes were sold at auction houses in the West. At the time, China was too poor to bid for the artefacts. The loss of such an important part of its history spurred the government into action.



The artifacts will also give historians much-needed information on a time when China was trading with the world.

During the Song dynasty, most of the country's trade was with India and the Middle East. Later, that trade would shift westwards. "People often think of ancient China as being a closed society, but in the Tang and Song dynasties, China traded with the world—much like today," Professor Liu added.

The *Nanhai 1* will eventually be moved to a new purpose-built museum near Yangjiang in Guangdong province. The dramatic building—still far from completion—is being built on the beach. The ship will be stored underwater in a massive tank, in which the water temperature, pressure and other conditions will be identical to where it lay on the seabed, allowing visitors to watch as archaeologists uncover its secrets.

China has invested about US\$40 million in this project in the hope of reclaiming a part of the country's history and ensuring that, this time, it stays in Chinese hands. ■ SOURCE: CHINA INTERNET INFORMATION CENTER

Remains of an Ancient Civilization Discovered On the Bottom of a Lake In Kyrgyzstan

An international archeological expedition to Lake Issyk Kul has found evidence of an advanced civilization dating back 25 centuries.

The expedition resulted in sensational finds, including the discovery of major settlements presently buried underwater. Side by side with the settlements are remnants of ritual complexes of times immemorial, dwellings and household outbuildings.

Stunning finds

A 2,500 year-old ritual bronze cauldron was found on the bottom of the lake. The subtlety of its craftsmanship amazed archeologists. Such excellent quality of joining details together can, presently, only be obtained by metalwork in an inert gas. How did ancient people achieve their high-tech perfection?

Also of superb workmanship are bronze mirrors, festive horse harnesses and many other objects. Artifacts identified as the world's oldest extant coins were also found underwater in the form of gold wire rings used as small change and a large hexahedral goldpiece.

Lake Issyk Kul has played a tremendous role since the inception of human history due to its geographic location at the crossing of Indo-Aryan and other nomadic routes. The Great Silk Road lay along the lake's coast until the 18th century. Archeologists found traces of many religions here—Zoroastrianism, Buddhism, Judaism, Christianity and Islam. Somewhere in the vicinity was Chihu, the metropolitan city of a mighty state of Wusung nomads, which ancient Chinese chronicles mentioned on many occasions. ■



Edited by Peter Symes



INDIANA UNIVERSITY

Cannon believed to be part of the remains of a ship abandoned in the 17th century by Captain Kidd. The wreck remains were found off an island in the Dominican Republic



Captain Kidd's Ship Found

Indiana University team discovers 1699 Captain Kidd Shipwreck in less than 3 meters depth off Dominican island

Resting in less than 3 meters of Caribbean seawater, the wreckage of *Quedagh Merchant*, the ship abandoned by the scandalous 17th century pirate Captain William Kidd as he raced to New York in an ill-fated attempt to clear his name, has escaped discovery—until now. Historians differ on whether Kidd was actually a pirate or a privateer—someone who captured pirates. After his conviction of piracy and murder charges in a sensational London trial, he was left to hang over the River Thames for two years.

Historians write that Kidd captured the *Quedagh Merchant*, loaded with valuable satins and silks, gold, silver and other East Indian merchandise, but left the ship in the Caribbean as he sailed to New York on a less conspicuous sloop to clear his name of the criminal charges.

Howard Pyles classical illustration of William "Captain" Kidd relaxing on deck

Anthropologist Geoffrey Conrad, director of IU Bloomington's Mathers Museum of World Cultures, said the men Kidd entrusted with his ship reportedly looted it, and then set it ablaze and adrift down the Rio Dulce. Conrad said the location of the wreckage and the formation and size of the cannons, which had been used as ballast, are consistent with historical records of the ship. They also found pieces of several anchors under the cannons. "All the evidence that we find underwater is consistent with what we know from historical documentation, which is extensive," Conrad said. "Through rigorous archeological investigations, we will conclusively prove that this is the Capt. Kidd shipwreck."

An underwater archaeology team from Indiana University has been licensed to study the wreckage and to convert the site into an underwater preserve, where it will be accessible to the public. ■

Mazotos Shipwreck Surveyed

The Cypriot Department of Antiquities has announced the completion of the first underwater research project of the *Mazotos* shipwreck.

Its study is of great significance for the nautical and economic history of the Eastern Mediterranean, as it is one of the very few shipwrecks of the Classical period found in such a good state of preservation, the department said. The shipwreck seems to have been a commercial vessel of the Late Classical period (mid 4th century B.C). Part of the cargo of the ship lies on the sea bottom and consists of amphorae, most probably from Chios. No other ceramic types were identified for the time being or any other parts of the ship (such as anchors), but the spatial distribution of the amphorae may indicate that the hull of the ship is buried under the sand.

"The results will throw light on important research questions such as the commercial relations between the North Aegean and the South Eastern Mediterranean and the role of Cyprus in these transport routes during the last phases of the Cypriot city-kingdoms as well as on types and sizes of ships amongst others." ■



Depiction of a Greek trading vessel from the Classical period

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Ghost Ship Festival 2008

Ghost Ships Festival is a conference devoted to Great Lakes Scuba Diving and Maritime History. Exhibits, workshops, and presentations cover just about every aspect of maritime history and Great Lakes scuba diving.

Clive Cussler's Team to Speak

On Friday, March 7, nationally known and respected underwater archaeologists Ralph Wilbanks and Harry Pecorelli will share their amazing adventure of locating and raising *CSS H.L. Hunley*, the first combat submarine to sink a ship. *Hunley* was the South's "secret weapon," built to break the Union blockade of Charleston's harbor. On February 17, 1864, after sinking *USS Housatonic*, the Union's largest battleship, *Hunley* and her crew vanished. ■

The 9th annual Ghost Ships Festival takes place on March 7th & 8th, 2008 at The Wyndham Milwaukee Airport and Convention Center

Are Artificial Reefs Really Beneficial?

Artificial reefs provide a base for corals, sponges and other life to encrust, in time drawing the rich diversity of sea life for which coral reef ecosystems are renowned. But as such reefs have at times done more harm than good, concerns do linger as to whether artificial reefs are good for the oceans.

The creation of artificial reefs goes back to at least the 17th century in Japan, where fisherman built reefs with oyster shells to attract fish. The past 50 years have seen artificial reefs created on anything from obsolete oil rigs and decommissioned warships to junk such as tires and washing machines, and not all such reefs have proven boons to the

“Artificial reef thinking is getting more refined”

environment—some have proven ineffective or actually harmful. For example, tires dropped off the coast of Fort Lauderdale in the 1970s ultimately broke loose from their restraints, killing natural reefs as they drifted about. Other trash was simply unsuitable for making reefs—the enamel coating on washers and dryers, for example, foils growth.

“We’ve gotten smarter since then. We now know what materials to use to build artificial reefs,” says Mark Perry, executive director of the Florida Oceanographic Society. “We don’t want to just throw anything out there in the water—artificial reefs aren’t just dump sites.”

It is also important to make sure that artificial reefs are placed in a fairly stable environment and be outside of surf-pounding areas. “You want to avoid them getting moved about by wave action,” Perry said.

Not a replacement for the real thing

“Natural reefs are obviously still valuable,” Perry said. “You can’t just destroy a natural reef and put out an artificial reef as a replacement. Artificial reefs may help offset the growing worldwide loss of natural reefs a little bit, but they should not be the only answer.”

Another concern during many years was that artificial reefs would take fish away from natural habitat. “By concentrating fish all in one place and making them easier to catch, they may exacerbate issues of overfishing,” said Jack Sobel, director of strategic conservation science and policy at the Ocean Conservancy. But according to Perry, it has never really been proven that conflict or competition happens.

Artificial reefs may provide corridors of a sort, allowing smaller fish to safely migrate from one natural reef to another, instead of just

crossing a huge empty expanse where they might get gobbled up,” Perry explained. “I do think having artificial reefs is better than having just natural ones. There is possibly evidence that artificial reefs actually augment natural habitat areas as long as they’re not right on top of them.”

“Decommissioned naval vessels may take a long time to prepare, but once cleaned out, they provide a huge habitat, a lot of space for wildlife to live in there,” Perry said. Construction rubble is also often used, and relatively benign in and of itself.

In addition, artificial reef designers are even crafting materials into balls, pyramids and other precise shapes that may favor certain species “such as grouper or snapper,” Perry said. “Artificial reef thinking is getting more refined.” ■

Artificial reefs may help offset the growing worldwide loss of natural reefs a little bit, but they should not be the only answer

Warship to be sunk in the St. Lawrence River

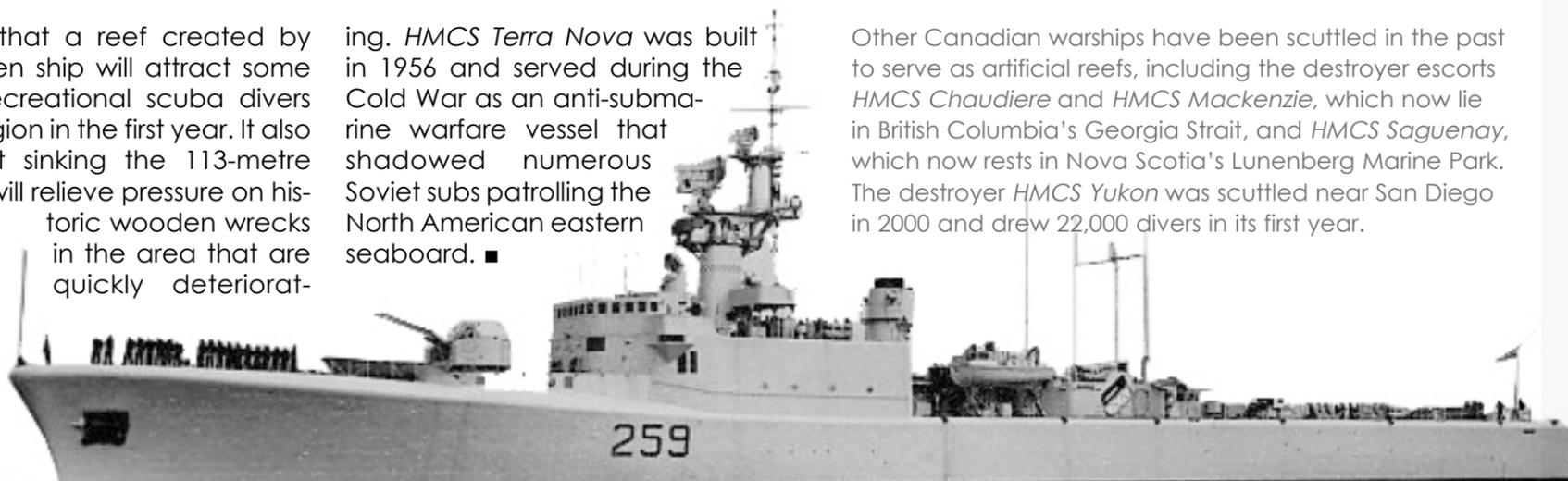
Canada: Plans have been unveiled today to sink an old navy warship in the St. Lawrence River to create an artificial reef for diving enthusiasts.

The Eastern Ontario Artificial Reef Association says it hopes to sink the decommissioned destroyer escort *HMCS Terra Nova* by late 2009. The proposed site is in the Thousand Islands region near Gananoque, east of Kingston. The association

expects that a reef created by the sunken ship will attract some 10,000 recreational scuba divers to the region in the first year. It also says that sinking the 113-metre warship will relieve pressure on historic wooden wrecks in the area that are quickly deteriorat-

ing. *HMCS Terra Nova* was built in 1956 and served during the Cold War as an anti-submarine warfare vessel that shadowed numerous Soviet subs patrolling the North American eastern seaboard. ■

Other Canadian warships have been scuttled in the past to serve as artificial reefs, including the destroyer escorts *HMCS Chaudiere* and *HMCS Mackenzie*, which now lie in British Columbia’s Georgia Strait, and *HMCS Saguenay*, which now rests in Nova Scotia’s Lunenburg Marine Park. The destroyer *HMCS Yukon* was scuttled near San Diego in 2000 and drew 22,000 divers in its first year.



Oriskany Boosts Local Economy With \$3.6 Million

A study by the University of West Florida indicates a US\$2 million annual economic impact on Escambia County from scuba divers visiting the *USS Oriskany*, the world’s largest artificial reef sunk off Pensacola in 2006. When the impact to Baldwin County, Alabama, is added, the economic impact increases to US\$3.6 million. The *Oriskany* generated more than 4,200 chartered dive trips during the year, attracting visitors from across the United States and abroad. ■

10-Acre Artificial Reef Proposed For Hawaii

The barren seafloor off the coast of ‘Ewa could become home to coral and other marine life if an artificial reef project is approved. The state is seeking a Conservation District Use Permit to create a 108-acre artificial reef offshore from the ‘Ewa district. The reef will be between the depths of 60 feet and 120 feet.

The artificial reef is intended to provide shelter and surface area that will improve marine habitat quality, prevent over-fishing and replenish overexploited fish species. ■

Florida: City of Jacksonville Lifts Moratorium On Creating Artificial Reefs

The Jacksonville City Council has approving 21 offshore sites that are suitable for man-made reefs. Most of them are artificial reefs that have deteriorated, said Jacksonville spokeswoman Kristen Key.

In 2000, Jacksonville imposed an administrative moratorium on artificial reefs after getting a complaint that oil may have been leaking from a sunken barge reef. The city took notice, even though a U.S. Coast Guard investigation showed no oil was coming from the reef. Due to public safety, liability concerns and a lack of oversight for the reef program, the city imposed the moratorium. ■





The Sevan trout (*Salmo ischchan*) is an endemic fish species of Lake Sevan in Armenia. It belongs to the genus *Salmo* of the salmon family (*Salmonidae*)

Diving Kazakhstan



When one thinks of Kazakhstan, diving doesn't exactly spring to mind. That honour falls to Borat, the clueless boorish reporter immortalized by Sacha Baron Cohen. However, this landlocked former Soviet Republic situated in Central Asia offers the unique experience of altitude diving. Resting at an altitude of 1600m and encircled by the lofty snow-clad peaks of the Tien Shan Mountains, Lake Issy-kul is the world's second-largest alpine lake after Titicaca in South America. Known as the "The Pearl of Central Asia", this enormous sheet of water measures 180km long and up to 70km wide. Despite depths plunging to 700m, Issy-kul translates as "Hot Lake" in the local dialect. Thermal activities, combined with mild salinity and a

unique microclimate, ensure that the lake remains ice-free in winter. Flowing into the lake are approximately 180 rivers of various sizes, providing a continuous supply of fresh water from nearby glaciers. Curiously, no water flows out.

As well as possessing sublime scenery, the area is also rich in history. Settlements were established as far back as the seventh century, when the region was part of the legendary Silk Road. Over time, they were eradicated by a combination of invading forces and rising water levels, but remains may still be seen underwater including ceramics, bronze cauldrons, ceramics and coins.

Dolphin Dive Club is a SDI TDI Facility in Kazakhstan. ■

More Marshall Islands Woes

Besieged with persistent mechanical difficulties, the Marshall Islands' grounded national airline may close the doors of the country's premier tourist destination. Bikini Atoll's renowned sunken World War II fleet attracts hundreds of divers annually, but the collapse of the national airline could deal the local diving industry a devastating blow. With bookings for the 2008 nearly full and the start of the diving season in February imminent, officials from Air Marshall Islands are growing increasingly concerned about the lack of progress in getting its planes airborne.

Last September and October, dozens of divers cancelled trips when the planes were repeatedly grounded with mechanical problems. Stranded groups of divers already at Bikini had to be evacu-

ated by ships. Officials confirmed that US\$700,000 is needed to repair the two grounded aircraft, but the cash-strapped government, already in default on an existing loan, is unwilling to inject more funds into the ailing airline.

With tourism from diving a major money-earner, the last thing anyone wants to see is more cancellations. "If this kind of misfortune continues into this upcoming dive season, our reputation, what is left of it, will be destroyed because of AML's inability to fly," stated Bikini dive official Jack Niedenthal. Despite all this, he remains optimistic. A charter aircraft may be brought in until the grounded planes can be repaired. However, he added, "If the government can't fund the airline, then it should get out of the airline business." ■

Thistlegorm reopened

After several weeks of conservation work, the Red Sea's famed *SS Thistlegorm* wreck is once again accessible to divers. The project, co-ordinated by the Hurghada Environmental Protection and Conservation Association (HEPCA), was set in motion to combat years of damage caused by thousands of dive-boat shotlines. In addition, trapped air bubbles exhaled by divers have also steadily contributed to vessel's erosion.



PETER SYMES

Aided by local dive operators and enthusiastic volunteers, 32 mooring lines and a number of air-escape outlets were added to prevent further damage. While an additional number of outlets are to be drilled in the near future, further closures of the site will not be necessary. Similar projects are in development for the *Rosalie Moller* and other wrecks. ■

The Prague-Ruzyně international airport will be the first to test a unique anti-terrorist device that is able to analyze liquids. Called the Emili 1, it was developed by a team headed by German scientist Norbert Klein at a research centre in Juelich, Germany. Utilizing microwave radiation, the detector is able to distinguish a liquid's composition, differentiating harmless beverages from acids and combustible substances.

After London's terrorist attacks in July 2005, European airports tightened security measures and banned passengers from taking liquids, creams and children's food in quantities

greater than 100ml aboard all aircraft. "If this identification system proves successful, it could be the first step towards the lifting of the current security measures,"

Prague airport security manager Stanislav Jonas told Prague's daily Lidove Noviny (LN). However, liquid restrictions would remain in effect during the test trial in Prague. A number of airports, including Tel Aviv and Dubai, have already expressed interest in the device.

In addition, Klein and his team are working on further modifications. A prototype hand scanner and a special pad that would be able to detect explosives and ceramic weapons in shoes might be completed as early as February. ■





NOAA National Marine Sanctuary Program Offers New Guide to Diving in America's Underwater Treasures

The NOAA National Marine Sanctuary Program has developed a colorful new printed guide and web page for scuba diving enthusiasts about diving in USA's 13 national marine sanctuaries, home to some of America's most spectacular underwater sights.

The new diving guide describes the wonderful world beneath the sea at each of the national marine sanctuaries, from the shipwrecks and nutrient-rich waters of Stellwagen Bank off Massachusetts to the

pristine coral reefs of Fagatele Bay in American Samoa. The brochure also offers tips on how to be a safer, more responsible diver by mastering buoyancy control, respecting marine wildlife, and how to volunteer for habitat monitoring activities in your local marine sanctuary.

Available in PDF format at <http://sanctuaries.noaa.gov/visit/diving.html>, the new guide can be downloaded and customized for use by dive operators and tourism companies to give their customers.

"NOAA's national marine sanctuaries have something to offer every diver, from the most experienced to the newly certified," said Daniel J. Basta, sanctuary program director. "We hope that all divers visiting our sanctuaries will want to join efforts to help preserve and protect these special places for future generations." ■

Via press release:

New liveaboard in Indonesia

Arenui Liveaboard offers different Indonesian cruise programs. Their new 37m long wooden vessel is just being built, and will raise its anchors in June 2008. The *Arenui* will touch not only all traditional sites but also destinations not yet reached by recreational diving tourism.

Cruise programs include Komodo, North and Central Sulawesi, Wakatobi and in particular, the new frontiers of Raja Ampat, Maluku, Cendrawasih Bay, Alor, Flores and Taka Bone Rate Atolls.

"*The Boutique Liveaboard*, the slogan of the *Arenui*, expresses our vision of simply providing maximum quality offerings in terms of diving and extra curricular activities, as well as exquisite accommodation facilities for our guests," says Luigi.

The *Arenui* guests, at a maximum of 18 passengers, will enjoy spacious cabins (minimum 17 square meters) which are furnished with inspiring handicrafts from each of the Indonesian provinces. Each diving group will not exceed six people, guided by divemasters. Cruises are planned with the intention to guarantee the most favorable weather conditions.

As for the food on board the *Arenui*, Luigi has this to say, "Our special daily a la carte menu presents wonderfully tasteful experiences for gourmet cuisine lovers. The boat also offers an Open Skydeck Bar in addition to other comprehensive leisure and recreational facilities such as on board spa, Internet connection, as well as an extensive selection of books and movies in a library/entertainment center."

Online bookings are open at launch price. Discounts for non-divers, groups and charters are available.

For further information:
www.thearenui.com
info@thearenui.com ■



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For more info and booking go to www.underwaterfestival.com.au



South Africa

CONSERVATION – Scuba diving prohibited

Inadequate law enforcement resources creates scuba diving bans. The South African government lapses to easy but unsustainable solutions to protect their marine environment.

By Arnold Weisz



A ban on scuba diving and snorkeling along most of South Africa's Cape coast has attracted a storm of criticism from the diving community. The Cape coast's recreational diving industry faces a shut-down as a result of the government's lack of ability to fight poaching. Anonymous law enforcement officers have told media that they don't have funds to police after office hours, hence leaving the coast free for

the poachers. The South African Environmental Affairs Minister, Marthinus van Schalkwyk, proposed a scuba diving ban in a further effort to protect the country's fast diminishing perlemoen (abalone) stocks. "The envisaged prohibition, subject to a process of public comment, will take effect from February 1, 2008," Department of Environmental Affairs spokesperson Mava Scott said.

Want to go diving today? Well, that is too bad. The zodiacs can't take you anymore



Diving ban—too drastic

Keeping divers out of the water is not always a good way to protect the environment, both the industry and conservation organizations agree.

"We've done nothing but promote environmental awareness. We're one of the few industries that makes our clients aware of the underwater environment. I can't see why the government is damaging our industry. It's a ridiculous ban," says co-owner of Dive Courses and Charters, Peter Labuschagne.

Also, one major environmental protection organization has reacted publicly with mixed feelings to the proposed diving ban in areas along most of the Western Cape coastline in an attempt to curb abalone poaching. WWF warns that such drastic measures could alienate one of marine conservation's most avid supporters, scuba divers and snorkellers. "Perhaps a middle way would be to permit diving only during daylight hours on weekends, when most recreation diving takes place. Such an arrangement would still assist in compliance, whilst also allowing scuba divers to appreciate the beauty of this area," says Dr Deon Nel, Manager of the WWF Sanlam Living Waters Partnership. ▶

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Mike Ball

A portrait of Mike Ball, a man with short hair, smiling and wearing a white t-shirt. He is holding a camera.

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A photograph of a diver in a colorful wetsuit swimming over a vibrant coral reef. The water is clear and blue.

www.mikeball.com

Battle for resources

The ban on all diving activities on the Cape coast is meant to save their fast dwindling abalone (*Haliotis midae*) population. Years of poaching have devastated South Africa's abalone population, more commonly known as perlemoen, with thousands of tons taken from coastal waters every year. South Africa hopes that many of the commercial fishermen affected will move to tourism-related industries. Addressing the South African media following a cabinet meeting, government spokesperson, Themba Maseko, said politicians had also approved a social plan to provide alternative employment opportunities for legal fishers of the shellfish.

Poor people battle for their everyday existence, and the need to protect the ocean's resources is creating more and more friction—not only in South Africa, but in most parts of the world. The people that actually harvest the marine life are often expendable pawns in an international trade that supplies the demand from the rich and wealthy—in this case, the South African abalone. The abalone is prized by gourmets, particularly in Asia, as a delicacy reputed to have aphrodisiac properties. ■

On a related note A worrismatic trend?

By Arnold Weisz

First line of defense

Although the diving industry in general by no measure has a 100 percent clean slate regarding protecting the environment, it has a self-interest in guarding our undersea environment. Laws and regulations have absolutely no effect if they are not enforced.

More often than not, a change of attitude and education are much more effective measures to protect the environment. Many countries regard scuba divers as their first line of defense against poaching and illegal harvesting of marine resources.

The Caribbean island of Bonaire has gone further than most in integrating scuba diving as a part of protecting the marine environment. The entire reef system around the island is a national park and has given this tiny Dutch island an identity. Their approach on environmental protection is a matter of national pride.

Sweden has had in effect for many years a total ban on any kind of fishing and seafood col-

lection by scuba divers. This has not deterred scuba diving. On contrary, it probably has had the opposite effect.

In Brazil, the environmental protection agencies are split on the matter. The State of Sao Paulo's environmental protection agency, Secretario Estadual do Meio Ambiente, wants organized scuba diving within state park boundaries. They also recognize the value of divers visiting the marine park.

"The fishermen stay out of the marine park when there are divers there. And if there is any illegal fishing, the divers will report this to us. As we can't be there 24 hours, seven days a week, divers are important in aiding us in protecting the park," says Julio Vellardi, park director at Laje de Santos State Marine Park.

The federal Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) wants to keep scuba divers out of the water in some places. IBAMA allows the Brazilian navy to use the Alcatrazes islands, a bit further north of Laje de Santos, for target practice, but has prohibited scuba diving! ■

New Zealand plagued by a series of diving accidents

Water Safety New Zealand (WSNZ) is now urging people to take more care while diving during this holiday season following a series of recent diving accidents in the Bay of Plenty, resulting in several fatalities and injuries.

Already a year ago, the police of Wellington issued an article encour-

aging people to practice safe diving habits. Then, Water Safety New Zealand statistics showed that five scuba divers and one snorkeler drowned in 2005 in New Zealand waters. Between January 1996 and December 2005, 47 people drowned in scuba diving accidents and 20 in snorkeling accidents. In 2006, three

people died while diving before the end of April. The industry standard of New Zealand says that all divers should have a medical exam before embarking on a diving course. The New Zealand Underwater Association (NZUA) website provides information on medical conditions in relation to diving. www.nzunderwater.org.nz ■



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Tradition, culture & vibrant reefs

Tawali

Text by Andrey Bizyukin
Photos by Andrey Bizyukin,
Wulf Koehler, Nikolay Ivanov

ANDREY BIZYUKIN

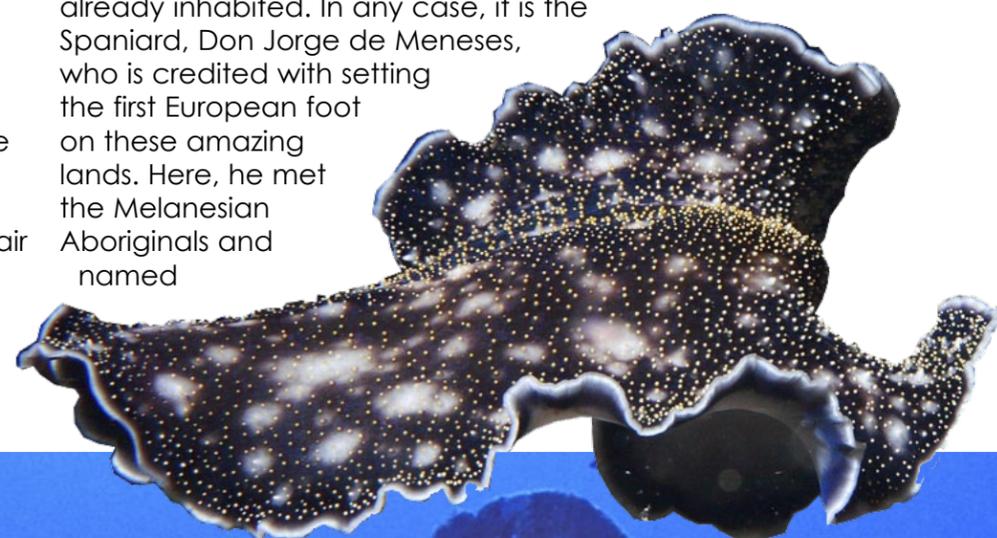
CLOCKWISE FROM LEFT: Cuttlefish; Spanish dancer; Black Jack aircraft from WWII; Nudibranch



After that ordeal, it was a relief to arrive in Port Moresby—the capitol of our dream destination—and take our first deep breaths of warm and moist tropical air. Looking around, we noticed that everyone except us were very dark-skinned, yet had what appeared to us to be distinct Russian features—the same noses, eyes, lips and expressions as some of our relatives and friends, just with more curly hair and darker skin. The sense of kinship made us feel right at home.

Papua New Guinea is the largest island in the world, second only to Greenland, and the Europeans discovered it in 1526—if

you can even say that about an island which was already inhabited. In any case, it is the Spaniard, Don Jorge de Meneses, who is credited with setting the first European foot on these amazing lands. Here, he met the Melanesian Aborigines and named



NICK IVANOV

WULF KOEHLER

“You want to go to Papua New Guinea?” The question was posed with marked surprise during our visit to the Australian Embassy, which looks after the interests of Papua New Guinea in our country (Russia). “You’ll need at least one and a half

for your intended departure.” Naturally, we were aghast with such a reception from an official representative who should really be happily promoting the destination, but that didn’t stop us. Being possessed of a sense of camaraderie with the great travellers and explorers

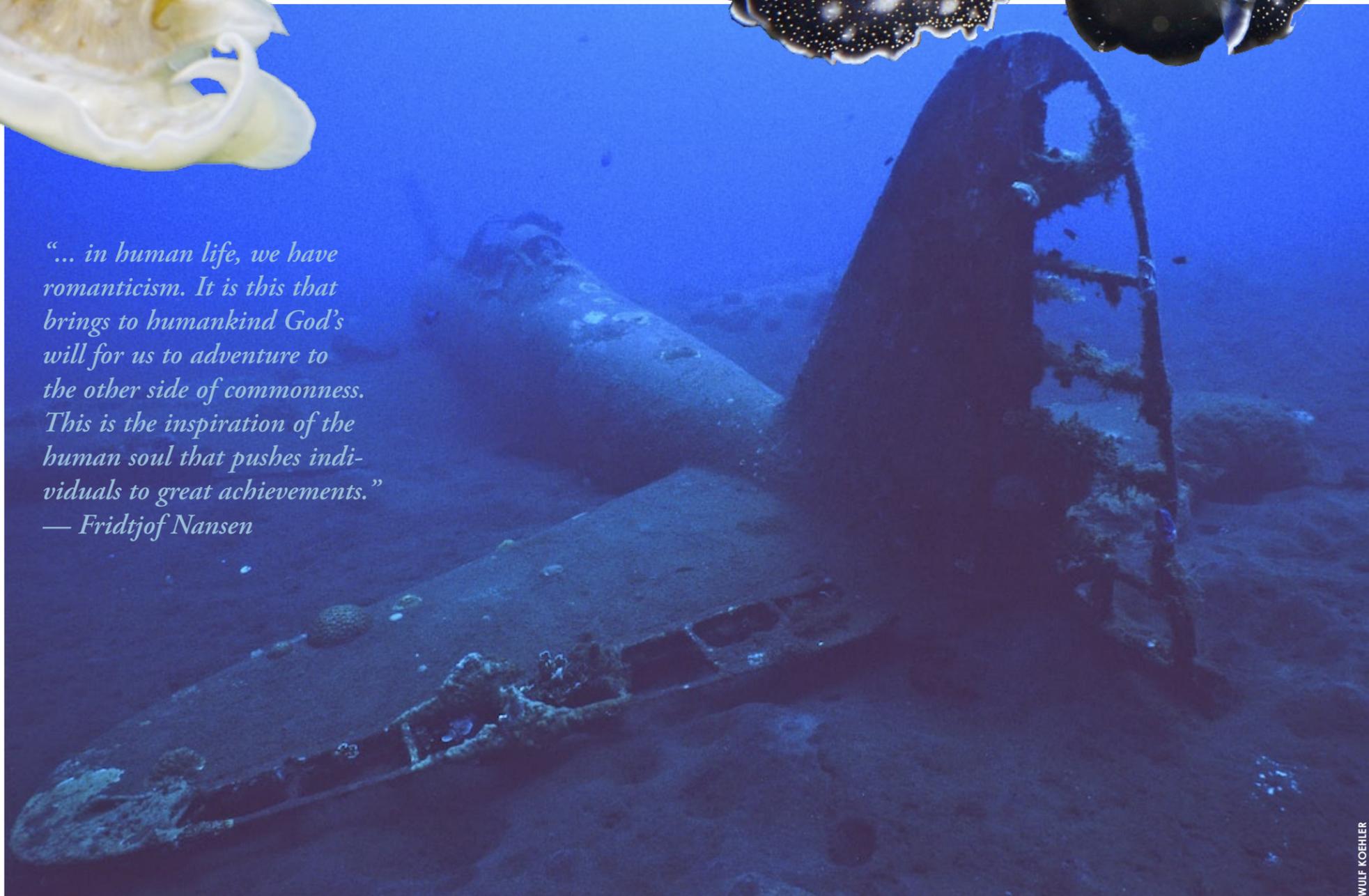


WULF KOEHLER

Nudibranch mounts a tunicate

of the past and a persistence only Olympic champions share, we managed to cut through all the red tape and bureaucratic obstacles to, by the end of it all, make it to Papua New Guinea on time.

“... in human life, we have romanticism. It is this that brings to humankind God’s will for us to adventure to the other side of commonness. This is the inspiration of the human soul that pushes individuals to great achievements.”
— Fridtjof Nansen



WULF KOEHLER

the island after their curly hair. Its present name, Papua, comes from the Melanesian language in which *papuwah* means curly-headed. Much water has passed under the bridge since the day of Jorge de Meneses, but scientists still refer to Papua New Guinea as a garden of Eden. There are more than 11,000 species of plants, 600 species of birds, 400 species of amphibians and about 100 known species of mammals.

As recently as 2005, scientists venturing into the jungle—which is still completely isolated from the rest of the world—found 20 new species of amphibians, four new species of butterfly and five new species of palm trees. The researchers also found a new rhododendron with huge flowers, an unique species of marsupial (a golden tree kangaroo), a long nosed echidna, and rediscovered Berlepsch's six-wired bird of paradise, which was believed to be extinct. It is the real "lost world" of Arthur Conan Doyle.

ANDREY BIZYUKIN



There are no species of ape and monkey on the island but the biodiversity is profound and still intact.

More than a thousand Papua-Melanesian tribes speaking 800 local languages live here, too. It was actually in Papua New Guinea that, more than 10,000 years ago, land was first cultivated. Long before the ancestors of the present day

Europeans took to agriculture, Papuans knew how to grow taro roots with which they are still cooking the local dish *Mu-mu*.

The capitol of Papua New Guinea, Port Moresby, is, according to statistics on crime, one of the three most dangerous cities in the world. But for us, who survive the daily life of Moscow, nothing seems out of the ordinary.

The abundance of Papuans with stylish multicoloured wardrobes and the appearance of having bloody mouths (like they have just drunk blood)



Tawali

NICK IVANOV

LEFT TO RIGHT: Exotic tribal ritual, school of Barracuda, detail close-up of Spotty shark (inset)... Great biodiversity is everywhere, underwater and on land

gave this marvellous place a very exotic tone. But Papuans are very friendly. From children to old people, they favour chewing betel-nuts, which is lightly narcotic stimulant causing them to salivate, which causes this appalling red colouration.

The first Russian to make a landing on the coast of Papua New Guinea was Nikolay Mikluho-Maklay who arrived aboard the vessel *Vityas* in 1870. Prior to his trip to Papua, he worked as a marine biologist in the Red Sea where he conducted research on corals, sponges and sharks. And like many modern-day divers who often go to the Red Sea, he came to a point where he would like to see something different. So, he decided to set out on a new adventure

heading an expedition to what was then the most distant point from modern civilisation—Papua New Guinea.

This Russian traveller, who had curly hair himself, was fascinated with the Papuan land and the Papuan people from the moment he first set foot on shore. "Papuan's caresses are very different," Maklay noted after his first night with a black island woman.

Maklay wrote in his field notebook: "The Papuan women have smooth skin with a light-brown hue. Their hair is thick and



Eye of a shark

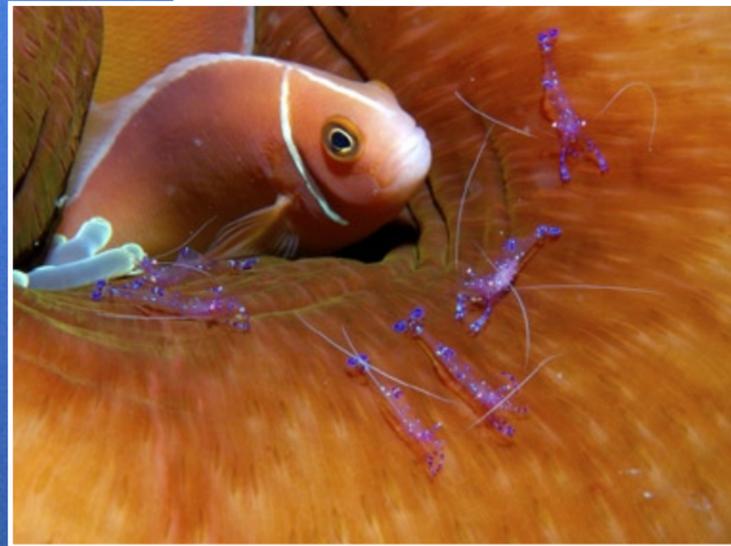
WOLFF KOEHLER

black from nature. Their eye-lashes are long and beautifully curved. Breasts of young girls are conical in shape

and stay small and pointed until their first breast feeding, and their buttocks are very well developed. The men like it very much if their wives wriggle their back parts as they walk in such way that one of buttocks should move to a side exactly with each step.



PNG saw some heavy battles during WW2. Diver explores the wreck of what seems to be Japanese Zero fighter plane



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Anemonefish are usually aggressively defensive about their host anemone but this one doesn't seem to mind the presence of commensal shrimp (probably *Periclemenes Holthuisi*) which may act as a cleaner

“Here is some Russian spirit.”

Not surprisingly, the Papuans actually tried to kill the Russian traveller at first, but after a while, they took to him. He decided to help the Papuans by providing medical treatment, offering the Papuans metal objects and giving useful advice. According to tales passed down through the generations, Maklay told the Papuan forefathers that stone axes were not sharp, but blunt, and were best thrown away into the forest. Replacing the stone tools, Maklay gave them iron knives and axes. He was the white Papuan who came to be known as the “Tamo-russ”, the Russian, or “Karran-tamo”, the man from the moon.

This happy travelling tale of Mikluho Maklay reflects how the semblance between Russians and Papuans still benefits Russian travellers in Papua New Guinea today. It is in stark contrast to some rather unfortunate events that happened to less fortunate missionaries in the past.

Some old Papuans still talk about the tale of “the inedible feet of white people”. In the beginning, Papuans met cordially with missionaries, but later, they decided to kill them. Missionaries were stabbed to death with spears and eaten in order for the Papuans to take over their force, wisdom and power. It was the first time that Papuans, who



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Big eye squirrel fish poses in front of a backdrop of ...how many nudibranchs are there? We still spot new ones in this image

never used shoes, cooked white people. But the Papuans didn't remove the white people's shoes first. Most parts of the cooked white people seemed tasty enough—except their feet. The Papuans couldn't chew their way through the shoes. It was just not possible. Later, the older and wiser Papuans taught the younger ones how to prepare white people in a tasty way.

The journey to Tawali

It took just one hour with a small Fokker commuter plane completely filled with divers mixed with Papuans, to take us to Alotau on the eastern part of Papua New Guinea. Another one and half hours of land transport followed taking us out on dirt roads across the jungle on shaky, one-way bridges over wild rivers and past fragile aborigine houses, lit by open fires and kerosene lamps.

We moved still further into the countryside. We then arrived at a landing stage on a deserted beach below the dense jungle and were taken aboard our next form of transport. Six miles more on the night sea and finally we moored in a cosy bay of Tawali. The



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Crab-eye goby illustrates how confusing or intimidating false eyespots can be



Spirit of Nuigini dive safari boat operates out of the Tawali resort

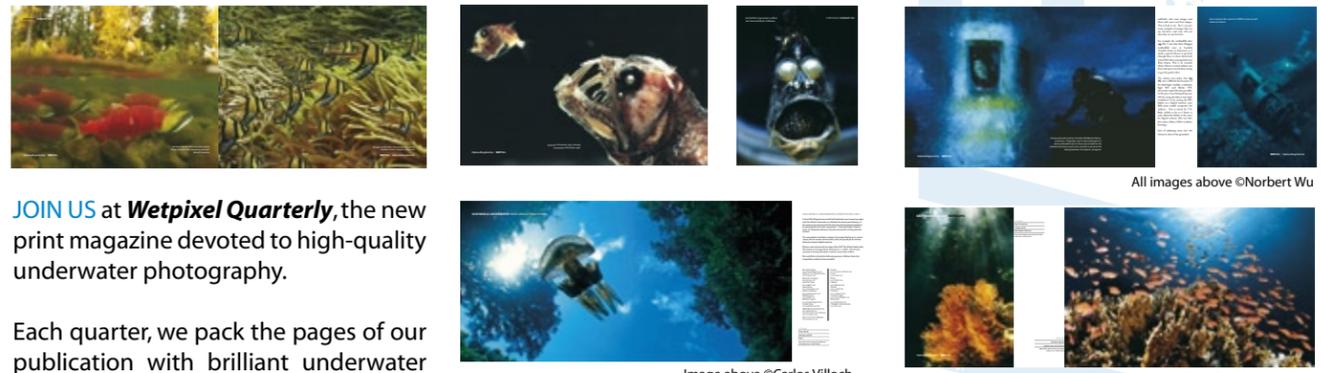


Cover image © Magnus Lundgren

The first edition of Wetpixel Quarterly is nothing less than stunning!
Over the years I have concentrated on cine and video. Your remarkable — almost overwhelming — portfolio of still photography makes me realize what I have missed. The impact, range of subject, color saturation and virtually all other visual factors transcends any range I can now create with video. And the collection in one publication of World Class stills is unprecedented. Keep up the flow of pure gold. Your beautiful publication is an honored keeper in my library.

P.S. And the above is no B.S.

Stan Waterman
Pioneer underwater film producer and photographer



All images above ©Norbert Wu

JOIN US at *Wetpixel Quarterly*, the new print magazine devoted to high-quality underwater photography.

Each quarter, we pack the pages of our publication with brilliant underwater imagery from both professional and amateur photographers around the world.

Image above ©Carlos Villoch

Images above ©Gary Tan Yew Hin (left) and Giordano Cipriani (right)

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Close but not too close, please. An epaulette shark keeps an wary eye on the approaching diver



Yellow sponges light up the reef

ANDREY BIZYUKIN

Tawali underworld

It is finally time for our first dive: We take a giant stride off the side step of the boat and immerse ourselves in the deep blue unknown sea around us.

Visibility is about 20 meters. We were told us that normal visibility should be around 30 meters.

We descended along rocks covered with huge sponges in all shapes and sizes. It is not necessary to drop down into the alluring abyss—all the underwater attractions are found in depths shallower than 40 meters.

There are plenty of canyons and underwater caves between the reefs and rocks. Corals, sponges and fishes like

The mouth of a giant clam looks like an abstract artwork



WULF KOEHLER

owners of this place—the two famous underwater photographers, Bob Hollis and Rob Vanderloos, came out to greet us.

“Tawali means ‘reef’ in the local language,” they started to explain. “We came here a few years ago. It was a quiet bay set in a framework of limestone rocks mixed with basalts covered by primordial jungle. We were instantly charmed by the beauty of this amazing place. And when we dived here, we realised, being underwater photographers, that we had stumbled across a rare treasure. The biodiversity, concentration and size of the underwater life and animals were unique and astounding. We had not seen such miracles anywhere else. That was why we decided to build our hotel exactly on this spot, even if it is so remote, far from civilization.”

Two hundred people from the local villages worked a full year to build this miracle of wooden architecture. Houses on poles rise out of the tropical bush. Local colouring and creative components of the Papuan spirit and the local tribes are reflected abundantly in the magical wooden sculptures. There are huge sea crocodiles, wooden masks and canoes. And the tribes’

totems on the columns protect Tawali’s guests.

There is a spacious hall for guests, pictures on the walls, and all the rooms are equipped with all the modern conveniences as well as cosy balconies, which overlook the peaceful bay. There is even a satellite dish and Wi-Fi for connecting to the outer world if you so desire. It is like a white man’s dream of a tropical paradise for which reason Rob decided to become a Papua New Guinea citizen and completely devoted himself to Tawali.

Diving

Diving in Tawali takes place from the comfortable day boat *Tawali Explorer*, which is equipped with a big dive deck six meters wide. It is a genuine ocean-

going vessel, fast and steady on the ocean swells. We ordered Nitrox fills for our cylinders and a big tank of fresh water for our underwater cameras. Diving is excellent everywhere in the bay, in the open ocean, in the strong currents as well as close by the local rocks where you can find a virtual fish soup of sharks.



Down “Luxurious daily dive boat Tawali”





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to hide there. We blind them with our bright LED torches while taking our first shots.

It was really spectacular to get into one of the caves and watch from the inside how the sun rays played with the light and shadows around the cave entrance.

We appreciated the splendid organization of the diving and the extra attention given to the underwater photographers from the first day.

The dive guides not only followed us discretely, but they also pointed out to us the most interesting inhabitants of the sea. We were given the

optimal opportunities to focus on exposure and picture composition. This enhanced our photographic effectiveness on each dive many times over.

I don't recall any other trip where it was possible to take so many great shots. All the photographers

were delighted with the photographs they took and what they saw on their dives.

The many woes that have affected coral reefs in other parts of the world seem not to have affected Papua New Guinea yet. In Tawali, it seems appropriate not to speak just of coral gardens but of coral jungles. "There is a jungle both above and below the surface," was the spontaneous delightful comment of my dive buddy. It is not like a "fish soup" either, but more like a "fish stew".

It is a common belief that Papua New Guinea is a paradise for macro photographers. There is an abundance of nudibranchs and worms of every imaginable colour and size, brightly coloured prawns in rainbow drapes, pygmy sea horses, tiny gobies, crawfish and many other charming creatures many of which are species new to science.

But Tawali is also the place for connoisseurs of big pelagics. You can dive in the strong currents and feed sharks in open seas—just don't forget to mount your wide-angle lense.

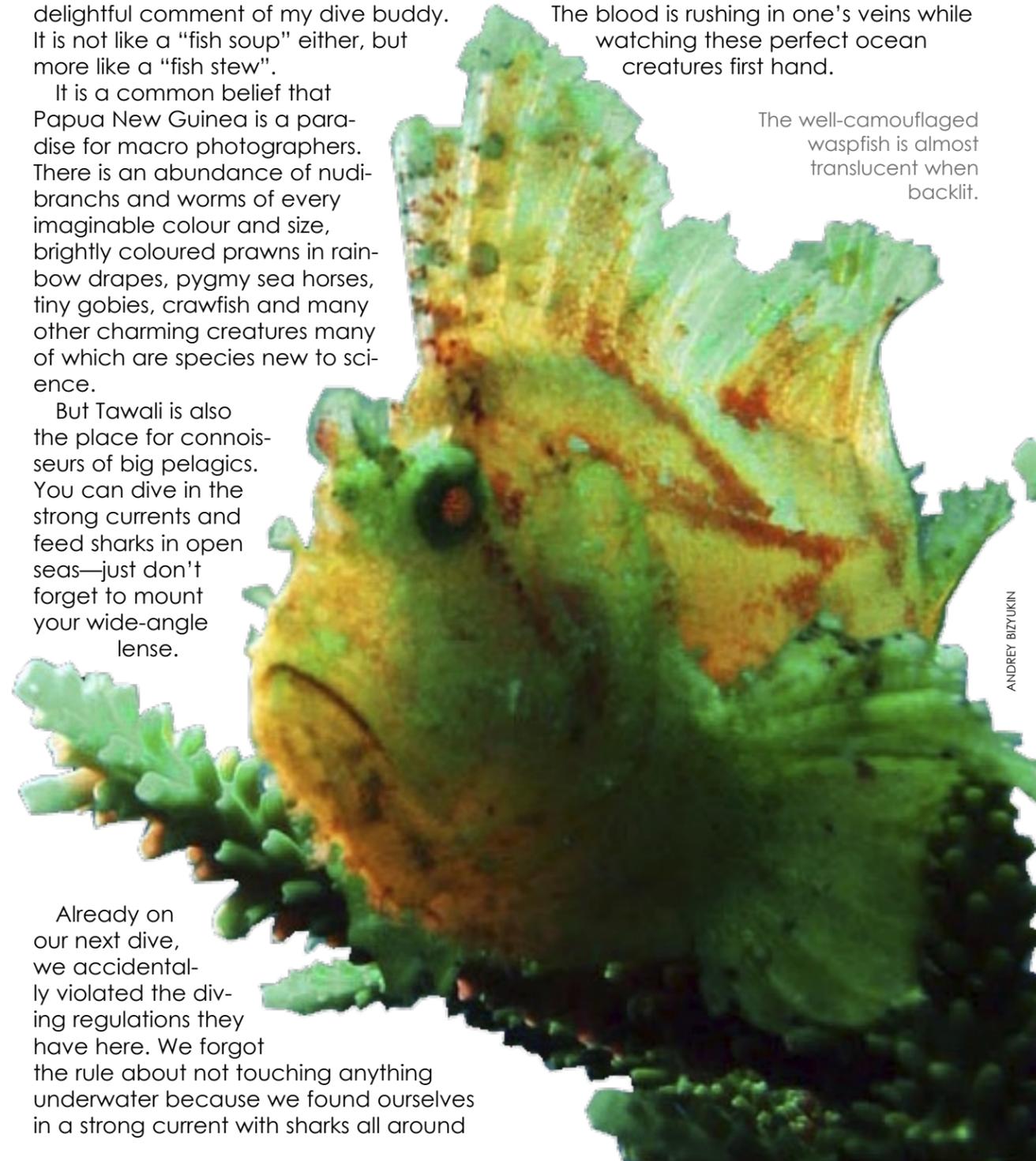
Already on our next dive, we accidentally violated the diving regulations they have here. We forgot the rule about not touching anything underwater because we found ourselves in a strong current with sharks all around

us and had little choice than to cling onto a head of corals while we, in a mixture of horror and exhilaration, watched the sharks in a feeding frenzy.

Our adrenaline levels went off the charts, and all the problems in the world were suddenly put into a new and different perspective. There is nothing like a little excitement to clear your mind.

The blood is rushing in one's veins while watching these perfect ocean creatures first hand.

The well-camouflaged waspfish is almost translucent when backlit.



ANDREY BIZYUKIN

“We got food from boiled taro. I asked: Do local people use special tapir (Papua New Guinea plates) for human meat. They said no. They told me that human meat was boiled in the usual pots and given to guests in the same tapirs. And only because they offered me no meat today, was I sure that this was not human”
—Nikolay Mikluho-Maklay

It was an unique experience that will stay with us forever. Diving with sharks is the pinnacle of diving, and we were happy to participate in this underwater show in the Papuan sea.

Bob and Rob told us that one famous photographer from National Geographic called Tawali one of the best dive sites of the world, and he did most of his shots just at one dive site less than 15 minutes from the hotel. Therefore, the next day we decided to head for this “famous” dive-site, which was close to a cracked rock.

The underwater landscape was made up of rocks that had rolled down on a shallow sunlit plateau with a vertical reef wall divided by canyons. Only half an hour into the dive we came across a plethora of different forms of



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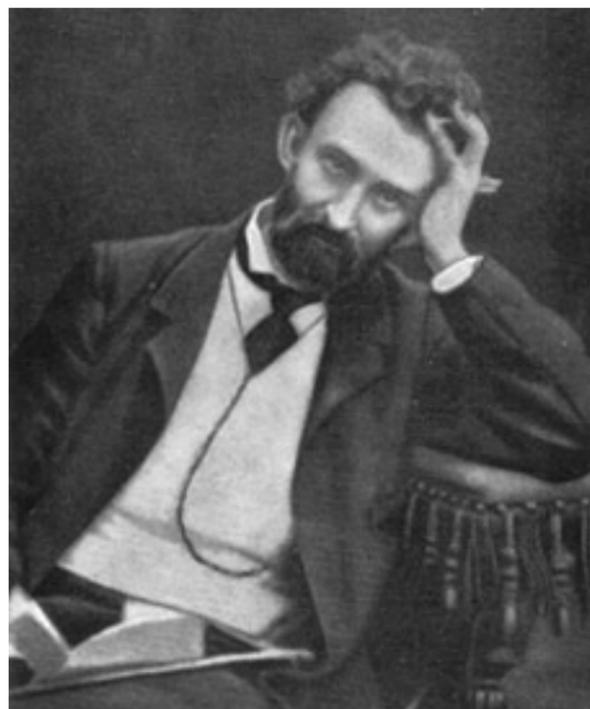
ANDREY BIZYUKIN

ANDREY BIZYUKIN





Nikolay Miklukho-Maklay (1846-1888) first came to Papua New Guinea in 1871 and he returned to New Guinea island four more times. His ethnographic and anthropological experiment was unique for the time. Even now some people of the Bay of Austrolabe on Maklay Coast use Russian words such as *topor* (axe)!



underwater landscapes and unique photo subjects ranging from macro to wide angle.

We saw nudibranchs, turtles, a school of barracudas, huge groupers, fascinating anemones, grottos and canyons, fire corals, fans and the biggest gorgonia I have ever seen, about five meters in diameter. This was sheer and undiluted pleasure.

What places Tawali in a league of its own is the closeness and availability of so many astounding dive sites, which will satisfy the ambitions of even the most demanding diver. Here, the photographer will find both the understanding of the photographer's requirements and the advantage of a comfortable hotel combined with a good safari boat. There is no need to spend all your time, day and night, out on a stormy sea. All the various dive sites are within comfortable reach with a day boat. And in the evening, after an exciting dive day, it is good to have a rest on land, review your shots and discuss tomorrow's plans in the comfort of a 5-star hotel located in a jungle on the edge of civilization.

WOLFF KOEHLER

Tawali



ANDREY BIZYUKIN

FAR LEFT AND ABOVE: Skull caves

The jungle

To come to Papua New Guinea and not visit the jungle would be like just lying on the sofa and watching an adventure channel on TV. Surely we had to go into the real thing and see the jungle life and people with our own eyes.

Since the beginning of time, Papuans were cannibals and fought to get human meat for cooking. Skulls of killed and eaten enemies were kept in the victors' houses, to protect the living from ailments

and disasters. Cannibalism was outlawed by the government about one hundred years ago. Although, from time to time, some travellers who are just a little too adventurous or brave for their own good, disappear in the local mountains. But incidences like these are quite rare.

Jungle inhabitants now hide skulls in caves, and for 30 kina, you can visit one of these caves close to Tawali. It is a huge dark cavern with stalactites and about 500 skulls stacked in several heaps. Our guide picks up the skulls without a second thought and poses for the



ANDREY BIZYUKIN

Japanese tank—a reminder of the Japanese occupation during WWII



The dive boats offer comfortable rides and spacious dive platforms

Contrasts meet. The delicate structure of a tunicate versus the brute muscular power of a patrolling reef shark

Welcome to the beautiful Tawali world!

A true mood-enhancer. Pod of playful wild dolphins adds to the local bright and cheery hospitality

camera as if there was nothing to it. Some of the skulls have holes testifying to the sudden and brutal death of the previous owner. A blunt force trauma is the term I think is used for this type of death in modern forensics.

The guide tells us that cannibalism is already history, but local people still discretely remove skulls and take them back to their houses. Old ways die hard, and apparently some traditions still exist. They do it to find protection against all sorts of disasters, protection in the remains of enemies killed by their courageous ancestors perhaps hundreds of years ago.

After a couple of days of very delightful diving, we sat on the porch

with Bob Hollis and Rob Vanderloos enjoying the vista of a fiery sunset, comfortably seated with a glass of Australian wine in hand, and watching

“The Papuans are staying close to my partly destroyed shack, fearing ‘Tamo-russ’ (Russian people) ... they call to me from afar their last ‘Emme-me’ and ‘E-aba-e’; and when the clipper moves further away, the beating of the ‘barum’ (big drum), informs the villagers that the man from the moon has left Papua” — Nikolay Mikluho-Maklay

the Southern Cross rise up on the night sky. Bob told us about his big plans to open a facility for technical diving and rebreather classes, which would be the first on Papua New Guinea. But first of all, they were going to pay special

attention to getting the best underwater photographers of the world here, which is why he is going to start providing the servicing of underwater housings in Tawali.

We came out of the jungle back to the sea. A big group of about 30 dolphins came to meet us. It seemed like they were very enthusiastic and welcoming and wanted to see us off. We took our last shots and prepared ourselves mentally for our long journey back to civilization on the opposite side of the planet, which now lies ahead of us. It is time to rush to the aircraft. But the dolphins don't have to be in a hurry; they can play endlessly in the wonderful coastal waters off Tawali.

If you are coming this way and visit

Tawali, you will probably be pleased to know that Papua New Guinea airlines permit divers an extra 15kg in luggage. But at the same time, they will probably cancel a flight or remove your booking for at least one leg of the journey, and for an indefinite time, lose your luggage.

But don't get too worried about these trivialities. A journey to Papua New Guinea is a great adventure, which leaves nobody indifferent. It is better to take these small problems in stride than to forsake what is possibly one of the few remaining opportunities to dive in a magical underwater world in one of last frontiers between truly wild nature and modern civilization, which seems to be destroying everything. You won't regret it, and you will never forget this romantic journey. ■



fact file



Tawali



SOURCE: US STATE DEPT & WORLD FACT BOOK AT WWW.CIA.GOV

History Archeologists have found evidence that indicates the arrival of humans on New Guinea about 60,000 years ago, most likely by sea from Southeast Asia during an ice age when distances between islands was shorter. Most likely, the first Europeans to site New Guinea were Spanish and Portuguese navigators sailing in the South Pacific in the early 16th century. Don Jorge de Meneses accidentally found the main island in 1526-27. He is credited with naming it "Papua," after a Malay term for the curly hair of the Melanesians. In 1545, a Spaniard, Íñigo Ortiz de Retes, applied the term "New Guinea" to the island because he thought the islands' people looked similar to those found on the African Guinea coast. Europeans continued to explore the islands and their coastlines for the next 170 years. In 1885, the eastern half of the island of

New Guinea which is the second largest in the world, was divided between the UK (south) and Germany (north). The UK's area was transferred to Australia in 1902. In World War I, Australia occupied the northern region and continued to administer the combined areas until independence in 1975. In 1997, some 20,000 lives were claimed by the end of a nine-year secessionist revolt on the island of Bougainville. Government: constitutional parliamentary democracy with legal system based on English common law; PNG has not accepted compulsory ICJ jurisdiction. Capital: Port Moresby

Geography PNG is made up of a group of islands in Oceania. It includes the eastern half of the island of New Guinea east of Indonesia, between the South Pacific Ocean and the Coral Sea. It shares the island of New Guinea with Indonesia and has one of the world's largest swamps along the southwest coast. Its area is slightly larger than California. Coordinates: 6 00 S, 147 00 E. Coastline: 5,152 km. Terrain: mostly mountainous with rolling foothills and coastal lowlands. Lowest point: Pacific Ocean 0 m. Highest point: Mount Wilhelm 4,509 m

Climate tropical; northwest monsoon takes place in December to March; southeast monsoon

takes place in May to October; there are slight seasonal temperature variations. Natural hazards: active volcanoes; PNG is situated along the Pacific "Ring of Fire"; frequent and sometimes severe earthquakes; mud slides; tsunamis.

Environmental issues deforestation of rainforests as a result of growing commercial demand for tropical timber; pollution from mining; severe drought. PNG is party to the following agreements: Antarctic Treaty, Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Environmental Modification, Hazardous Wastes, Law of the Sea, Marine Dumping, Ozone Layer Protection, Ship Pollution, Tropical Timber 83, Tropical Timber 94, Wetlands

Economy Papua New Guinea has an abundance of natural resources, but rugged terrain and the high cost of developing infrastructure has hampered development. 85% of the population practice agriculture subsistence living. Mineral deposits provide almost two-thirds of export earnings. That includes copper, gold, and oil. The government of Prime Minister SOMARE, the first prime minister ever to serve a full five-year term, occupies itself with remaining in power. While it has brought stability to the national budget mainly through expenditure control, the

government relaxed spending constraints in 2006 and 2007 as elections approached. Challenges facing the government include regaining investor confidence, restoring integrity to state institutions, promoting economic efficiency by privatizing moribund state institutions, and balancing relations with its former colonial ruler, Australia. There is also a worsening HIV/AIDS epidemic and chronic issues in law and order and land tenure. More than \$300 million in aid will come from Australia in FY07/08. This accounts for nearly 20% of the national budget. Natural resources: gold, copper, silver, natural gas, timber, oil, fisheries. Agriculture: coffee, cocoa, copra, palm kernels, tea, sugar, rubber, sweet potatoes, fruit, vegetables, vanilla; shell fish, poultry, pork. Industries: copra crushing, palm oil processing, plywood production, wood chip production; mining of gold, silver, and copper; crude oil production, petroleum refining; construction, tourism.

Population 5,795,887 (July 2007 est.). Below poverty: 37% (2002 est.). Ethnic groups: Melanesian, Papuan, Negrito, Micronesian, Polynesian. Religions: Roman Catholic 22%, Lutheran 16%, Presbyterian/Methodist/London Mis-

sionary Society 8%, Anglican 5%, Evangelical Alliance 4%, Seventh-Day Adventist 1%, other Protestant religions 10%, indigenous beliefs 34%. Internet users: 110,000 (2006)

Languages Melanesian Pidgin serves as the lingua franca, English spoken by 1%-2%, Motu spoken in Papua region. There are 820 indigenous languages spoken in PNG, which is over one-tenth of the world's total.

Telephone services are not widely available; fixed-line and mobile-cellular telephone density is less than 3 telephones per 100

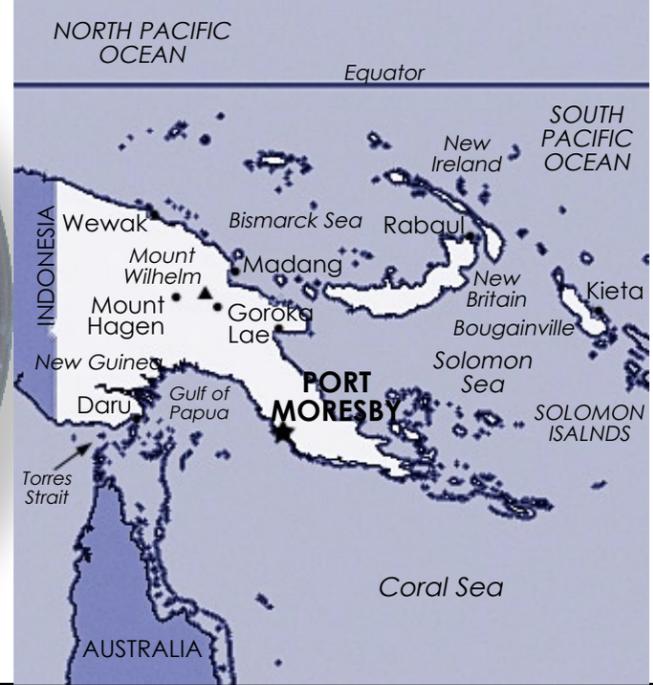
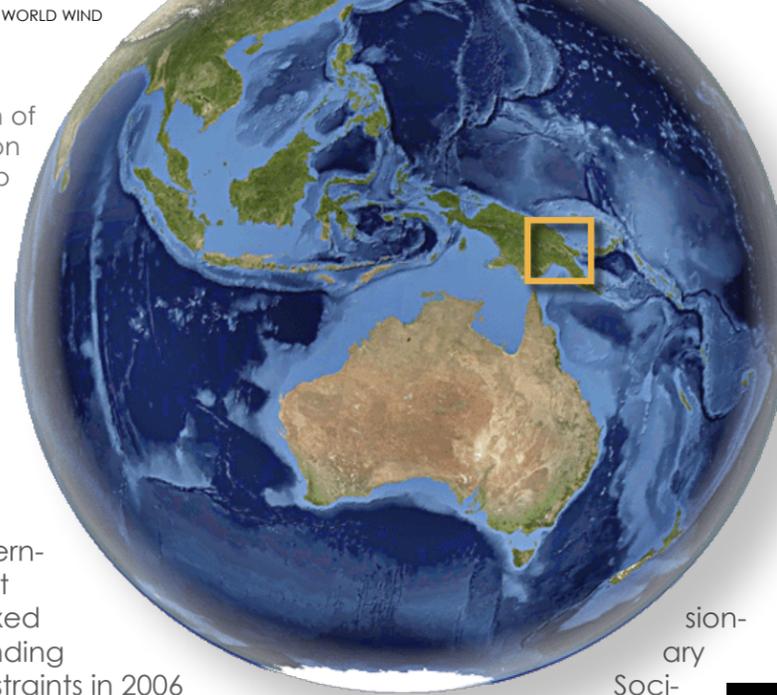
Health Very high degree of risk of food or waterborne diseases such as bacterial and protozoal diarrhoea, hepatitis A and typhoid fever. Vector borne diseases such as dengue fever and malaria are high risks in some locations (2007)

Decompression Chamber Melanesian Hyperbaric Services P. O. Box 111, Jacksons Airport Port Moresby, Papua New Guinea Emergencies: 6930305 or 6931202 (ISDC: 675) peter@walindi.com

Web Sites PNG Tourism www.png-tourism.com About PNG on Lonely Planet www.lonelyplanet.com

RIGHT: Location of Papua New Guinea on world map

FAR RIGHT: Map of Papua New Guinea and its islands



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Society 8%, An-

DIVER'S INK LOG-BOOK STAMPS

www.diversink.co.uk





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one site for all your divefun

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POINT & CLICK
ON BOLD LINKS



Edited by
Arnold Weisz

Equipment

Gee Whiz



Nanospotter

The Spotter is ultra compact and makes use of five super bright LED bulbs, powered by four AAA batteries, which last up to 60 hours at maximum output. Unlike the old chemical "Stick Lights" the Nano Spotter is environmentally friendly and re-usable. This specially designed and unique multi-purpose LED Light application comes with small colored plastic discs allowing for various lighting options. The Nano Spotter is perfect for diver identification during night dives, cave dives, wreck dives and allows for easy identification in any group situation. www.fantasea.com



Scooter vest

Apollo vehicles weigh up to three pounds in water. The new 5mm black neoprene vest helps protect cover and lightens the load. Designed for use with any Apollo scooter, the vest attaches with Velcro and can be used with or without a saddle. AV-2 owners will appreciate the integrated viewing area for battery level indicator. Black 5mm neoprene vest attaches with velcro. A vehicle weighs 1.5-3lbs in water (varies with battery type). Use of vest helps protect cover and lightens the load. OK for use with saddle. Able to view battery levels on AV-2 without removing cover. www.diveapollo.com



N2ition

Zeagle Introduces New N2ition Dive Computer. Zeagle has released its newest computer, the N2ition.

This user-friendly nitrox computer features an expansive screen, big bold data digits, handy screen prompts and three control

buttons that take any confusion out of navigating the options and settings. Three color coded bar graphs provide at-a-glance tracking of ascent rate, nitrogen loading and oxygen exposure. The N2ition has the ability to handle two nitrox mixes on a single dive. You can program it to calculate your status on a 21 to 50 percent mix for your bottom work and 21 to 99 percent mix for decompression. The N2ition uses a Modified Buhlmann algorithm (12 tissue compartments). www.zeagle.com

Sherwood SR

The SR utilizes a pneumatically balanced second stage, with a two-piece flow-through first stage piston for precise 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. The second stage contains a SMART demand lever and floating crown which reacts to depressurization and relieves the load on the seat, extending seat life while promoting consistent performance. www.sherwoodscuba.com



Digital Mask

The Liquid Image Digital Underwater Camera is aimed at those who want to snap underwater but don't want to splash the cash on really expensive camera kit. Costing around the 100 US-dollars this mask lets you record both video and still images thanks to the upto 5-megapixel camera that's placed just above the nosebridge of the mask. The lenses are complete with crosshairs that help you focus your underwater shots. The camera comes with an internal 16MB memory, and an external microSD card slot. The camera and mask combination is available in both a 3.1 and a 5.0 MP version. The shutter press is located on the top of the goggles, so as you see something you want to capture you simply push the button. www.liquidimageco.com



Via Press release



2008 DUI DOG Rally & Demo Tour Diving Unlimited International (DUI) has released the dates for the 2008 DUI DOG Rally & Demo Tour. Celebrating its 11th Anniversary, this event has allowed tens of thousands of divers to experience the joy of drysuit diving and some of the products that DUI has in its range. About 125 to 350 divers test diving DUI equipment each weekend during the event. DUI has designed a new 38-foot trailer to hold even more equipment.

At each event you may expect:

- Meet Industry Leaders and DUI Factory Professionals
- Free Collectors Edition DUI TEST DIVER Hat
- Educational Seminars & Presentation by Divers Alert Network
- Free Barbecue Lunch
- JUST FOR DOGS! Test Dive a DUI Delta BCS and get a FREE T-Shirt
- Join Us Saturday Night for Dinner and Program with Raffle Prizes

For more info, dates and locations for the event visit:

www.dui-online.com

Atomic Aquatics mask wins prestigious red dot design award

The Frameless Mask is a piece of scuba diving equipment designed to maximise visibility under water, as well as to minimise the use of materials and parts in its manufacture. Its functional and aesthetic ergonomic design is the result of efforts to create a universal visual style for the Frameless Mask.



GPS Tracker

The Trackstick II Personal GPS Tracker records its own location, time, date, speed, heading and altitude at preset intervals. With over 1Mb of memory, it can store months of travel information. The Trackstick is the perfect tool for individuals looking for a way to track anything that moves. Use it for recording the exact routes you take when hiking, biking or vacationing. Record the location of everywhere you went, import pictures and other information into Google™ Earth to offer an entirely new perspective of your journey. Includes GPX photo stamping feature for adding your favorite photos to your own maps.

www.earthgizmos.com



Still going

Like a Porsche 911 some great designs never go out of fashion. Next generation of Mares best-selling fin - the Quattro is announced to hit the shelves in March.

www.mares.com



sQuba - an Underwater Car

Okay, who wants a car that drives underwater? I'm certain every hand is going up as Rinspeed has actually made a car called the sQuba that can turn you into Captain Nemo, motorist.

www.rinspeed.com



Elastek wetsuit

The BARE Elastek from BARE Sportswear combines a new material with anatomically correct patterning and 3D shape, components like a color-matched G-lock zipper and graphics to produce a full-stretch suit. The BARE Elastek wetsuit line consists of a 3, 5 and 7mm fullsuit with an optional 7mm overvest for both men and women. It comes in 15 sizes for men and 13 sizes for women.

www.baresportswear.com



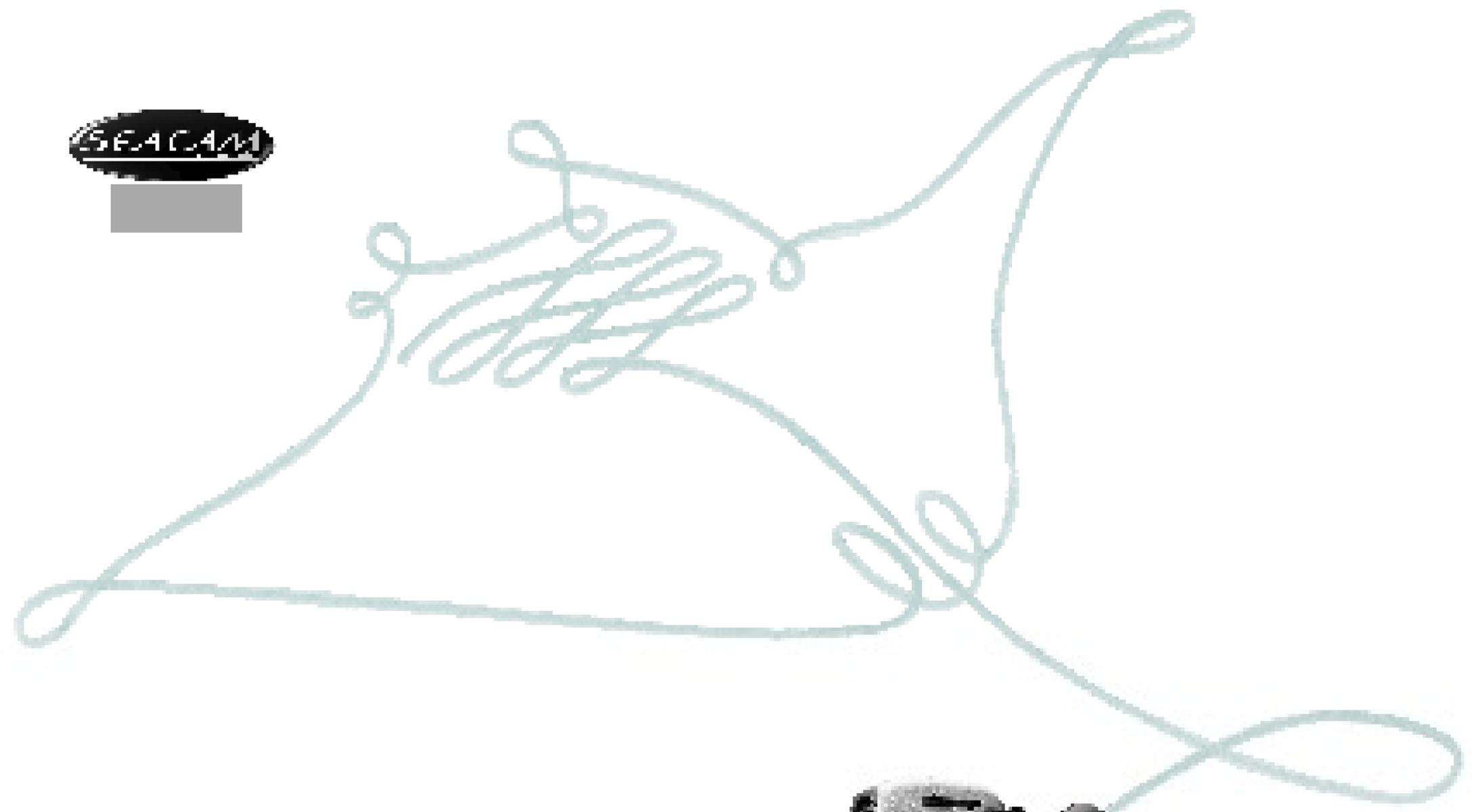
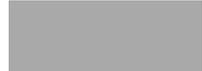
Recall

ROMI Recalls Scuba Regulators Due to Drowning Hazard

The U.S. Consumer Product Safety Commission, in cooperation with ROMI Enterprises, announced on Dec. 11, 2007, a voluntary recall of the Oceanic and AERIS scuba Regulator First Stages. Consumers should stop using recalled products immediately unless otherwise instructed. An internal component that seals air between the high-pressure first stage and the intermediate-pressure second stage can fail. This can result in uncontrolled flow of air to the diver and pose a risk of serious injury or death.

For further information or to determine if your specific unit is affected, contact ROMI toll-free at (888) 636-9390 between 8 a.m. and 5 p.m. Pacific Time, Monday through Friday. Oceanic customers can send an e-mail to service@oceanicusa.com or visit the firm's web site at www.oceanicworldwide.com. AERIS customers can send an e-mail to info@diver-aeris.com or visit the firm's web site at www.diveaeris.com.

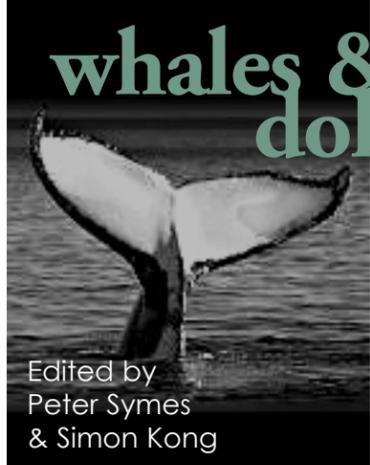
SEACAM



ma of dreams



Edited by
Peter Symes
& Simon Kong



PETER SYMES

How Marine Mammals Avoid Brain Damage From Low Oxygen

Specific proteins found in the brains of marine mammals may be behind their ability to stay underwater for long periods without suffering oxygen deprivation.

Our brains need constant oxygen. So why can certain mammals dive underwater for up to 90 minutes without blacking out? The standing hypothesis was that they possessed some hitherto unknown physical capabilities to either store or deliver more oxygen to the brain.



But the idea did not stand up to closer scrutiny. Despite adaptations such as higher capillary density and blood flow that could be shunted preferentially to the brain, blood oxygen levels still plummet after just a few minutes underwater.

Instead, it turns out that marine mammals have high levels of certain oxygen-carrying proteins called neuroglobins and cytoglobins, residing in the brain tissue. In an article just published in the *Proceedings of the Royal Society*, researchers at the University of California at Santa Cruz describe the quantity of these special oxygen-carrying proteins across 16 mammal species. The swimmers had significantly higher levels, up to ten times as much as those who live on land. Evidence points to cytoglobins playing a role in moving oxygen out of the blood stream and into the brain, even when oxygen levels are very low. Neuroglobins, on the other hand, appear to be able to grab reactive oxygen and prevent the formation of destructive free radicals.

Researchers don't know if certain animals are born with higher brain globins or whether they develop over time. And

they also wonder whether these proteins hold clues to brain health and aging. Whales are known to live for as long as two centuries. Perhaps these globins play a part.

"What was remarkable was the level of variability we found," said lead author Terrie Williams, professor of ecology and evolutionary biology. "Some animals had three to ten times more neuroprotecting type globins than others. These wild species may hold many clues about how to turn on protective mechanisms in the mammalian brain to protect it from conditions of low oxygen, also called hypoxia."

Treating strokes

The discovery could have important implications for understanding stroke and aging in humans, according to Williams. It's not yet clear whether it is environmental stimuli that affect the production of globins but the amounts appear to be malleable. That's promising because if globin production could be boosted in humans, then brain damage due to disease or aging could potentially be minimized. ■ SOURCE: UNIVERSITY OF CALIFORNIA

Interaction with humans shapes dolphin noises

Dolphins appear to change their vocalisations depending on their physical and social environments and level of human interaction such as feeding, new research by a University of Queensland, Australia student, Melinda Rekdahl shows.

Miss Rekdahl studied about 120 dolphins from groups of wild dolphins in Moreton Bay, captive dolphins at Seaworld and provisioned dolphins at Tangalooma Wild Dolphin Resort. She spent two weeks with each dolphin group and recorded hundreds of hours of dolphin noises such as burst pulses and clicks and ten hours of whistles.

"Captive and provisioned dolphins whistled more than the wild dolphins while feeding with captive dolphins showing the highest rate of whistles," Miss Rekdahl said. "Feeding was the behaviour most influenced by humans in the captive and provisioned environment." ■

12 Species of whale and dolphin found in Pakistan's waters

Led by an expert from the United Kingdom, a Pakistani research team has for the first time identified and recorded the presence of 12 species of marine dolphins and whales in the Sindh-Balochistan waters. The identified species include five dolphin species, one porpoise species, two species of the toothed whale and four species of the baleen whale. ■

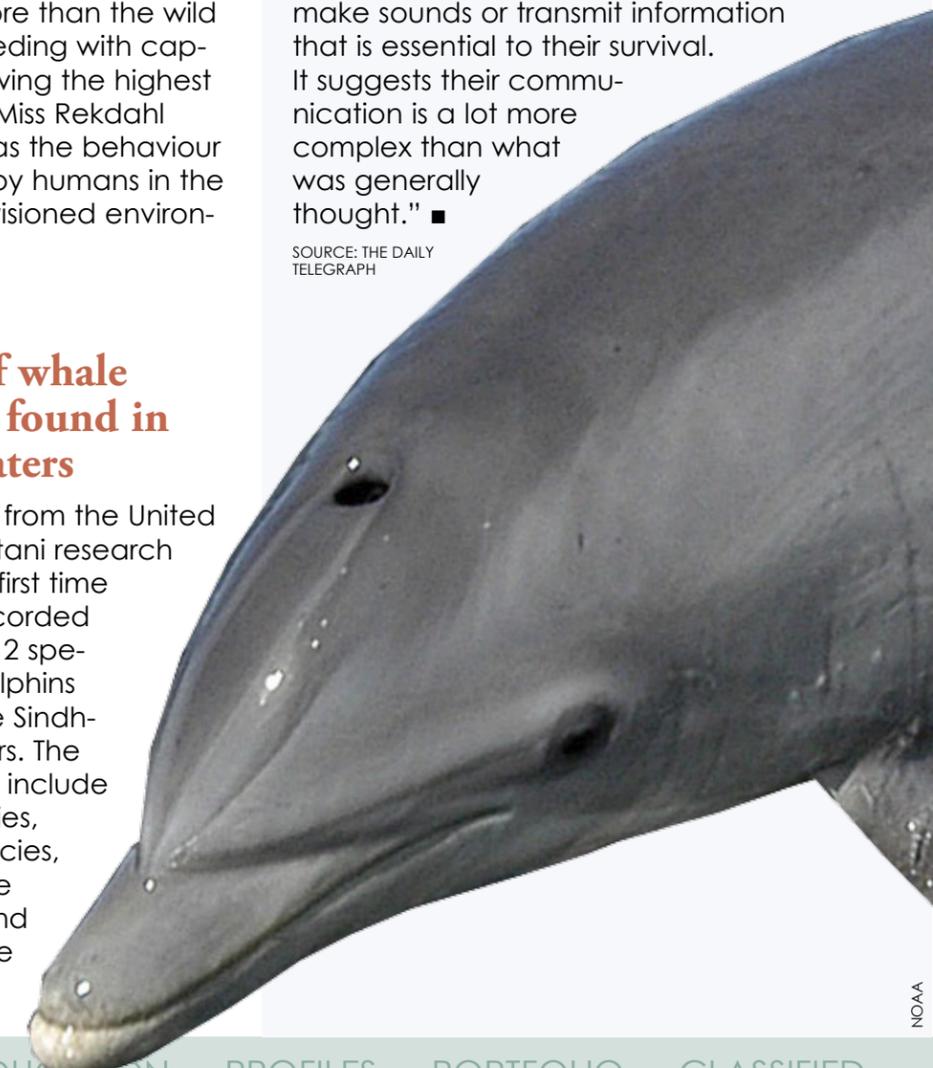
Speak Dolphinish?

An Australian researcher has discovered that certain whistles of bottlenose dolphins are linked to specific behaviour.

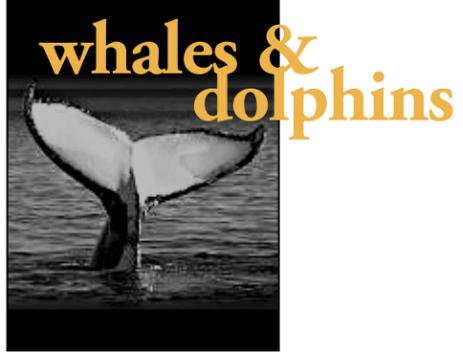
PhD candidate Liz Hawkins from Southern Cross University's Whale Research Centre spent three years listening to more than 50 different pods of dolphins. Using the starting and final frequency of the sound and its duration, she distinguished 186 distinct whistle types among the 1650 recorded, of which 20 were common to more than one pod. Ms Hawkins said the sounds were not evidence of a language but showed the dolphins were communicating "context-specific information".

"A specialist in linguistics would not call this a language," she said. "They are wild animals and generally wild animals only make sounds or transmit information that is essential to their survival. It suggests their communication is a lot more complex than what was generally thought." ■

SOURCE: THE DAILY TELEGRAPH



NOAA



Japan Agrees to Suspend Its Hunt of Humpback Whales

Japan has agreed not to hunt humpback whales during its annual whale hunt that is underway in the seas off Antarctica. US Commerce Secretary Carlos M. Gutierrez applauded the decision and said it was an act of goodwill towards the International Whaling Commission.

Japanese officials said they would postpone the harvest of humpback

whales at least until after the next annual meeting of the IWC, slated for June. This year, Japan was planning to target 50 humpback whales for the first time in its Antarctic research program along with 50 fin whales and up to 935 minke whales. In 1986, the IWC placed a moratorium on commercial hunting to allow species of whales to recover from decades of over har-

vest. Whales experience a wide range of threats including the unintended interaction with fisheries, ship strikes, pollution, plastic debris, and habitat loss. ■

SOURCE: NOAA

Happy whale?
North Pacific humpback whale breaches

Hector's and Maui's dolphins still left unprotected

The New Zealand government has delayed a final decision on how best to protect one of the world's rarest dolphins.

Hector's and Maui's dolphins are among the rarest in the world, with as few as 8,000 Hector's left. DOC monitoring shows 23 Hector and four Maui dolphins have died in the past year, some after becoming tangled in nets.

The government had been looking at bringing in permanent restrictions on set nets in areas where the dolphins are found.

The New Zealand Ministry of Fisheries says it has had more than 2,000 public submissions on the management plan for the mammals and wants more time to consider them.

Forest and Bird says it's good the ministry is taking public feedback seriously, but it's disappointing another deadline will not be met. ■

SOURCE: ONE NEWS

US judge limits marine military sonar in California

A US federal judge has set limits for the use of marine sonar by the military in California, a practice environmentalists have long accused of putting sea life in danger.

Judge Florence-Marie Cooper issued an injunction barring the Navy from using mid-frequency active sonar when marine mammals are within 2,200 meters and requiring it to monitor the area for an hour to ensure no marine life is in harm's way.

However, Cooper allowed the military to use the equipment within 20 kilometers of the coast, rejecting environmentalists' demands for a 40 kilometer exclusion zone.

The National Resources Defense Council, which led the environmentalists' suit, called the decision a victory, while the Navy said it planned to review the decision.

Marine life advocates have argued since 2005 that the use of Navy sonars was endangering whales' lives by causing them to become disoriented and stranded on beaches. ■ SOURCE: TERRA DAILY



Walrus Habitat is Melting Away

Global warming is melting away the sea ice in Alaska that experts fear their efforts to save the walrus, polar bears and ice seals are in vain. Every summer, 3,000 to 4,000 young walrus die in stampedes when they are stranded on land instead of sea ice. This diminishing piece of ice located on the Russian side of the Chukchi Sea is forcing the walrus to stay on coastlines putting pressure on nearby foraging areas instead of feeding in the rich waters offshore.

The Arctic sea ice has plummeted to its lowest levels since 1979. Research suggests that diminished sea ice and warmer water may decrease plankton, which are food for creatures on the bottom, which in turn are eaten by walruses. If the walrus population stays within 30 miles of shore in summers, they could over harvest the available food. ■ SOURCE: SOTT.NET



pearls of the
mediterranean



WOLFGANG PÖLZER

Text by Harald Apelt
Photos by Harald Apelt & Wolfgang Pölzer

It was not a "big hello"... There were no red carpets, and when the new sovereign of the principedom of Elba entered his island at the island-capital of Portoferraio, most of the 10,000 inhabitants of Elba didn't take any notice of this historical date. The new sovereign was a Frenchman facing his new future on this wonderful green island nestled off the Italian coastline. It was a Tuesday afternoon on the 3rd of May, 1814, when Napoleon I Bonaparte, former emperor of France, reached Elba upon an English frigate and set his first steps on the island.

Following the treaty of Fontainebleau, the French emperor was exiled to Elba after his forced abdication on the 2nd of April, 1814. No longer a big wig in Europe anymore, he

now had to be satisfied with being a small Bonaparte for the rest of his life on one of the loveliest islands in the Mediterranean. He was allowed to keep his title of "Emperor" and to keep a personal guard of 600 men. Finally, he received an annual pension of two million francs. Although he was nominally the sovereign of Elba, the island was watched (more or less) by British naval patrols.

Well, most of us know how the story ends—Napoleon returned to Paris after only ten months of restless "holidays" away from international policy and battlefields. He had another 100 days at the head of his army until he finally lost his last battle at Waterloo on June 18th, 1815. This time, in October 1815, he was exiled to the not half as nice

Italy's Elba

About Napoleon & Sunfishes

PEARLS OF THE MEDITERRANEAN: PORTO AZZURRO, ISOLA D'ELBA, ITALY

Porto Azzurro is on the south eastern edge of the third biggest Italian island, Elba. It is the first destination in our *Pearls of the Mediterranean* series, upon which we would like your eyes to feast. Elba is only about 10 kilometres off from the coast of Italy and is the biggest island of the Tuscan archipelago. Although the island thrives on tourism nowadays, the small seaports on its 150 kilometres of coastline are not yet over-run by mass tourism. Porto Azzurro—the blue harbour—is the pearl of this island.



WOLFGANG PÖLZER

Porto Azzurro

pearls of the mediterranean



Business as always, a fisherman is repairing his nets



Ria Marina, a picturesque village in the north of Elba



Elba

under King Philipp III, the fortress, San Giacomo di Longone, which was placed on a protruding peninsula of land, has overlooked the harbour and Barbarossa Bay. This wonderful building, unfortunately, is not often visited these days because it is used as a national prison.

Markus' dive center is the only building at Barbarossa Beach. He owns a small pier, which is the starting point for all the daily dive expeditions on the two full metal diving boats, the *Matteo Sandro* and the *Sisto*.

Both boats are specially constructed for diving. The flagship *Matteo Sandro*, at 13.5 metres in length, is a fully equipped and quite comfortable vessel with a



island of St. Helena in the south Atlantic, where he died only six years later.

Maybe his life would have taken a better turn if he had been more interested in the beauty of the island of his first exile. Certainly, Napoleon Bonaparte was not really interested in seamanship, and of course, he didn't know anything about diving. This is probably the reason why the resigned emperor saw only half of Elba's paradise!

Omnisub Dive Center

Markus Schempp is a German dive instructor and the owner of Omnisub Dive Center at Porto Azzurro. He was not exiled to Elba but discovered this place with his Croatian wife, Mirjana, more than ten years ago. They decided to stay here in order to begin a new life with their dive center.

Since then, Markus and Mirjana have learned to



WOLFGANG PÖLZER

anything else too heavy in the diving business, requiring too much muscle power to be burdened by in the heat of a typical Italian summer. speak fluent Italian, and Markus has become a very keen driver of his "Ape"—an ugly little three-wheeled mixture of a "cabin-motorcycle-van-car". This vehicle is the modern Italian replacement for the donkey. It really has nothing to do with apes, but with busy bees, which is what the Italian word "ape" means. It is fun driving an "Ape", even if you are not transporting dive-tanks, weight belts or

Markus' dive center is located at the Barbarossa Bay just 15 minutes walking distance from Porto Azzurro harbour. It is a nice walk, which everyone who visits this picturesque seaport should do.

Porto Azzurro, thus named in 1947, was called Porto Longone in former times. Since its days of Spanish rule

sundeck for "apres dive" sun bathing and enough space for groups of divers on the short daily diving trips.

The *Sisto* is about 3.5 metres shorter and has space for ten divers. It is mostly used by diving groups or dive clubs. With this boat, they can customize their individual daily diving plans beyond the regular diving schedules.

Both boats have a power

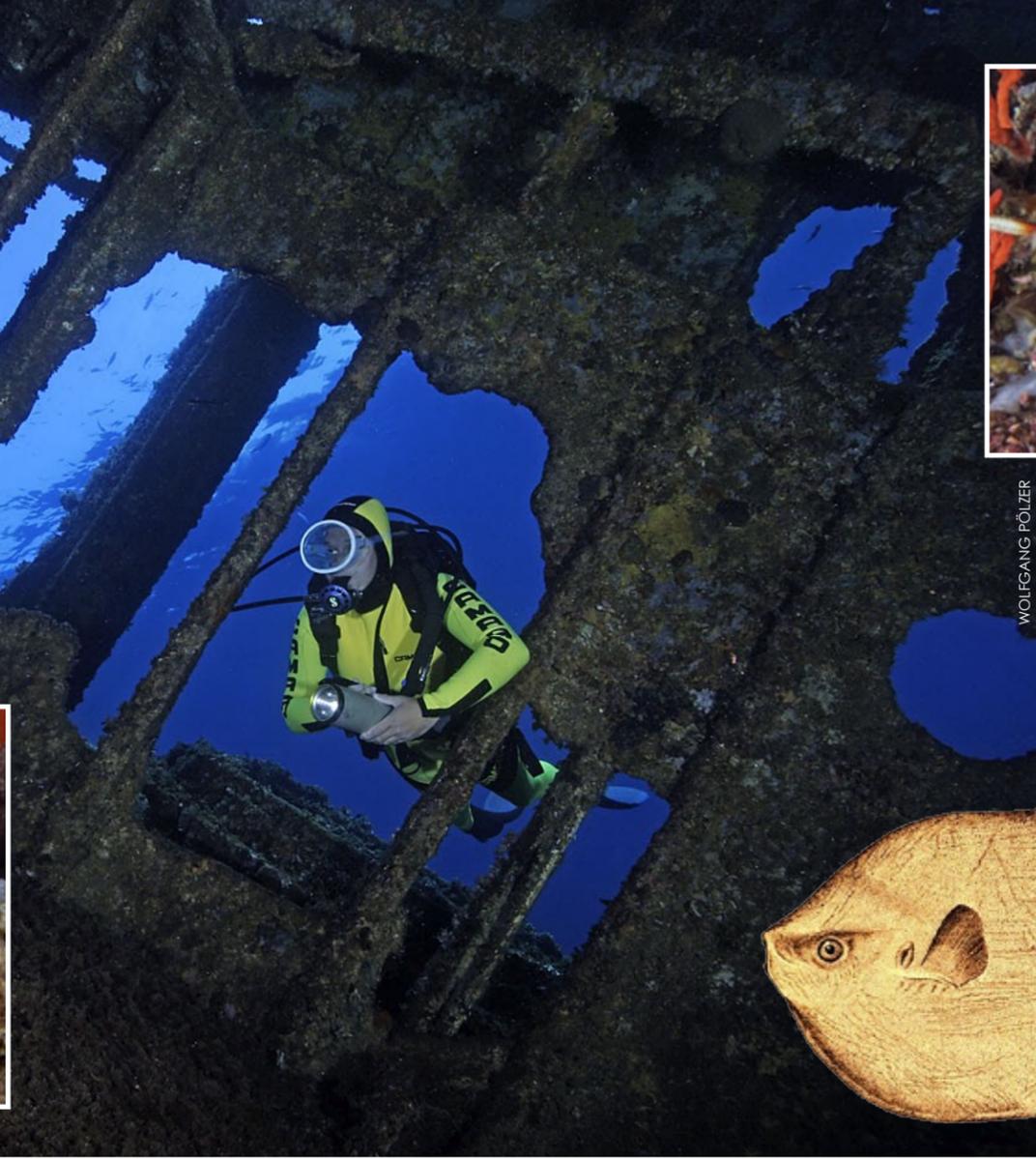
HARALD APELT

HARALD APELT

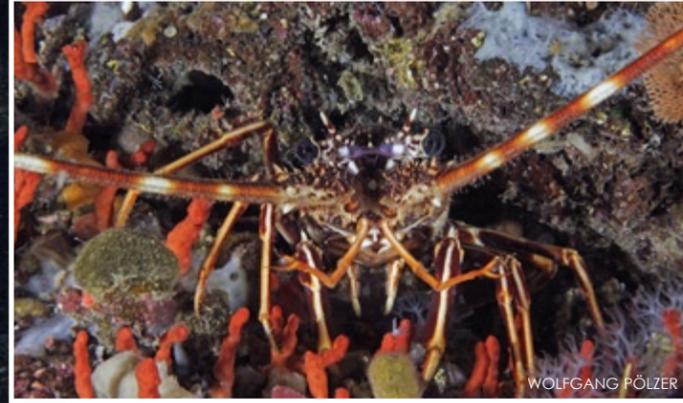
pearls of the mediterranean



WOLFGANG PÖLZER



WOLFGANG PÖLZER



WOLFGANG PÖLZER

Elba

a few seconds, these huge, lazy and dull looking animals take up an unbelievable speed and disappear into the deep blue.

There is just one thing that is missing around Porto Azzurro to make it a perfect

dive destination—a wreck. Around Elba, there are quite a lot of wrecks to be found but in depths that are out of range for recreational divers.

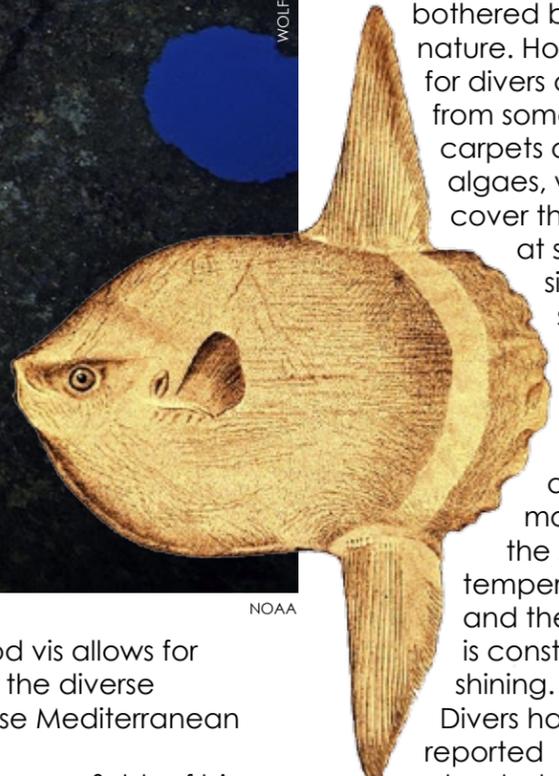
However, to make everybody happy, there is a really nice wreck on Elba accessible even for sport divers. Unfortunately, you'll have to exchange the comfortable boat ride on the *Matteo Sandro* for a 40-minute car-ride to the other side of the island. My advice, make that trip. Take your dive equipment and go to the southwestern coast of Elba. There, you will find a small village called Pomonte.

Thirty-five years ago, the cargo ship

swimmers at the southeastern part of the island. But neoprene-coated divers aren't bothered by this curiosity of nature. However, irritation for divers does come from some really huge carpets of filamentous algae, which completely cover the sea bottom at some of the dive sites during the summer.

There is another phenomenon which happens during summer months when the surface water temperature is warm and the sun is constantly shining.

Divers have reported extended encounters with sunfishes, which seem to enjoy the escort of the divers. Sometimes they have even been found sleeping on the surface. But if you get too close to them, their instincts kick in and their alarm-clock goes off. Within



NOAA

compressor on board, as well as weight belts and dive tanks. No diver likes to carry these items before and after a dive. With *Sisto*, this equipment can stay on board for the duration of your diving vacation.

Diving

All the dive sites

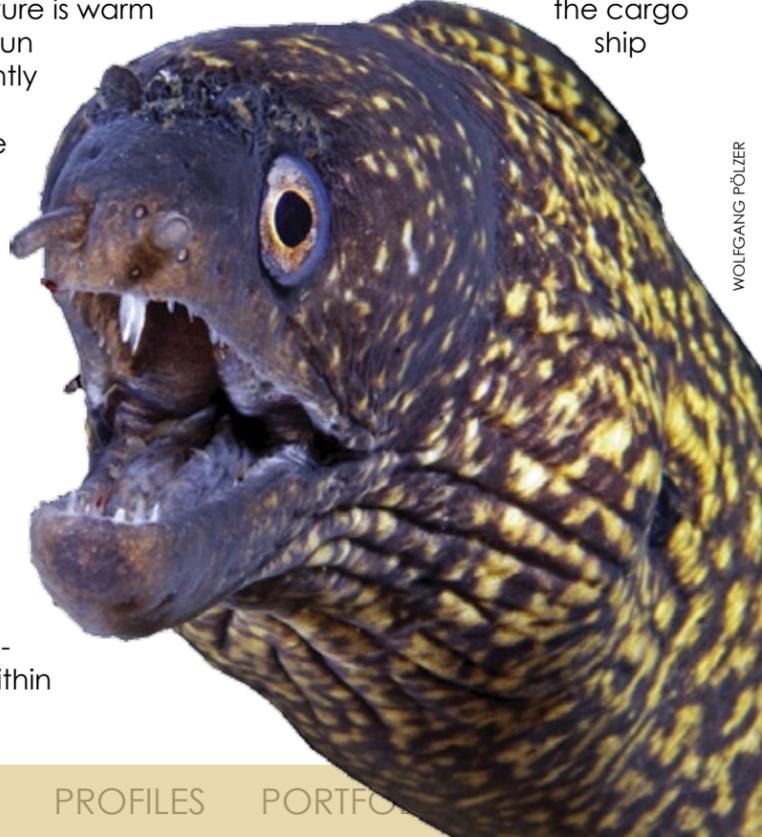
are close to the coastline, so that the longest ride to a dive spot takes just a little more than 40 minutes. The rocky coastline of the island continues into the deep blue under the surface. Most of the dive spots are between 15 and 40 metres depth and have mostly good visibility of 20 to

40 metres. The good vis allows for a fantastic view of the diverse topography of these Mediterranean dive sites.

Canyons and caverns, fields of big rocks and breath-taking wall diving—my favourite spot for night dives—offer quite a lot of adventures, even for keen divers. Sea fans and colour changing red and yellow corals can be seen continuously. Morays, conger eels, spiny lobsters, octopus, baracudas and even big groupers can be found by the Omnisub divers on their daily diving trips.

Sometimes, during the recent unusually hot summers of the Mediterranean, big populations of nettle jellyfishes have angered

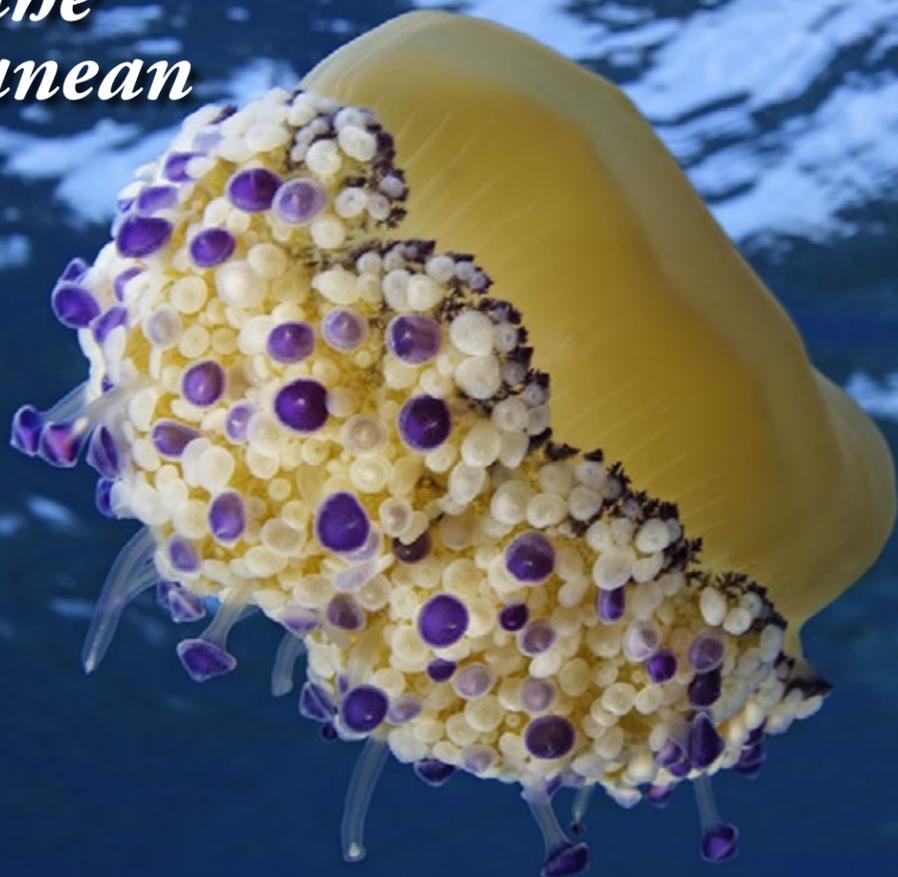
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WOLFGANG PÖLZER

pearls of the mediterranean

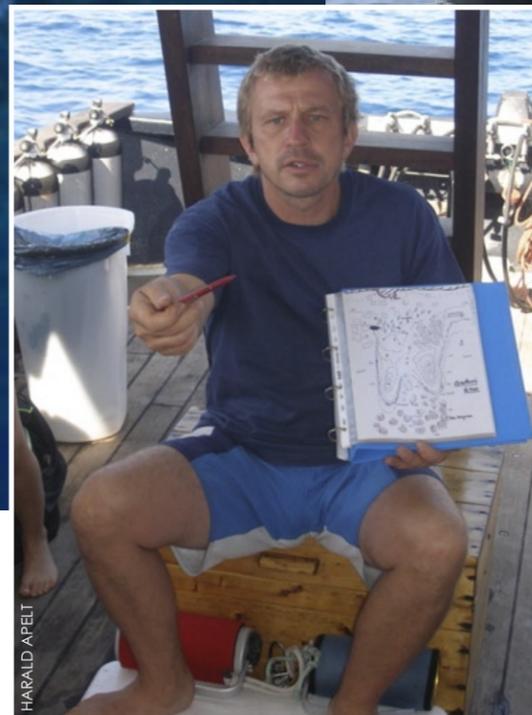
Elba



WOLFGANG PÖLZER



HARALD APELT



Matteo Sandro, owner of Omnisub Elba gives a dive briefing



WOLFGANG PÖLZER

Elviscott crashed on the small rocks located 200 metres away from Pomonte beach. It sustained machine damage and sunk directly at the rock. Now, it is one of Pomonte's attractions. Even while snorkelling, you can have your wreck experience there, and scuba divers can explore this wreck nearly completely, at a maximum

depth of only 14 metres, during an extended one-tank-dive. It's just a 200-metre snorkel trip from the beach to the left side of the island rocks. You will not be able to fail this wreck.

If you are on the car once again on your 30-kilometre trip back to Porto Azzurro, you should use the chance to add some more kilometres to your trip and discover the other, northern side of Elba. Narrow and winding roads lead you around Monte Capanne, which is 1019 metres tall and the highest hill of the island. Fantastic views are offered at several sightseeing points. And if you would like to walk in Napoleon's footprints, you could see his former villa and his museum. Or you can just take a walk and try to find Napoleon's life-sized stone statue on a wall in the small mountain village of Marciana north of the Monte Capanne.

The versatile three-wheel *Ape's are now seeing a renaissance all over Italy



HARALD APELT

The dive center Omnisub Elba has a private pier for its dive vessels Sisto on the left and Matteo Sandro on the right.

A day of diving at the *Pomonte* wreck and a long exploratory tour of the island of Elba can only be finished with a good Tuscan red wine and an Italian pizza. I know that many of our readers believe they know what it means to have a real Italian pizza with a great glass of red wine. But let me elaborate... I am talking about sitting together with friends on a warm summer night, outside, with a great pizza on the table, smelling the Mediterranean Sea, seeing the stars above, and drinking good red wine until you are tired enough to fall sleep and enjoy a night of wonderful dreams. Good night, Elba. I'll be back again next year! ■

If you are looking for more adventure, you can enter Monte Capanne by foot. It's a nice but not so easy trek of about four hours. But at the station on the top of the hill you, will be rewarded with an awesome view overlooking the island. And in good weather conditions with good visibility, you will see the other islands of the Tuscan archipelago and sometimes even Corse. Bring good shoes to take this route. If you want to tour the hill in flip-flops, you better take the cable-lift. It is really spectacular and takes you up and down the slope in small metal-cages. With luck, two people

can stand in one of these cages without panicking. (Every ski-lift I've ever seen have been more comfortable and intelligent in construction than these cages. Maybe they were used in a "former life" as a white knuckle ride in a "tunnel of horror"?)

fact file



Elba, Italy

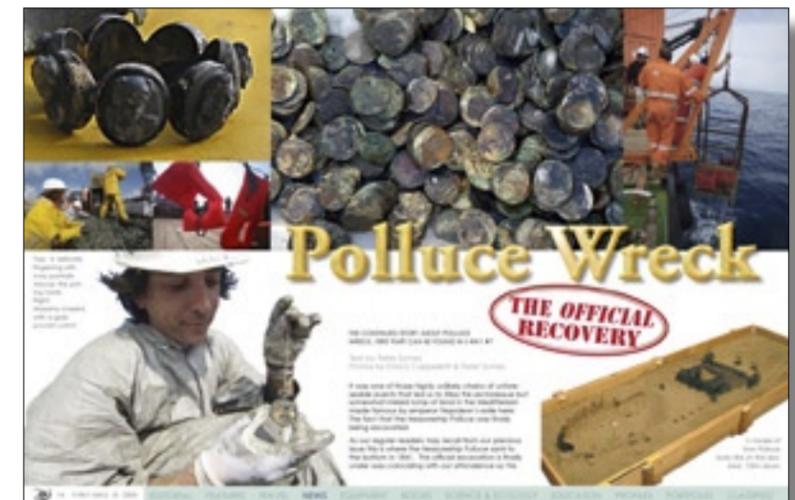


HARALD APELT

Further reading about Elba



Just off the coast of Elba a treasure wreck - the Polluce was excavated in 2005 under heavy surveillance by the Carabinieri. Right-click on the cover to download or go to this link: www.x-ray-mag.com/pdfs/articles/Feature_PolluceWreck_07.pdf



Part 2 - the excavation. Right-click on the cover to download or go to this link: www.x-ray-mag.com/pdfs/articles/Feature_PolluceWreck_TheRecovery_08.pdf

History The oldest known group of humans living on Elba were the Ilvates who had roots in Liguria. Later on, from about 750 BC, the Etruscan were located on Elba. They were the first to use iron ore on the island. Much later, around 500 BC, Greeks occupied the island and called it Aithalia, which means *fuming*, due to the endless fires of ferrum production and the carbon black in the air. It was 246 BC when the Romans conquered the island. Elba was under Roman influence for more than 800 years.

In the sixth century AD, the Langobards integrated the island into their empire. In 787 AD, Elba was given as a gift to the pontifex in Rome. But the Roman Church never influenced Elba's development and finally gave the island as a gift to the important naval force of Pisa. Pisa had supported Rome for a long time in the continuous fight against the Saracen, an Arabic Muslim people who had attacked Italian seaports for a long period of time.

Under the control of Pisa, a lot of monumental buildings were constructed on Elba. In the 13th century, Elba was attacked several times by forces from Genova, the major rival power during this time. In the

following years, Elba's sovereigns changed quite often. Eventually, the island was split. Finally, even Porto Longone, today's Porto Azzuro, was captured in 1596 by Philipp III of Spain.

During the revolutionary wars, the island was occupied by England, and later on, after the peace conference of Amiens, Elba was given to France. After the short era under Napoleon, Elba was given to the dukedom of Tuscany, and later on, joined the united kingdom of Italy.

Geography Elba is Italy's third largest island located about ten kilometres off the Ligurian coastline. It is around 225 square kilometres in size and the largest island of the Tuscan archipelago with a coastline of about 150 kilometres. The island is divided into eight districts: Portoferraio (the capital of Elba), Campo nell'Elba, Capoliveri, Marciana, Marciana Marina, Porto Azzurro, Rio Marina and Rio nell'Elba. Elba's highest mountain is Monte Capanne with a elevation of 1019 metres. Porto Azzurro is a small seaport on the southeastern side of the island. In the winter during the off season, there are around 3000 inhabitants living in Porto Azzurro.

Climate Mediterranean climate with mild winters and long warm summers. Average yearly temperatures are around 17°C. Spring is warm and mild with many hours of sunlight and infrequent rains. Summertime from June to mid-September rarely gets very hot, in the range of 35 to 37°C. Late summer and autumn occur from mid-September up to end of the diving season at beginning of November when water temperatures are still very comfortable. Water temperatures normally do not become less than 10°C. In summertime, it climbs up to about 24°C (surface temperature). For divers in the winter and springtime, a semi-dry suit is quite comfortable, a drysuit is perfect. In summertime, 5-7 mm wetsuits are perfect.

Currency Euro. Exchange rates: 1 EUR = 1.48 USD, .74 GBP, 158.13 JPY, 1.47 CAD, 1.66 AUD, 2.09 SGD

Language Italian. Most people, especially those working in tourism speak English and perhaps some Spanish, French or German.

Visas & Permits All members of Schengen countries of the European community need only a valid identity

card. Visitors from all other countries need a passport and a classic visa.

Travel info Airport at Elba: "La Pila", Elba International Airport Tel: +39.0565.976011 www.elbaisland-airport.it Located two kilometres from Marina di Campo. The next largest international airport is located at Pisa. There is a train connection from here to Piombino marittimo (Ferry Harbour). Ferries depart around every 30 minutes during the high season from Piombino to Portoferraio at Elba. Direct connections from Piombino to Porto Azzurro are also available, but only during the high season and just few rides per day. Car transfers to the island during the high season should be booked ahead of time. Two ferry lines serve this route. The price during the high season for transportation of one person and one car is about 43 Euro (round trip). For more information, timetables and prices, see www.torremar.it or www.mobbylines.it

Information Info-portal about the island of Elba is at www.elbalink.it Available in Italian, German and English.

[Link to Google map of Elba >>>](#)

Well,
I'll be
darned ...

There's a

Cave Under Ras Muhammad

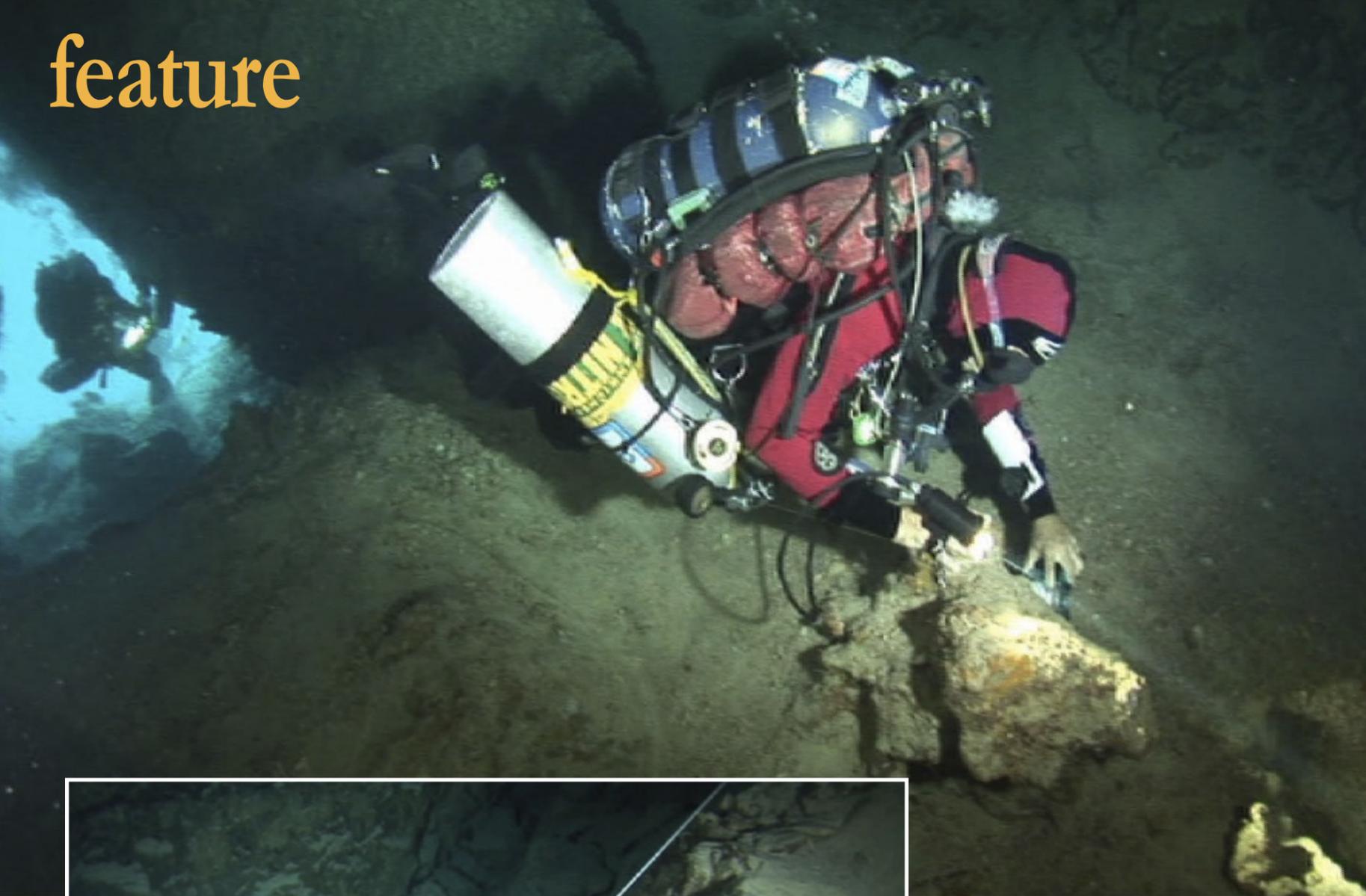
Text and photos courtesy of Leigh Cunningham

Scores of holiday makers frolic in the waters around Sharm el Sheikh oblivious the cave explorations going on nearby



The darkness below Ras Mohammed

Technical divers have discovered an extensive cave system far below the fish and coral at the very tip of the Sinai Peninsula. Leigh Cunningham recounts an ambitious project to dive and survey these mysterious caves, which are already being dubbed "the new Wakullah".



THIS PAGE: Heavily equipped divers investigate the depths of the cave and take measurements

Ras Muhammed Cave

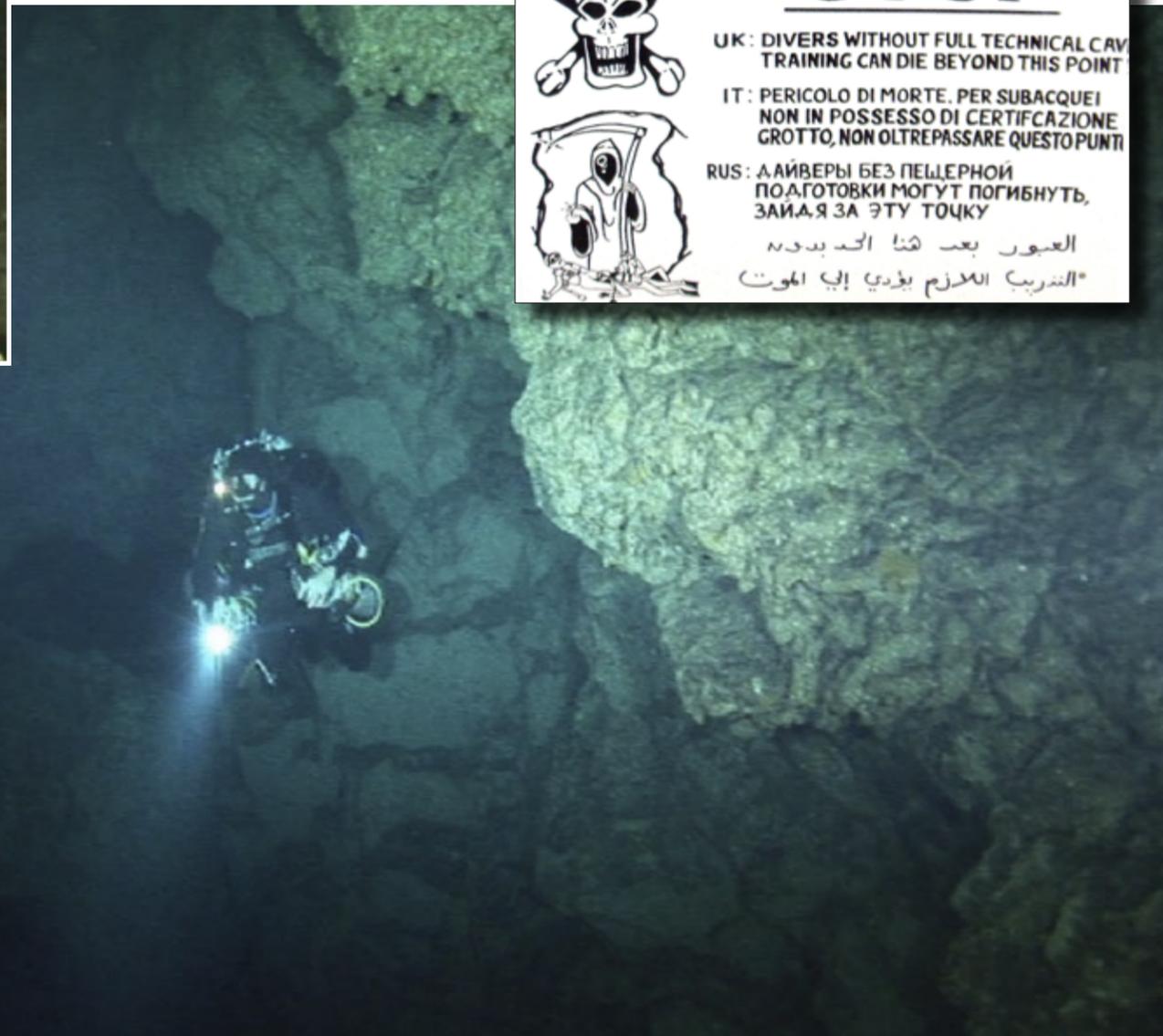
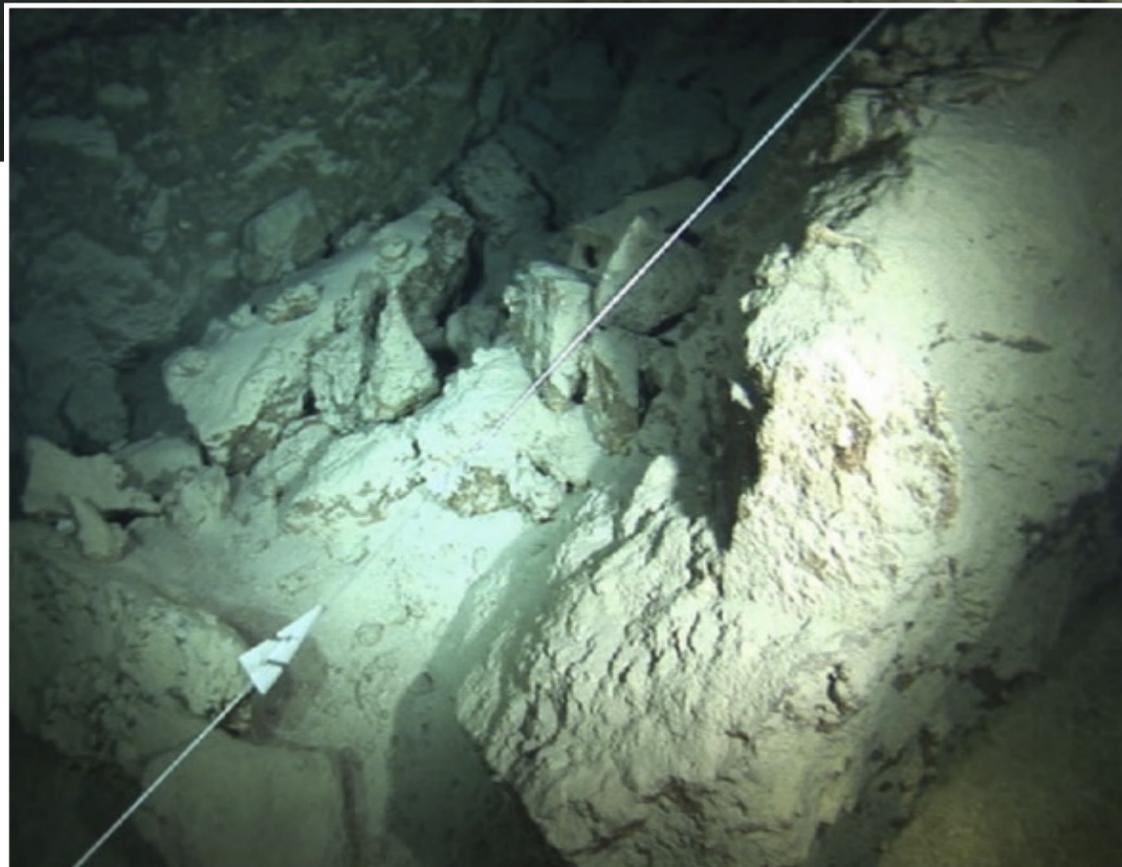
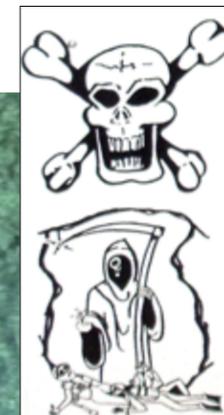
Back in the summer of 2001, I was diving with Francisco Ortigosa, a good friend of mine who had just completed the advanced trimix course with me. Fran is a geophysicist, and we were diving in the Ras Mohammed National Park when he suggested there may be cave systems in deep water in the Jack Fish Alley area on the eastern wall of the famous headland.

Later, after several exploratory dives, I found a cave close to the old Jack Fish mooring, with an entrance starting at 65m. I explored the cave with Fran and my deep diving buddy, Frenchman Thomas Chabanne. We laid a guide line from the right hand corner of the first chamber leading down a chim-

ney to the second chamber.

After several dives in this cave, we established that there did not appear to be a passable passage leading to any further chambers. Thomas and I continued searching for more entrances close to the original 65m entry, and deeper along the wall, we were rewarded with another cave entrance at 80m.

We planned a deeper and longer dive to explore this cave. When we entered, we found ourselves on a sheer wall, dropping to what appeared to be well in excess of 100m. This was obviously one hell of a cave, and it was very tempt-

STOP

UK: DIVERS WITHOUT FULL TECHNICAL CAV
TRAINING CAN DIE BEYOND THIS POINT

IT: PERICOLO DI MORTE. PER SUBACQUEI
NON IN POSSESSO DI CERTIFCAZIONE
GROTTO, NON OLTREPASSARE QUESTO PUNTO

RUS: ДАЙВЕРЫ БЕЗ ПЕЩЕРНОЙ
ПОДГОТОВКИ МОГУТ ПОГИБНУТЬ,
ЗАИДЯ ЗА ЭТУ ТОЧКУ

العبر بعد هنا التدريب
التدريب اللازم يؤدي إلى الموت

THIS PAGE: Scenes from the expedition to the cave under Ras Muhammed

ing to continue exploring, but at that point, I made the decision to halt further deep cave dives altogether until I acquired cave training.

A case for cave training

For the next five years, I was kept busy with the Yolda Wreck Project and running various various courses. However, in early 2007, my friend, the technical instructor, Gennadiy (Gena) Fursov, asked me for information regarding the exact location of the cave entrances in the Jack Fish Alley area. I gave Gena the information that I had gathered during my dives, and over the next few weeks, I was regularly informed by Gena of his exploits inside the caves.

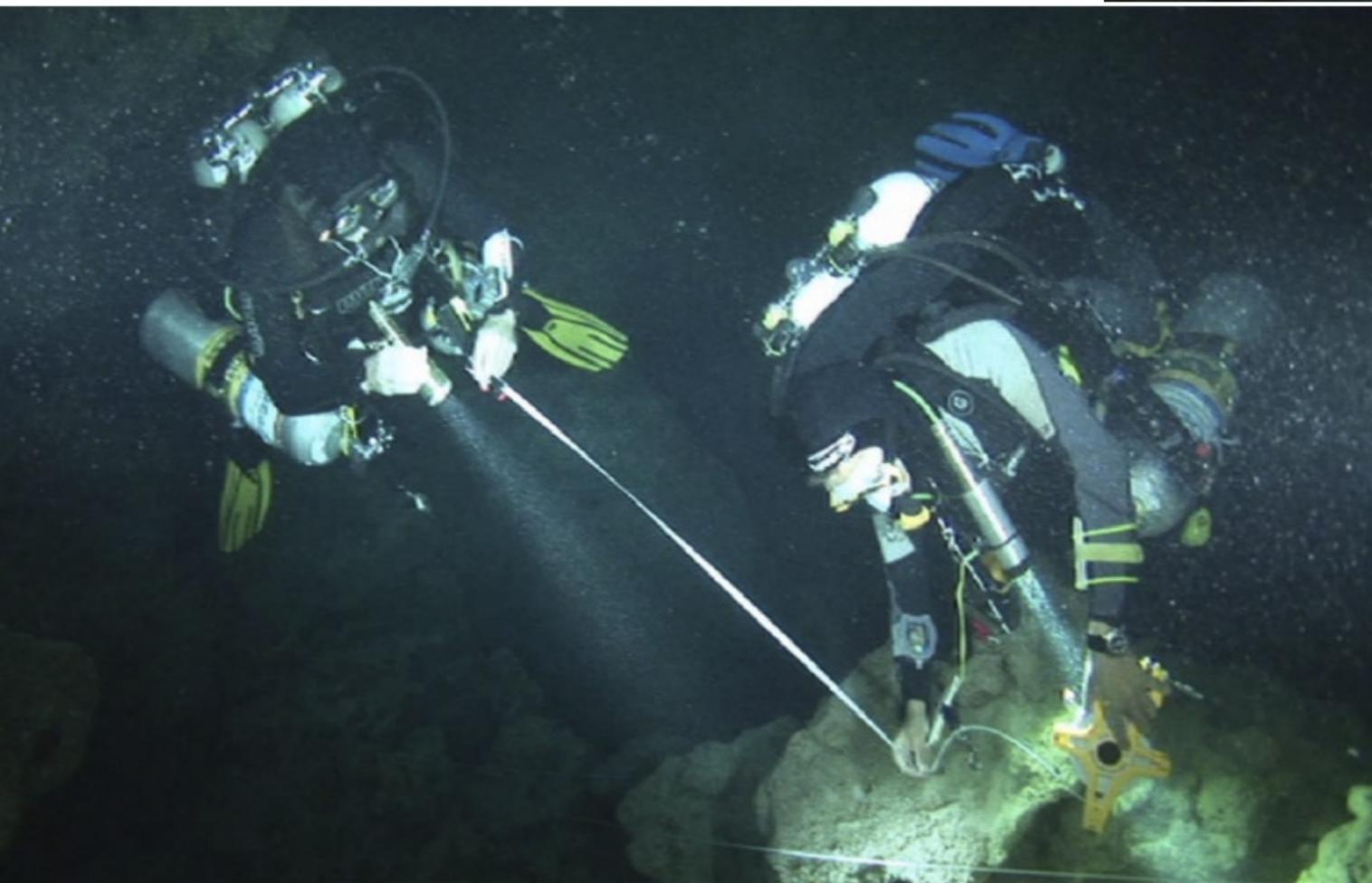
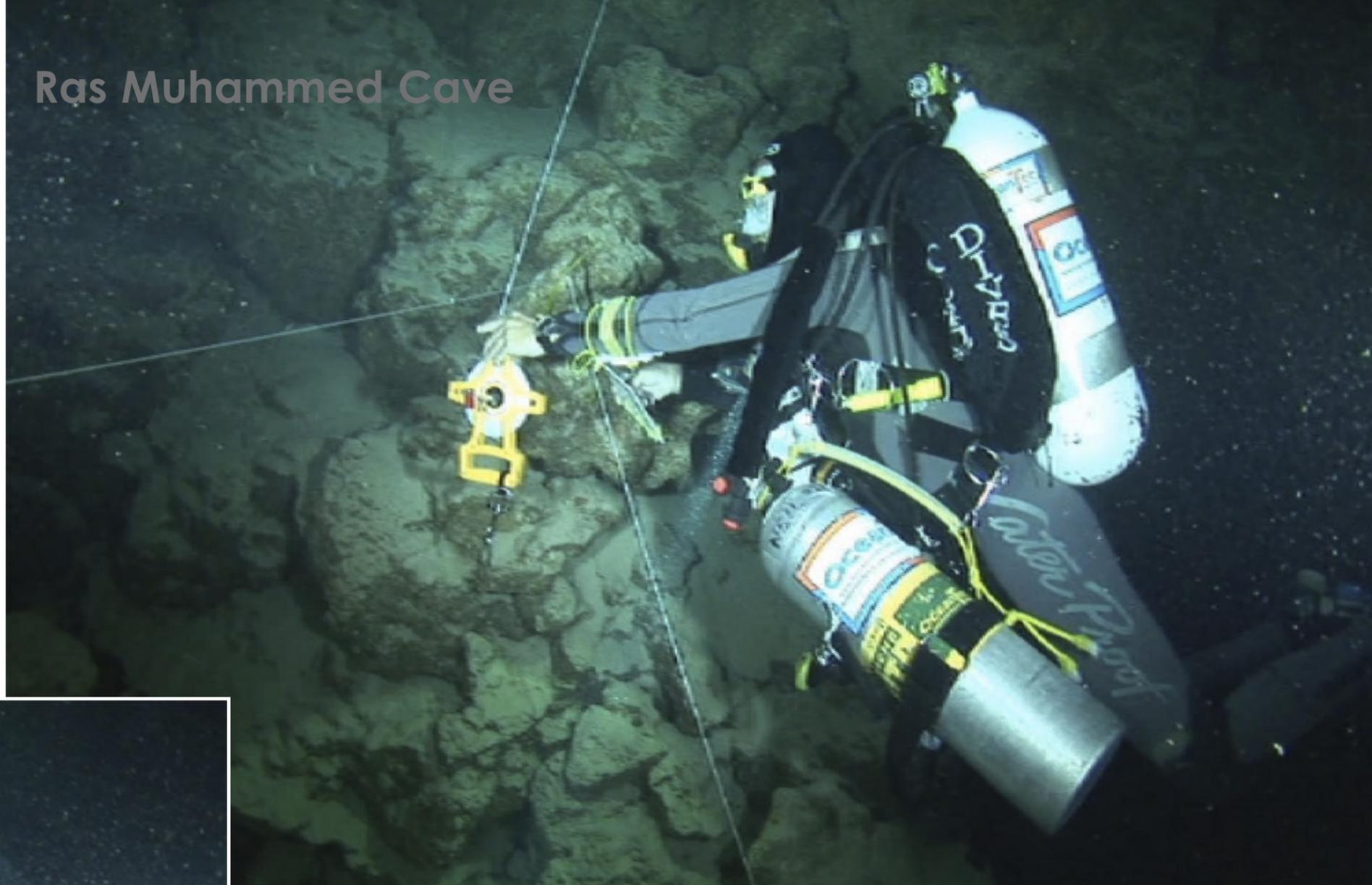
After he had reached 110m in the deeper of two systems, Gena asked me if I would like to put together a team and push deeper into the system.

I agreed at once, but shortly afterwards, I realised I was about to blunder into a highly dangerous situation without the proper preparation.

Six years previously, I made a clear decision to stop diving caves altogether until I completed full cave training. Now, today, with still no cave training, I had given a similarly untrained diver detailed information regarding the exact location of the caves. Even more stupidly, I had agreed to put a team together and lead them into these unknown caves. It was time to get properly cave certified!

I got in touch with Cave Diving Instructor Trainer and Explorer, Andreas Matthes, or Matt to his friends. Matt was responsible for much of the most extensive and logistically complicated cave exploration and surveying in the Yucatan from the early to mid 1990s,

Ras Muhammed Cave



as well as being an active technical instructor trainer. Matt was an excellent instructor, and after two weeks in Mexico, the team and I felt well prepared for the challenges that lay ahead in Ras Mohammed.

The project

Once back in Sharm El Sheikh, a plan was formulated for what we named the Jack Fish Alley Cave Exploration Project, the goals of which were:

- To find out if there may be a passable connection between the shallower and deeper known caves, or a passable connection to any other caves

- To explore the deeper cave and conduct a survey of the explored areas

A group of eight cave divers, including Valentina Cucchiara (Deep Cave Videographer), plus five technical support divers made up the dive team. One dive a day was conducted for four days, all using OC scuba. The very experienced dive team was a combination of technical divers instructors and instructor trainers.

Vital support

Our boat for the project was provided by our main sponsor, Ocean Tec, run by Mr Chad Clark,

who also provided 12 manifolds of Trimix plus intermediate's and hyperoxic Trimix mixes, EANx, O2 as well as a fair few spares each day. Ehab, Ocean Tec's "mix master", kept the blending team busy throughout the night until sunrise each day. Medical support was provided by Dr Adel Taher and Dr Ahmed Sakr from the local Sharm Hyperbaric chamber. Further logistical support was provided by Hamdy Sammy, director the local Search and Rescue (SAR). The cave diving team split into three smaller teams with Valentina, the videographer, swapping teams each day.

Ras Muhammed Cave

Day 1: The Reaper's Lair

The team met bright and early at Ocean Tec, where gargantuan amounts of gas, countless dive crates and the deco station were being prepared. Mohammed Salem, director of the Ras Mohammed National Park, had given permission to use the old mooring at Jack Fish Alley; it's not normally allowed, but the proximity to the site made general diving logistics much simpler and safer. Divers kitted up on route and once moored, the floating deco station was deployed with EAN80 and O2 staged.

The support divers, led by Jilly

Healey and Suzy Coombs, laid a guide line from the bottom of the decompression station to the 65m cave entrance (we had called it The Reapers Lair) while the cave teams decide on their goals for the day.

For the first dive, Gena and I were the first team in. We laid a survey line in the Reapers Lair, and conducted a survey to the furthest explored point from the cave entrance. Valentina filmed the first chamber to the connecting passage (Dead Mans Shoot) in the right hand corner of the first chamber, with Thomas and Oxana Istratova in support.

Team 2 (Jim Dowling, Jimmy Jewel and Dave "The Cave" Summerfield) followed an hour later, counting knots on the line and recording depths at key points, all the while drawing the contours of the cave. Team 3, consisting of Paul "Doozer" Close and Neil Black, finished our first day by confirming depths at survey points. They also started measuring distances from survey points to the cave walls, ceiling and floor in the first room.

Day 2: The Devil's Eye

Gena and myself were now focused on exploring the deeper



ABOVE: Preparing for the dive. LEFT: Diagram of Devils Eye cave

of the two caves—The Devil's Eye—leaving the other two cave teams to continue work on the Reapers Lair, working towards a comprehensive Grade 3 survey. Gena was using twin 20's, and I had twin 18's on the back, plus another five 12-litre cylinders required to complete the relatively long bottom time and the required four hours of decompression.

This was very much the day of the cylinders—we needed loads to cover the 25-minute bottom time to explore between the cave entrance at 80m and 130m, and the idea was to use our large

twin sets solely for cave gas. We travelled to the cave entrance with an intermediate Trimix, staging this mix and another mix of hyperoxic Trimix at the cave entrance. We laid 45m of survey line from the cave light zone vertically, to a little over 100m, before veering off to the left and following a passage leading to a major restriction in 108m. I tied the line off and followed Gena back up the main line to 95m, then turning right over the Devils Eye, explored another passage to a max depth of 113m.

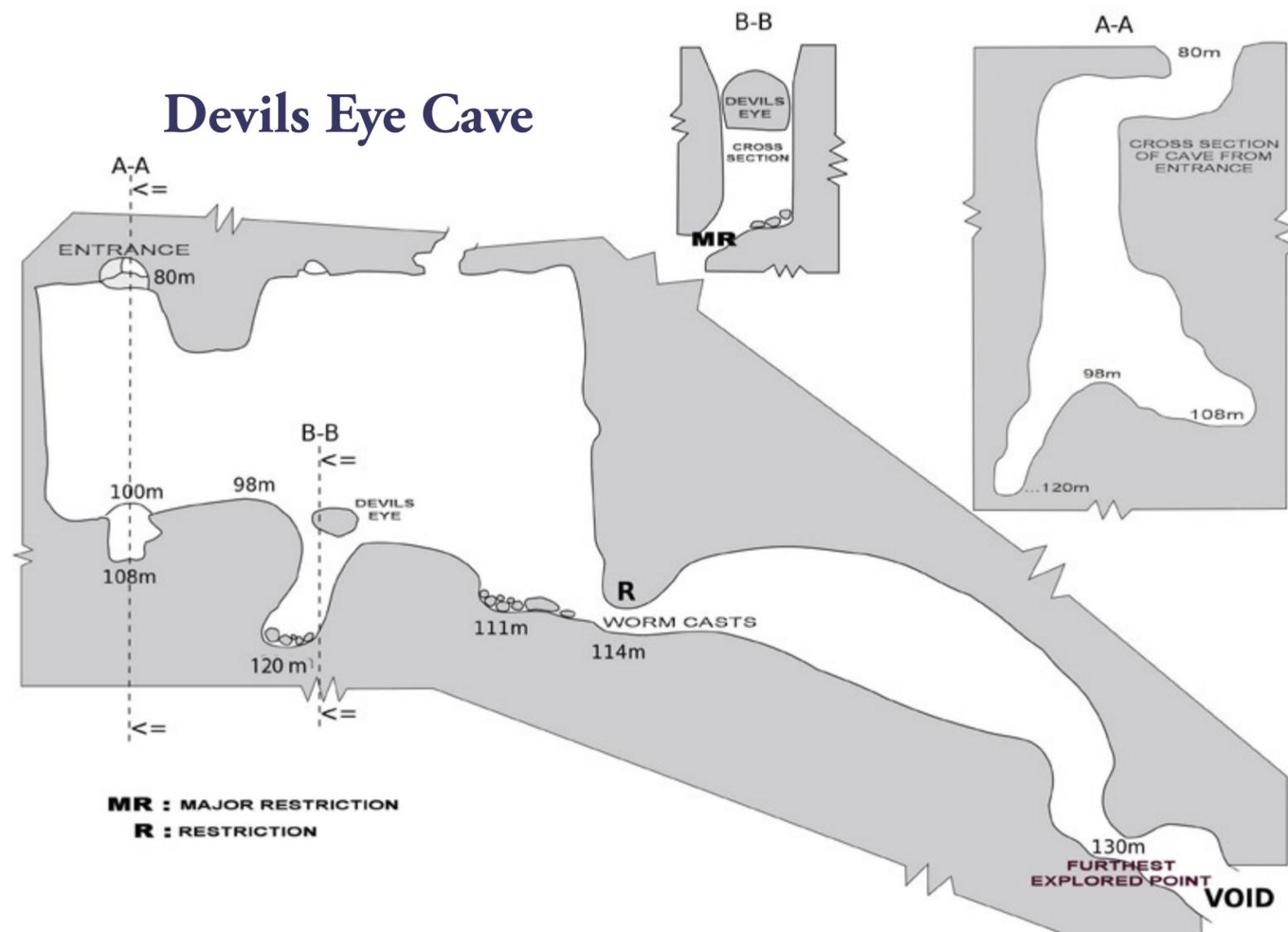
When it was time to head back to the main line, we approached

a secondary tie off at 100m. On the way out, we noted the main vein of the cave appeared to run of to the right, (facing line) bearing North. Our torch beams disappeared into a narrow, seemingly endless void. More to explore tomorrow!

As we exited the cave, our support divers, Nina and Oxana, were waiting with fresh gas to exchange for our intermediate mixes en route along the guide line system to reach the pure O₂ cylinders staged on the decompression station.

The second team completed a 20-25 minute bottom time

Devils Eye Cave





Edited by
Michael Symes

We have previously looked at the various properties of water which have an effect on aquatic fauna, some of them a bit out of the ordinary, such as surface tension. However, one of the most important properties influencing the marine environment is one we perhaps notice first of all, the temperature of the water, especially when we go swimming or diving.

The increase in world temperatures due to the rise in atmospheric CO₂ levels is currently much in the news, with the many references to warmer summers, droughts and rising sea levels. Most of the information available concerns the effect of rising global temperatures on terrestrial environment i.e. desertification, flooding, etc. Yet the global warming also has important impacts on the marine environments. Not only do increasing temperatures affect the physical properties of water such as its density, and its ability to dissolve salts and gases; it has a also great effect on marine biological processes. Fish populations and other aquatic resources are likely to be seriously affected by higher water temperatures.



T *How aquatic animals will cope – or not – with changing water temperatures* Temperature

By Michael Symes

As pure water is only a liquid between 0°C and 100°C, it is not surprising that life, at least as we know it, which depends on water, is to be found on earth where this condition obtains, though most life on Earth lives at temperatures of less than about 50°C. Yet, the so-called hyperthermophiles can live in extremely hot environments i.e. hotter than about 60°C, with an optimal temperature above 80°C. The most heat-tolerant hyperthermophile is the recently discovered Strain 121, which can exist at temperatures of up to 121°C. The toughest hyperthermophiles live on the superheated walls of hydrothermal vents, and require temperatures of at least 90°C to enable them to survive.





NASA

The present temperature of the oceans

The oceans store vast amounts of energy in the form of heat, which has the sun as its primary source. Infrared radiation from the sun plays an important role in that ultimately all the forms of energy in the oceans, such as the long-term circulation and the evaporation at the surface of the sea, depend on input from the sun. There are only two sources of energy that do not depend on solar heating. These are tidal energy derived from the gravitational pull of the sun, moon and—to a small extent—the planets; and geothermal heating through the seafloor from the molten core of the Earth.

The net heat input to oceanic heating is given by the direct solar input and geothermal heating. These are estimated at 150 watts/m² and 0.01 watt/m² respectively. So, it is obvious that the geothermal heating is negligible compared with the solar heating. The net heat loss is given by black body radiation (50 watt/m²), the conductive heat loss to the atmosphere (10 watts/m²), and the loss due to evaporation (90 watts/m²).

The amount of sunlight arriving at the sea surface varies, of course, according to the time of day, season, and weather.

Global average surface temperature has increased over the 20th century by about 0.6°C

The temperature of the oceans is thus given by a dynamic balance between incoming heat and outgoing heat. There are naturally great differences, though, in the temperature of the water between, say, equatorial waters and polar waters, at least for the surface waters. These surface water temperatures range from some 40°C in shallow tropical lagoons to -1.9°C (the typical freezing point of sea water) in polar regions. Apart from the Mediterranean and Red Seas, any warm water in the open ocean is restricted to an upper mixed surface layer of about 100 – 200 meters depth.

However, whatever the surface temperatures are, the temperature falls to about 5°C at about 1000 m depth and thereaf-

ter declines slowly to between about 0°C and 3°C at greater depths. Even below the hottest tropical regions, the water at a depth of 2000 to 3000 m hardly ever rises above 4°C. There are, of course, some few exceptions to this, for example the water close to hydrothermal vents where the water can emerge at temperatures of up to 400°C, although it rapidly cools to the surrounding water temperature of 3 – 4°C. (See X-RAY MAG issue 5, 2005)

Increasing ocean temperatures

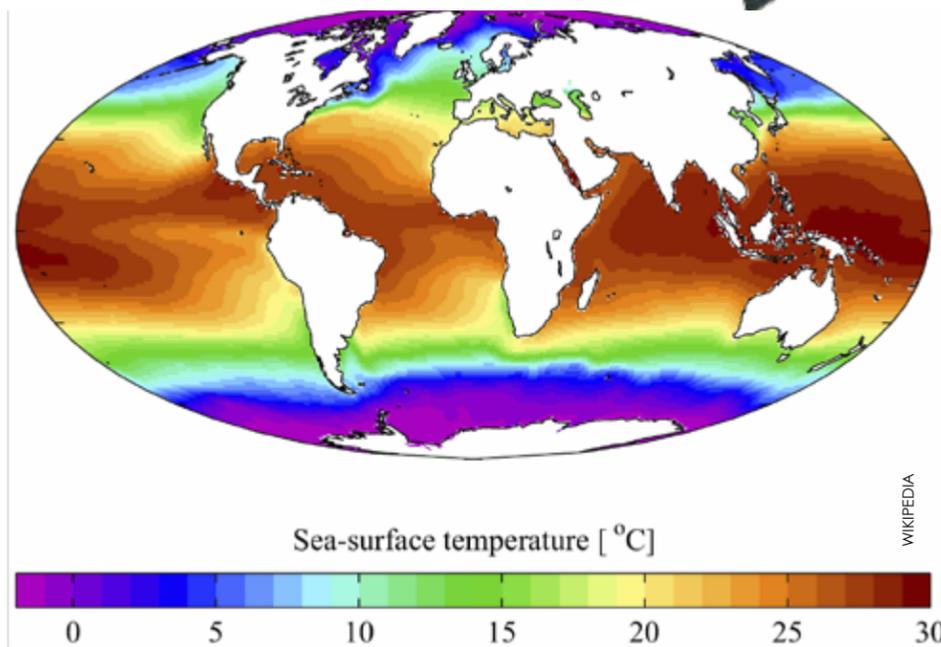
There are various opinions about the magnitude of the temperature changes

occurring due to global warming. However, the Intergovernmental Panel on Climate Change, based on a consensus of many hundreds of scientists from many countries, state that the global average surface temperature has increased over the 20th century by about 0.6°C ± 0.2°C. It should be noted, though, that this warming has not been globally uniform. The most recent warming has been greatest between the latitudes 40°N and 70°N, while the North Atlantic Ocean, for example, has cooled in recent decades.

These temperature changes are, however, still mostly confined to the upper water



STEIN JOHSEN



WIKIPEDIA

Annual mean sea surface temperature from the World Ocean Atlas 2001. Temperature here is in degrees Celsius

levels. Work by the Scripps Institution of Oceanography has modelled the time variation of heat content for the various ocean basins. In both the simulations and observations, the heat content in most of the oceans increased only slowly with depth, consistent with a diffusion process. The water had been warmed below about 1000 meters only in the north and south Atlantic, reflecting strong vertical convection there.

The mean daily variation in surface temperature in the open ocean is, however, very small, being gener-

ally less than 0.3°C. Below ten meters depth, there are practically no variations in temperature. Unlike for creatures living in inter-tidal waters, which can be subjected to great differences between day and night-time temperatures, plankton and fish are unaffected by temperature changes over 24-hour periods.

Not only are there vertical changes in temperature, there are also the oceanic currents, which circulate the warm waters and the cold waters. Whilst most marine life has evolved as a function of the environments brought about

Even below the hottest tropical regions, the water at a depth of 2000 to 3000 m hardly ever rises above 4°C

by these regular currents, irregular currents such as El Niño can cause biological and physical functioning to change quickly over both small and large areas. It can disrupt the whole marine food chain

The following table shows the average temperature for the various thermal ocean layers at the Equator.

Thermal layer	Depth in meters	Average temperature °C
Mixed surface layer	0 – 150	26
Permanent thermocline	150 – 750	7.5
Deep layer	750 – 2000	4.5
Bottom waters	>2000	3.3

STEIN JOHSEN - WWW.LIVFOTO.NO



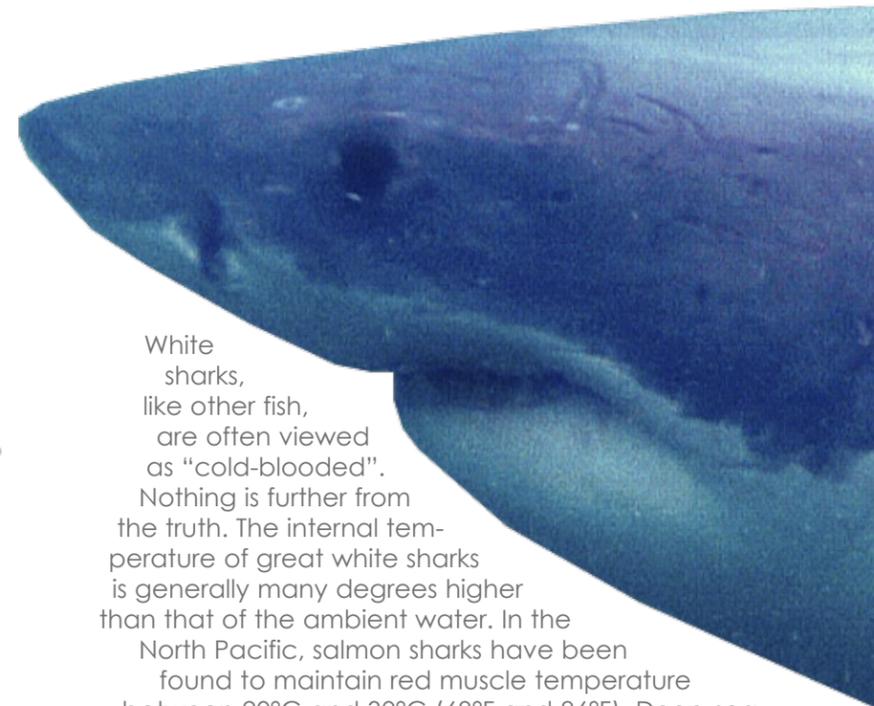
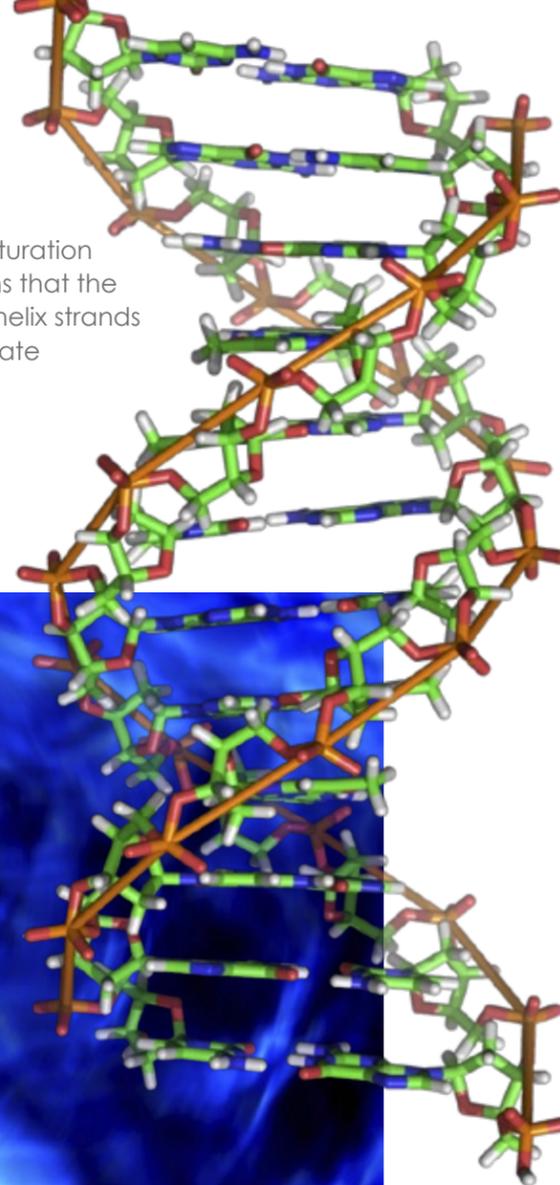


BEV SYKES VIA FLICKR

A boiled egg has a different consistency because the proteins takes shape by being heated

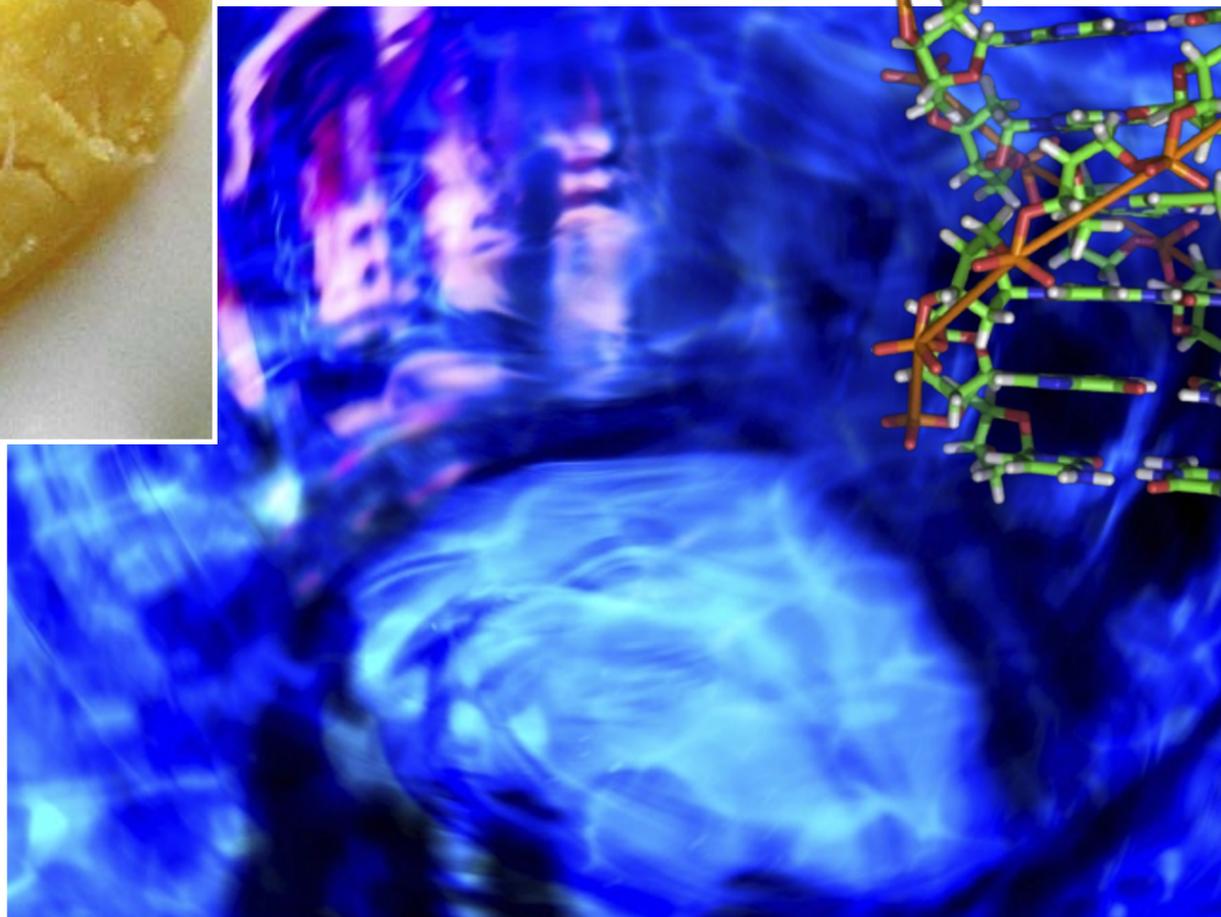
the proteins become irreversibly changed during the four minutes or so at 100°C. To counter the effect of high temperatures in nature, the thermophiles, for example, mentioned above, have had to evolve special proteins, as DNA will normally be denatured above 60°C. Denatured means that the DNA helix strands separate.

Denaturation means that the DNA helix strands separate



TONY WHITE

White sharks, like other fish, are often viewed as "cold-blooded". Nothing is further from the truth. The internal temperature of great white sharks is generally many degrees higher than that of the ambient water. In the North Pacific, salmon sharks have been found to maintain red muscle temperature between 20°C and 30°C (68°F and 86°F). Deep-sea predators such as swordfish, tuna and sharks also warm their eyes and brain to give them superior vision when hunting



measured by oxygen consumption, of all poikilothermic organisms is greatly increased with rise of temperature. According to van't

Hoff's rule, the increase is two to three times for each 10°C rise in temperature within favourable limits. This can be of great consequence for life on earth in the years to come.

Effect of temperature on marine animals

Marine animals, like their terrestrial counterparts, can be divided into four main types with regard to their thermal behaviour.

Firstly, there are the animals whose body temperature varies with the temperature of the surroundings. They are the **poikilothermic** animals, the so-called cold-blooded animals, (from Greek, *poikilos*, various), these

being the invertebrates and fish. It is well known that different poikilothermic animals differ greatly in their ability to tolerate high temperatures although the time of exposure is also very relevant. This is in part due to the effect of temperature on nerve velocities in peripheral nerves, which can have sharp upper and lower limits. For example, in some Antarctic poikilotherms heat-block was found to occur at around 31°C. Poikilothermic animals generally have more complex metabolisms than the homoiotherms (warm-blooded

Poikilothermy – This refers to creatures whose internal temperatures vary, often matching the ambient temperature of the immediate environment (Greek: "poikilos" ποικίλος = "varied," "thermia" θερμία = "heat"). (In medicine, loss of normal thermoregulation in humans is referred to as poikilothermia.)

and can be catastrophic for some species such as the Peruvian anchovy.

Although there might be some disagreement about the magnitude of the increase in oceanic temperatures, one thing is certain: even small changes in sea surface temperature can have drastic effects. There will be changes in oceanic circulation patterns, the polar ice will melt (it is already starting to doing so) giving a rising sea level, and giving fresh cold water which, being more dense, tends to sink. These variations in temperature and salinity will control vertical ocean currents. Water temperature also partially determines the concentration of dissolved gases, such as oxygen and carbon dioxide, in sea water. These gases are fundamentally linked to biological processes. All

these factors will effect life in the oceans.

Effect of increasing temperature on biological processes

Biological processes, like all other chemical processes, are rate-dependent on temperature, and biological molecules are generally very sensitive to increased temperature levels. The rate of reaction increases with increasing temperature up to a certain point, where either the reaction reaches an equilibrium or the reactants/products decompose. An exaggerated example, perhaps, but just think of a boiled egg where

double stranded DNA is heated up to between 60 to 80°C, the two strands unbind into single strands. They will recombine if allowed to cool slowly. Such organisms will probably be totally unaffected by any possible increase in the Earth's temperature.

The temperature dependence of the rate of

chemical reactions

A rule of thumb is that for most simple chemical reactions the rate approximately doubles for every 10°C increase in temperature. Thus a reaction at 35°C will go about twice as fast as at 25°C. However, biological reactions are far from being simple from the chemical-kinetics point of view. The rate of metabolism, as



PETER SYMES

Bald rock cod are so well adapted to very low temperatures that there is a possibility of developing commercial antifreeze products from them

Greek, *stenos*, narrow) which are restricted to narrow temperature limits. These include the reef-building corals, for example, which require a minimum temperature of 20°C and a maximum temperature of not much more than 30°C.

Species, which are cold-stenothermic, have a wide geographical range, being found in the shallow waters of the Arctic as well as at depths of 2000 – 3000 m where the temperatures are about 4°C. An example is the bald rock cod, *Pagothenia*

To mingle with the in-crowds below, humans need an attire that preserves body heat



NOAA

in a previous issue, that have sophisticated mechanisms for maintaining body core temperatures, which are close to that of humans, 37°C. For example, the Humpback whale has a body temperature of 36°C, with the av-

borchgrevinki, a common fish which lives under sea ice at temperatures of -0.5°C to -1.8°C, and which dies at temperatures over 6°C (this is the lowest known temperature to kill an animal). However, in the long term this may not be true, see below.

Thirdly, there are the animals that can exist in environments with a wide temperature range; they



BERNARDO SAMBRA

Marine mammals must maintain a core temperature almost identical to that of humans—about 37°C

are known as **eurythermic** (from Greek, *eurus*, wide). These species tend to have wide distributional ranges, or they live in regions of considerable temperature fluctuations, such as temperate inter-tidal zones. Such animals are, for example, the periwinkle (*Littorina litorea*), the common mussel (*Mytilus edulis*) and the common cockle (*Cardium edule*).

Finally, there are the aquatic mammals that are **homoiothermic** (from Greek, *homos*, same) i.e. they maintain a constant body temperature, and are usually referred to as warm-blooded. These are the cetacea, discussed

average body temperature of Cetaceans being ca 35.5°C, which is low for a mammal. In comparison, the elephant seal has a body temperature of 36.7°C and the Weddell seal 37°C.



Periwinkle (*Littorina litorea*)



JASON HELLER

Tropical corals only thrive between 20° and 30° C

creatures), having four to ten enzyme systems that operate at different temperatures.

In general, poikilotherms do not use their metabolisms to heat or cool themselves although the swimming muscles of the Tuna fish are warmed by a heat exchanger, with a network of fine veins, the rete mirabile, providing a thermal barrier against loss of heat. One obvious means of temperature control for poikilotherms such as fish is to change depth in the water column to find a suitable temperature.

Secondly, there are the **stenothermic** species (from



Control of temperature in aquatic mammals

In terrestrial mammals, temperature is controlled by a number of mechanisms. The central organ for temperature control is situated in the hypothalamus, which contains the control mechanisms as well as the key temperature sensors. The body core temperature is detected by these sensors, which change their rate of nerve impulse generation according to the temperature. At the normal

body temperature, these cells generate pulses at a certain rate which indicates the pulse set point of the system. If, for example, the core body temperature falls below 37°C, then the nerve impulse rate slows down, and a message is sent to the hypothalamus. The body will then initiate a number of positive responses to conserve heat in the body and to increase heat production, and with immediate cessation of sweating. Flow of heat to the skin will be reduced

by vasoconstriction of the capillaries, shivering will be induced to increase heat in the muscles, and there will be secretion of the hormones norepinephrine, epinephrine, and thyroxine to increase heat production. There may also be 'goosepimpling' of the skin, which raises the hairs on the body. This is a residual effect from our evolutionary ancestors who were covered in hair or fur, and erected the hairs of the fur to increase insulation.

Like in their terrestrial relatives, the aquatic mammals, too, have a very sophisticated temperature control system. Although very similar, it is obvious that some of the mechanisms used by the human body cannot be used by the aquatic mammals. Sweating, for example has no function in controlling the temperature of these creatures.



MARCELO MAMMANA

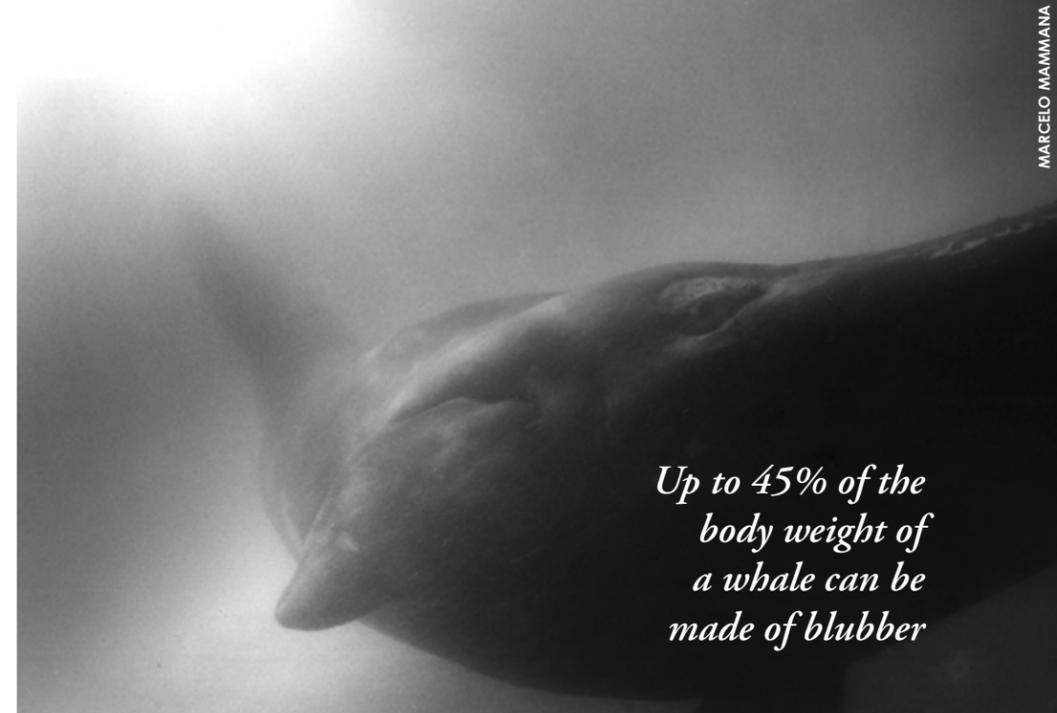


Aquatic mammals too have a very sophisticated temperature control system but cannot use perspiration to cool themselves

If the body temperature is too high, it can be cooled by radiation, conduction, convection, and evaporation of sweat. The first three factors are not under control by the body; they are purely physical effects that depend only on the actual temperature of the body and the ambient surroundings. Naturally, we humans can increase their effect by removing clothing, to improve radiation, or fanning our bodies to increase conduction and convection. However, the body itself can actively induce sweating, so that if the skin temperature increases above 37°C, sweating will begin almost immediately.

Whales require a thick layer of blubber to maintain their body temperature in water because heat is transmitted much more easily by water than by air. Up to 45 percent of the body weight of a whale can be made of blubber, which serves not only as an insulator but also as an energy reserve. Ocean water is relatively cold in contrast to body temperature, but a fast swimming whale does produce a lot of heat, which has to be removed. This is carried out by means of blood vessels leading to an extensive network of capillaries in the flippers, tail flukes and dorsal

There is nothing like a good layer of blubber to make you all comfy



Up to 45% of the body weight of a whale can be made of blubber

Whales require a thick layer of blubber to maintain their body temperature in water

fin. Concurrent circulation, on the other hand, minimises heat lost from the arteries to the surroundings. In some ways, temperature control may be easier for the cetacea, for it is easy to get rid of heat in cold water—if the water is cool enough.

Adverse effects of increasing oceanic temperatures

It has been discovered that global warming caused marine mass extinction at the end of the Permian period 251 million years ago. It is estimated that 95 percent of marine species were killed off.

This mass extinction, although the worst, was but one of five that have occurred over the past 550 million years. The temperatures are estimated to have been about 6°C higher than today. The most recent event was the Cretaceous-Tertiary, which occurred 65 million years ago, when temperatures were about 4°C higher than today.

The mass extinction 251 million years ago appears to have happened because of the slow decline and death of deep sea creatures, which were the first to



MARCELO MAMMANA



Dolichorhynchops osborni, a plesiosaur from the Late Cretaceous when temperatures were about 4°C higher than today



go, followed by the shallow water inhabitants. It indicates that something was arising from the deep oceans which possibly was the very toxic hydrogen sulphide produced by deep-ocean anaerobic bacteria i.e. those that don't use oxygen in their metabolism. These bacteria were favoured by the fact that the warming of the surface water had decreased the ability of the oceans to absorb oxygen. However, whatever mechanism it was that caused the mass extinction, it was probably tied to the ocean circulation processes. The emission of hydrogen sulphide from the oceans could also account for the great demise, 65 percent of the terrestrial species, which occurred at the same time.

Will a rise in temperature lead to a new mass extinction? Whether or not a mass extinction is soon to occur, it is believed by some climatologists that a rise of 1.5°C to 2.5°C is likely to take place before the middle of the century. If this is true, then between 20 percent and 30 percent of animal and plant species could die. Sea water temperature affects faunal distribution and, as we have seen, water temperatures can vary both horizontally in the surface and vertically down into the depths. So, these temperature changes have a great significance for the faunal—and floral—distributions. Faunal distribution depends to a large extent on a given organism's ability to adjust to the ambient conditions. If they cannot adjust, they must either move or die. For example, the eelpout, *Zoarces viviparus*,

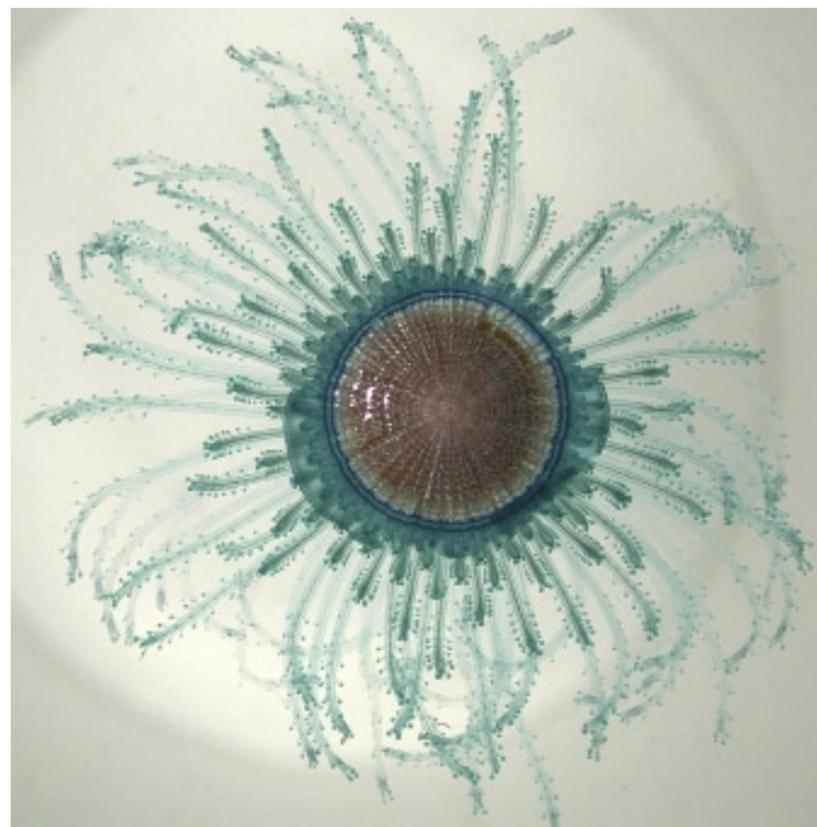
Whether or not a mass extinction is soon to occur, it is believed by some climatologists that a rise of 1.5°C to 2.5°C is likely to take place before the middle of the century

is near the top of its local food chain in the shallow waters of the southern North Sea. Research carried out at the Alfred Wegener Institute in Bremerhaven, Germany, appears to show that the fish face an oxygen constraint because as the water warms up, it contains less dissolved oxygen. With less oxygen available, the eelpout gives birth to fewer young, so their population declines. This also appears to be the case with cod in the North Sea, which are finding it hard to maintain high reproducibility. A permanent increase in water temperature will probably not mean that these fish will become extinct, but that they will move from their ancient homes to new, cooler aquatic pastures to the north.

The invasion of jellyfish

A typical example of what happens ecologically when the sea temperature changes even slightly is given by the mauve stinger jellyfish. Recently, millions of these creatures drifted into a salmon farm in the Irish Sea, killing more than 100,000 fish. Several more swarms of these jellyfish, a Medi-

terranean species, have been observed around Britain, even as far north as the Shetland Islands. Apparently, warmer sea waters in the Mediterranean is boosting the jellyfish numbers by increasing winter survival and lengthening the breeding season. The increasing water temperatures then allows them to move north. Generally speaking, most jellyfish are posi-



Jellyfish swarms are becoming more commonplace

tively affected by global warming, not only by the increasing water temperatures, but by the fact that the increased concentration of carbon dioxide affects creatures with acid-soluble shells which compete with jellyfish.

Because they have positive control over their body temperatures, the homoiothermic animals will probably be the least affected by temperature increases, at least initially. Those best suited to survive will therefore probably be the aquatic mammals which, like humans, have a large measure of control over their body temperatures thus making them, to a large degree, independent of increasing water temperatures.

The first type of aquatic animal to be really effected are those who are restricted to narrow temperature limits i.e. the stenothermic

animals such as the corals. There is already evidence that this is occurring with the bleaching of corals.

Freshwater pearl mussel (*Margaritifera margaritifera*). Mussels have a wide temperature tolerance but may be affected by change in predation

The eurythermic animals, which have evolved to survive in environments with a wide temperature range, will probably have little difficulty in adapting to increased temperatures.

The greatest effect of changing temperatures will obviously be on those creatures that have no, or little, control over their temperature, because this is a function of the ambient water temperature. These are the poikilothermic animals and to a lesser degree the stenothermic species. As heat is required for many chemical changes to take place, including those needed for muscle activity, the activity of poikilothermic animals depends greatly on the temperature of the surrounding water. Therefore, these animals mostly flourish where the water is warm, near tropical coral reefs, for example, where there is an abundance of fish species to be seen. On the other hand, there are relatively few fish and invertebrates to be found in the cold depths of the oceans.

A clear example of what can happen to an ecological system in delicate balance when temperature changes occur is given by starfish and mussels in the tidal waters of Oregon, USA. It was found by Eric Sanford of Oregon State University that a 5°F (ca 2.8°C) change is enough to change dramatically the feeding habits of the starfish. This creature feeds mainly on mussels along the US Pacific coast.

He found that a drop of the same magnitude caused the starfish to virtually stop feeding on the mussels, which then allowed a rapid expansion in the mussel population. They can then crowd out algae, barnacles and other organisms. On the other hand, an equivalent increase in temperature caused the starfish to go on a feeding binge, which caused the mussel population to drop drastically. The consequent collapse of the mussel communities then affects the crab, sea cucumbers and worms, which are part of the ecosystem.

A temperature drop of the 2.8°C caused the starfish along the US Pacific coast to virtually stop feeding on the mussels, which then allowed a rapid expansion in the mussel population.



His study thus suggests that if a key species in an ecological system is sensitive to temperature, a slight warming or cooling can trigger a cascade of rapid changes that will affect every animal within that system.

Some cold-stenothermic fish, however, may be able to adjust to increasing water temperatures. For example, in the case of the bald rock cod mentioned above, it has been found that when these fish were exposed to long-term changes, they could compensate for those changes. Dr Frank Seebacher of the University of Sydney has found that they could adjust their cardiovascular system and metabolism to survive in warmer waters. The cod were first acclimatised in 4°C water for four weeks and then transferred to water with temperatures of up to 10°C. The fish appeared to live as happily in the warmer water as they did at -1°C.

However, temperature affects many life history parameters such as fecundity and the development time with the development time from egg to adult being accelerated under increasing temperatures. Increased temperatures can also affect the sex ratios. It has also been found that this accelerating effect of increased temperature has a life-shortening effect corresponding to the rate of reaction increase with increasing temperature. For these creatures, it appears to be a case of 'Live fast, die young'.

If the changes in temperature occur very slowly, then the species can adapt. The fact that an Antarctic fish, the bald rock cod, has the capacity to compensate for chronic changes in temperature means that we must be careful in our predictions regarding the catastrophic consequences of global warming. Unfortunately, the current increasing changes in



Aspergillus is caused by the terrestrial fungus *Aspergillus sydowii*. The gorgonia counteract the disease by encapsulating fungal hyphae in purple pigmented galls

bright blue coral, found in Caribbean and Florida Keys, has been dying in some places at a rate of over 20 percent. The sea whips have also been found to be dying of the bacterium *Scytonema* in the Florida Keys. The optimal temperature for many of these pathogens to flourish is about 32°C, the temperature at which bleaching is prevalent.

There are also the secondary effects of warming such as predator-prey interactions. These again will have a feedback effect on other plant and animal species, with the bleaching of corals due to increasing water temperatures being a well-known phenomenon.

Coral bleaching

As described in a previous issue, corals are a symbiosis between small polyps and a type of algae called zooxanthellae, which are packed into the cells of the polyp tissue. The algae use the photosynthetic process to produce energy-rich compounds. The corals can utilise some of these products in their own metabolism and, in return, give protection to the zooxanthellae.

Corals and zooxanthellae, like all biological life, live within a preferred range of temperatures. Summer sea temperatures that are 2 – 3°C above normal can kill corals. At these temperatures, the symbiotic relationship will eventually collapse and, as the corals cannot escape to more suitable environmental conditions, being attached to the reefs, the corals will die. As it is the algae that give colour to the corals, the loss of them from the coral will cause the corals to become pale or bleached. Many corals appear to be living close to their upper temperature limit, and transient temperature increases

of only a few degrees above the usual maximum can kill corals. However, there is a great variation in susceptibility to changing temperatures between different coral species, so that some corals may survive an increasing oceanic temperature—if not too great. There is also the effect of the increasing solubility of carbon dioxide in the warming surface waters of the oceans, resulting in the reduction of the amount of dissolved calcium carbonate available to reef-building corals.

Apocalypse soon?

Many climatologists today feel like Cassandra of Greek mythology who was thought to be endowed with the power of prophecy but fated never to be believed. So, are we facing another mass extinction event? Not immediately, perhaps, but all the realistic prognoses indicate that there will be a great loss of species by the end of this century. And the great tragedy is that with the bulk of marine species still undiscovered, we will lose species before we even know of them. And it is not just species we will lose, it is whole ecological systems.

In the short-term, it is possible that corals, for example, can adapt to the rising temperatures either by acclimatisation, with changes in their physiology, or by natural selection. However, it may not be the relatively simple effect of an increase in water temperature that is the most important effect. It has been suggested that great changes in the oceanic currents can occur, both horizontally and, especially, vertically. Such changes could drastically change the environments for all marine species, both the bottom dwellers and those who live in the surface waters. Most species would be quite incapable of coping with such changes and would therefore be wiped out.

More relevant for the diving community, regarding the relatively near future, we may see a total loss of our beautiful coral reefs. So divers, visit the reefs while you can, for many of the more susceptible may not exist for many more years. ■

Although the oceanic temperature changes are, as yet, small, they can still have some significant effects.

water temperatures are happening too fast for many of the current species to adapt, and they will therefore disappear. Of course, evolution will ensure that species will appear that can survive—and flourish—under the new conditions.

Although the oceanic temperature changes are, as yet, small, they can still have some significant effects. Climatic-related pressures can act directly on aquatic animal life through physiological effects such as changes in food demands, in growth rates, and in abilities to reproduce and survive. It has also been shown that increasing temperatures can be favourable for disease-causing pathogens in corals.

For example, it has been shown that a fungus, *Aspergillus sydowii*, is a pathogen for the sea fan, *Gorgonia ventalina*. This

Deep sea mussel beds are likely to be least affected by temperature change





Edited by
Michael Arvedlund, PhD
& Peter Symes, M.Sc.

They are all Transsexuals

The popular anemone fishes are mostly known for their symbiosis with giant sea anemones, their interesting behaviour, and beautiful colours. But they also have another lesser known but interesting side to their lives: Their life cycles includes transsexual 'stunts'

Anemone fishes are hermaphrodites. They have both male and female gonads. However, once hatched, the female gonads are suppressed, thus turning them all into male when juvenile. Among young fish, it's all boys, no girls.

In the early part of their life cycles, after some days out in the blue as pelagic larvae, anemone fishes settle on the coral reef once they find a suitable host sea anemone. Usually, there are a small group of anemone fishes in one large sea anemone. The first one in the pecking order in a sea anemone turns into a female and mates with number two, which will remain a male. The rest of the fishes in the pecking order also remain males. They are not allowed to mate with the female. Only the number one male in the pecking order, the alpha male, can mate with the female.

The phenomenon of sex reversal is a fascinating part of anemone fish life history. Sex change occurs in many fishes. For example, it is now well established that most wrasses (*Labridae*) and parrot-

A reared batch of anemone fishes of the species *Amphiprion melanopus*, and they are all boys!

Michael Arvedlund and Peter Symes

Boys, girls or what?

fishes (*Scaridae*) begin adult life as females and later assume the more colourful male phase. Similar changes are widespread among groupers (*Serranidae*).

A leader with no balls

What sets the anemone fishes apart in this respect, however, is that the sex change goes

from male to female. As mentioned above, the largest and most socially dominant fish in a particular anemone is generally the female whose

gonads are functioning ovaries with remnants of degenerated testicular tissue. The smaller male, which in species such as *A. frenatus* and *P. biaculeatus* may be less than half the size of the female, has gonads that are functioning testes but also possess non-

functioning or latent ovarian cells. If the dominant female dies or is experimentally removed, the male's gonads cease to function as testes, and the egg-producing cells become active. Simultaneously, the largest of the non-breeding individuals becomes the functioning male.

This adaptation allows continuous reproduction; without it, an adult would ▶

The clownfish, or anemonefish, are the subfamily *Amphiprioninae* of the family *Pomacentridae*. Currently 27 species exist, of which one is in the genus *Premnas*, and the rest are in the subfamily's type genus *Amphiprion*. The other pomacentrids are called damselfish.

Clownfish and damselfish are the only species of fish that can avoid the potent stings of an anemone. There are several theories for how this avoidance is accomplished.

In a study published in the journal *Nature*, evolutionary biologist Peter Buston and colleagues report that clownfish in Papua New Guinea reefs can change their sex at will for social reasons. ■

The humphead wrasse (*Cheilinus undulatus*) is a wrasse that is mainly found in coral reefs. It is also known by the name "Napoleon wrasse", "Maori wrasse", or "Napoleonfish", or "So Mei" (in Cantonese, or "Mameng" (in Philippines).

Some males grow very large, with one unconfirmed report of a Humphead Wrasse that was 229cm long and weighed 190.5 kg



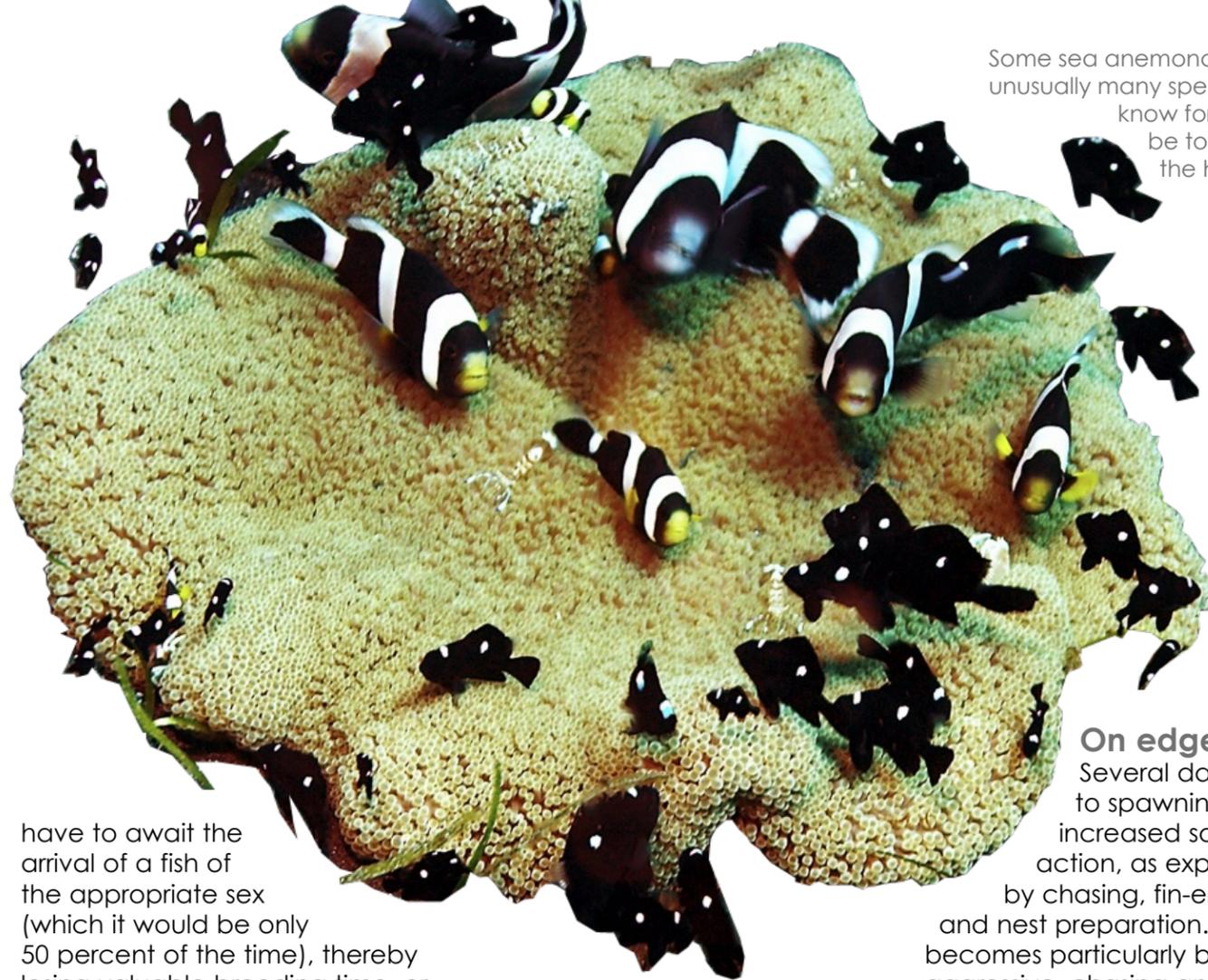
Sex change the other way around

Some fish change sex from males to females, like the anemone fishes. In different species, it may be the other way around, such as in humphead wrasses. Adult females are known to change into adult males.

The factors that control the timing of sex change are not yet known, nor how 'decisions' are made about which fish changes sex. We still have much to learn about the biology of this species. The humphead wrasse is long lived, but breeds very slowly. It takes quite a long time, possibly up to five years, with the fish reaching about 35-50 cm in total length before individuals reach sexual maturation. This has made it an endangered species, as it is not being regenerated fast enough to compensate for fishing. Its meat is in high demand Southeast Asia, selling at over US\$100 per kilogram.

Humphead wrasse mate in pairs formed within larger social groups that form temporary aggregations. Sometimes spawning aggregations can number several hundred fish in areas with no fishing pressure. Planktonic eggs are released into the water column and drift away from the spawning site.

After hatching, the larvae stay in the water until they settle on the substrate. Population sizes and structures are not yet known for this species. Juveniles occur in coral-rich areas of lagoon reefs, among live thickets of staghorn *Acropora* sp. corals, in seagrass beds, murky outer river areas with patch reefs, shallow sandy areas adjacent to coral reef lagoons and in mangrove and seagrass areas inshore. They tend to move into somewhat deeper waters as they grow older and larger. ■



Some sea anemones like this *Stichodactyla haddonii* host unusually many specimens of anemonefish. We don't know for sure but this high number of fish may be due to a lack of mature clownfish in the host.

have to await the arrival of a fish of the appropriate sex (which it would be only 50 percent of the time), thereby losing valuable breeding time, or it would have to seek out a mate, leaving its anemone and thereby risking predation both on itself and on its symbiont.

Within the tropics, spawning occurs throughout most of the year, although there may be seasonal peaks of activity. In subtropical or warm temperate seas, as, for example, in southern Japan, reproductive activity is generally restricted to spring and summer when water temperatures are at their highest. At Enewetak Atoll (located at about 11°N in the central Pacific), spawning is strongly correlated with the lunar cycle: most nesting occurs when the moon is full or nearly so. Moonlight may serve to maintain a high level of alertness in the male, which assumes most of the nest guarding duties. Moreover,

because newly hatched larvae are attracted to light, moonlight may draw them towards the surface, thereby facilitating their subsequent dispersal by waves and currents.

Anemone fishes are unique among damselfishes in forming permanent pair bonds that sometimes last for years. In other damsels, one male may mate with several females during a single spawning episode, and different sets of females are often involved in subsequent spawnings. However, pair-bonding in most species of anemone fishes is very strong and is correlated by the small size of their territories (centered on their sea anemone) which is, in turn, correlated with the unusual social hierarchy that exists in each "family" group.

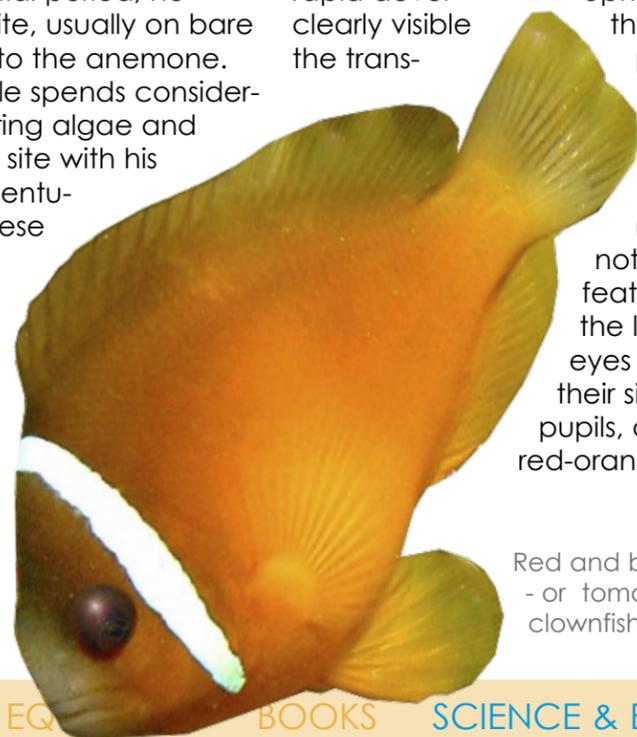
On edge

Several days prior to spawning, there is increased social interaction, as expressed by chasing, fin-erection, and nest preparation. The male becomes particularly bold and aggressive, chasing and nipping his mate. He also displays by fully extending his dorsal, anal, and pelvic fins, while remaining stationary in front of or beside her. During the nuptial period, he selects a nest site, usually on bare rock adjacent to the anemone. Initially, the male spends considerable time clearing algae and debris from the site with his mouth; he is eventually joined in these activities by his mate.

Spawning, which occurs most often during morning hours, generally lasts from about 30 minutes to more than

two hours. Once it commences, the tiny, conical ovipositor of the female is clearly visible. A number of eggs are extruded through this structure on each spawning pass, when the female swims slowly and deliberately in a zig-zag path with her belly just brushing the nest surface. She is followed closely by her mate, who fertilizes the eggs as they are laid. Numerous passes occur during each spawning session. The number of eggs deposited ranges from about 100 to over 1000, depending on the size of the fish and on previous experience. In general, older, more experienced pairs produce more eggs than do recently formed pairs.

Anemonefish eggs are elliptical or capsule-shaped, are about 3-4 mm in length, and adhere to the nest surface by a tuft of short filaments. They incubate six to seven days. Just prior to hatching, the embryo, which has undergone rapid development, is clearly visible through the transparent parent egg membrane: the most noticeable features are the large eyes with their silvery pupils, and the red-orange yolk



Red and black - or tomato clownfish



How to determine the sex on a fish

Often you cannot determine the sex of a fish just by looking at it. Determination of the sex and gonadal maturity of a fish is often necessary to determine the sex. A typical sex identification problem is facing biologists in groupers. A newly developed method by the fish sex change expert, Alam Mohamed at Sesoko Station, Japan, is an accurate and reliable determinate of the sex of live groupers using 5-10 mg gonadal tissue samples, harvested using non-lethal gonadal biopsy. Alam's fish survive the operation and there is no serious infections resulting from the surgery. Alam's method is therefore quickly spreading around the world. ■

sac that is responsible for the general colour of the entire egg mass throughout incubation, the nest is guarded and cared for by the male. He chases other fishes from its neighbourhood, especially potential egg-eaters (e.g. wrasses). The male frequently visits the nest to fan the eggs with his pectoral fins and to remove dead eggs and debris with his mouth. The female is mainly occupied with feeding during this time, but occasionally assists the male with his duties.

The embryos hatch one night after about a week (dependent on the species) and the tiny embryos swim to the surface guided by the moonlight and out on the open ocean, away from predators, and to a life as pelagic larvae for one or two weeks (also dependent on the species). Out on the blue the larvae grows by feeding on zooplankton, and returns another night to settle on the reef, detecting a suitable host sea anemone, and the life cycle has once again made on full round. ■



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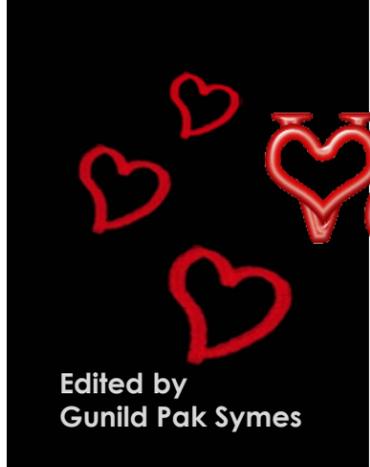
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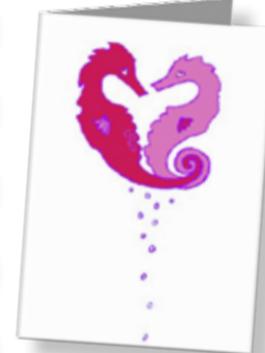
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Kissing Fish Mug



Biologist, rebreather diver, inventor of Pyle Stops or... database manager

X-RAY MAG catches up with the ever-inventive and contemplative pioneer, Richard Pyle, to find out what makes him tick, insights into his theories, and the stories behind his accomplishments.



Who is Richard Pyle really? A biologist or a rebreather diver?

Excellent question, many people have asked me that. I am definitely a biologist. My whole life I have been interested in fishes, and I don't know why but it always has been that way. I've had an aquarium since I was a little kid, so fishes have always come first. Scuba diving was a tool to get access to fishes. The most exciting part for me is finding new things that nobody ever found before, and I quickly learned that the only way I could go where my Ph.D advisor P.H.Randall hadn't already found a fish was—and he has been all over the world other than down—so I got into deep diving to try to get into a new place and find new kinds of new fishes nobody found before. There is a lot of history there, but I started off with regular scuba, going deeper and deeper and deeper. And I found out the hard way what the problems were. I got a bad case of the bends—you can read

all about it on my website—and then decided not to give up on deep diving but to learn to do it properly. That led me to Bill Stone. I read his article about trimix diving—this was before technical diving became a common term—in 1987. (See Interview with Bill Stone in X-RAY MAG #15). So, I wrote him a little letter and I asked, "How do you do this?" And he then wrote me back and told me, "We do it this way..." So, I learned how to do trimix diving from Bill Stone, and through him, I also learned about rebreathers, as he was already building rebreathers at that time. So, I got into rebreathers through fishes, and if I had to give one of them up, I would give up rebreathers before fishes.

I am definitely a biologist first and a rebreather diver second. But I will say that I get almost as much enjoyment out of thinking about the technical aspects of the diving. I enjoy thinking about rebreathers and technical diving almost as much as thinking about fishes, so every day I change

hats. I have my fish hat and my rebreather hat. They are two very different things to think about, as the topics are very different. I enjoy being able to think about them both.

The reason I ask is that you seem to have not just one, but two claims to fame.

It is actually more, as I have four worlds that I move in—and my family is my fifth world. The four worlds that I travel in are: The saltwater aquarium world—I am actually more known to people in the saltwater aquarium world than any of the other worlds—and I always get invited to give keynote presentations at aquarium meetings, but generally, I have been too busy to do that. The second world is the fish world where I know a lot of people and then, of course, the rebreather and tech world. But there is a completely different world from which I get my pay check, and that is for programming databases. Most of my travelling goes to

A talk with **Richard Pyle**

What is the "Twilight Zone"?

In this context, the coral-reef Twilight Zone is roughly defined as coral-reef habitat at depths between about 200 feet (60 meters) and 500 feet (150 meters).

The upper limit represents the approximate maximum depth to which stony corals tend to dominate the reef structure, and the lower limit represents the maximum depth at which significant photosynthesis occurs (the maximum depth to which the living coral reef extends).

The reason the coral-reef Twilight Zone is shallower than the open-ocean Twilight Zone stems mostly from the difference in water clarity between the two habitats.

In the open ocean, the crystal-clear water allows sunlight to penetrate considerably deeper than around coral reefs, where the water is often teeming with plankton.

Therefore, the biologically important transition zone between light and dark exists at somewhat shallower depths around coral reefs. ■

Divers on scuba have mostly explored reefs down to 60m

The "Twilight Zone"

We may know more about the ocean floor than we know about the coral-reef Twilight Zone

Submersibles have mostly explored depths below 150m



meetings to discuss standards for computer databases, so we can exchange data about biological diversity from different computers around the world. I am changing between all these hats all the time and between all these different groups of people. A lot of times, I joke about...you know what a nerd or geek is, someone who is too much into something ... I have found that in those worlds there are geeks in every one of them. Some are science nerds about the fish, and some are dive nerds.

There are different sorts of geniuses?

The funny thing is that across the topics, they all have the same characteristics, and I am one of the nerds. In fact, I am a nerd in all four categories. I can have the same sort of excited conversations over dinners regardless of whether it is about databases, fishes or rebreathers. I am surprised how similar it is.

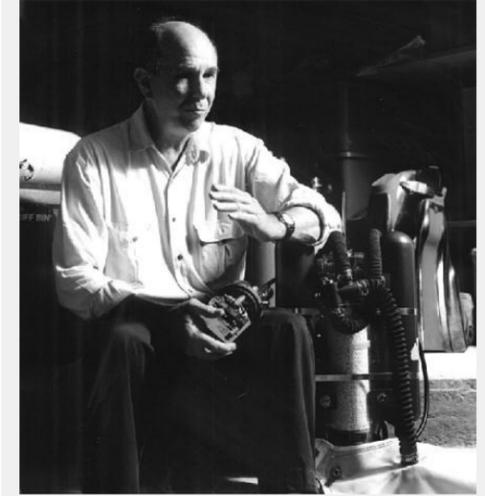
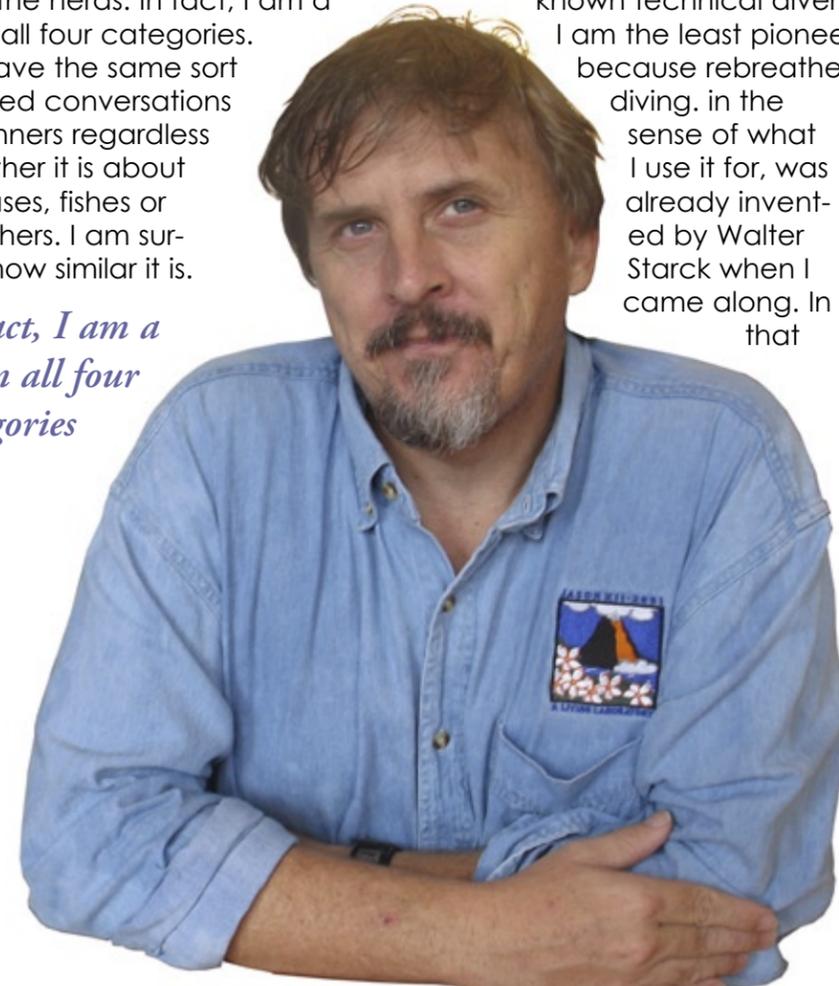
In fact, I am a nerd in all four categories

Richard Pyle

But you are the one that is widely credited with coining the term—or in some way being synonymous with—"The Twilight Zone"

It actually started out with Walter Starck who I think got credit for recognizing that this depth zone, however we want to define it, say from 50 to 150 meters, is awaiting to be explored. (Scubadivers can rarely go beyond 40m and submersibles rarely operate shallower than 150m – ed.). Walter Starck, aside from his fame as a photographer, his most significant contribution was to build the very first electronically controlled rebreather, the Electrolung. He invented this rebreather to do what I do, to find new fishes on the deeper coral reefs but this was back in the 1960's. Of all the

known technical divers, I am the least pioneer because rebreather diving, in the sense of what I use it for, was already invented by Walter Starck when I came along. In that



Dr. Walter Starck is one of the pioneers in the scientific investigation of coral reefs. He grew up in the Florida Keys and received a PhD in marine science from the University of Miami in 1964. He has over 40 years worldwide experience in reef studies, and his work has encompassed the discovery of much of the basic nature of reef biology. In this process, over 100 species of fishes, which were new to science, were found as well as numerous corals, shells, crustaceans and other new discoveries.

In the early 1960s, he began the first extensive exploration of coral reefs at night.

In conjunction with this work, he was among the first to adapt and use SLR cameras and electronic flash underwater. This, in turn, enabled the first underwater macro photography. In 1964, he developed the optical dome port now used universally for wide-angle underwater photography.

In 1968, he developed the Electrolung—the first electronically regulated, closed circuit, mixed gas scuba. With the Electrolung, Dr Starck began exploring the deep reefs beyond the frontiers of compressed air diving, and many exciting new discoveries resulted. ■

SOURCE: WWW.GOLDENDOLPHIN.COM

Bio

Dr. Richard Pyle was born and raised in Hawaii, where he caught an interest for fish from a very early age. He set up his first aquarium when he was five years old, and started scuba diving when he was 13. By the age of 19, he lived in Palau where his passion for discovering new fishes lured him into deep water, resulting in a crippling case of decompression sickness while diving with world-renown ichthyologist John "Jack" Randall. Jack then offered him a job in the fish collection of the Bernice P. Bishop Museum in Honolulu, where Richard continues to work.

Determined to continue exploring the coral reef "Twilight Zone" in a safe and responsible way, Pyle was among the pioneers of modern Technical Diving in the late 1980s. In 1994, he was a test-diver for the prototype Cis-Lunar MK-4 closed-circuit rebreather, and travelled the Pacific in search of new species of fishes on deep coral reefs—which he and his colleagues are discovering at a rate of 11 new species per hour of bottom time. Recently, he has acted as consultant for Poseidon in developing the new Cis-Lunar Mk VI, which will be marketed in 2008.

Richard has authored over a hundred scientific, technical and popular articles and has been featured in dozens of documentary films (including the IMAX film, *Coral-Reef Adventure*). He was a founding member of the Board of Directors for the Association for Marine Exploration—a non-profit organization dedicated to conducting innovative scientific exploration using advanced diving equipment and techniques. In 2004, he was selected by Esquire magazine for the "Best and Brightest" issue, and was also recipient of the "Genius Award" from General Electric which helped support his research. In 2005, he was awarded the NOGI award—coincidentally, simultaneously with another X-RAY MAG interviewee, Bob Evans.

■ SOURCES: BISHOP MUSEUM

respect, I am just a late comer. There was also another guy, Pat Colin, who was a bit later than Walter Starck and was also inspired by him. He also built his own rebreather to go down to the deep reef zones, so I am not the first, by a long shot.

But I seem to be the lucky one who was around when technology was finally ready to do this. Walter invented his own technology, but at that time, they even had to make their own oxygen sensors. They built them themselves from scratch, whereas, I can just go order them from Teledyne or whoever. I was lucky in being 20 or 30 years later, because now I have access to technology that they didn't. I don't think that I was the first person to use the term "Twilight Zone" either. Walter Starck wrote an article, I think it was in 1972, in National Geographic where

I was lucky in being 20 or 30 years later because now I have access to technology that they didn't.

he used the phrase about all the discoveries awaiting to be done in the twilight zone. He was probably the first, and then I started applying that term, and then I started talking about it. But then biologists got angry with me, because that term already applies to something in the middle of the ocean, about a 1000 meters deep, and in the cave world, it means something else. So, it is a little overused. I then started calling it deep coral reefs, but then they discovered these coral reefs a 1000m deep. So, now I don't know what to call that zone that I am working in. It is the "coral twilight zone" or what? I don't know, but that is the area that I am interested in.

But what is so special about this zone in a biological sense?

Two things are special about

it. One, is that we know so little about it, about the species and about the interactions that go on there. The other thing is that it is a transition zone. One environment where the coral reef meets another environment, the open ocean, and this zone is the bridge between the two, and very interesting things happen.

The coral reef is clear, obviously a sunlight driven ecosystem where the energy comes from the sun and is passed on through the algae, into herbivores, etc. But once you get below the light zone, you only find scavengers and carnivores that rely on energy from elsewhere.

But my zone represents that area where one system transforms into the other. And one of the things that is most surprising that we have found is that while you may think that it is a mix of species from above and from below, it is actually a completely new set of species. This zone is unique at the species level, and there are lots of new species there. But every species we find is somehow related to the shallow reefs rather than the deep ocean. The big question we had in the beginning is whether the zone was mostly like the shallow ecosystems or the deeper ones, and it is definitely mostly like the shallower systems, except that we almost

While you may think that it is a mix of species from above and from below, it is actually a completely new set of species.

Deep Stops = Pyle Stops

Deep stops seems to be the latest buzz-word when it comes to promoting the latest models of dive computers. Deep stops allow you to complete your safety stops at depth. The amount of stops needed, as well as the depth at which they are required, depends on the maximum depth reached during the dive.

But Deep Stops are not all that new and were in fact discovered by Richard Pyle by coincidence—hence the alias *Pyle Stops*—as he started noticing that he was much less fatigued after deep dives if he had taken some breaks in the decent.

A "Pyle stop" is an additional short deep-water stop, which is increasingly used in deep diving. Typically, a Pyle stop is two minutes long, and at the depth where the pressure change halves on an ascent from the bottom to a shallow water decompression stop. For example, on an ascent from a maximum depth of 60 metres 7 bar to a decompression stop at 20 metres 3 bar, the Pyle stop would take place at the halfway pressure, which is 5 bar at 40 metres.

This is an excerpt from an article Richard Pyle wrote 10 years ago:

Back before the concept of "technical diving" existed, I used to do more dives to depths of 180-220 feet than I care to remember. Because of the tremendous sample size of dives, I eventually began to notice a few patterns. Quite frequently after these dives, I would feel some level of fatigue or malaise. It was clear that these post-dive symptoms had more to do with inert-gas loading than with physical exertion or thermal exposure, because the symptoms would generally be much more severe after spending less than an hour in the water for a 200-foot dive than they would after spending four to six hours at much shallower depths.

The interesting thing was that these symptoms were not terribly consistent. Sometimes I hardly felt any symptoms at all.

At other times, I would be so sleepy after a dive that I would find it difficult to stay awake on the drive home. I tried to correlate the severity of the symptoms with a wide variety of factors, such ▶

Modern dive computers now incorporate Deep Stops in their decompression models. Suunto (D6 is shown) is one of the most prominent proponents





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The interesting thing was that these symptoms were not terribly consistent. Sometimes I hardly felt any symptoms at all.

only found new species. Not all was new, but many. What is interesting from an ecological perspective is the transition from one habitat to another and, from a species viewpoint, the fact that everything within the zone is unique.

Is it just the species' composition?

It is a bit of both. In fact, you find hardly any herbivores down there, which makes sense as there are not many algae down there. You find a lot of omnivores, wrasses for example, fishes that will eat almost everything, and there are a lot of those. You'll find planktivores, fish that eat plankton, like damselfishes and anthias, for example. The fishes you find there are the ones most adapted to just surviving. So, it is a little of both.

Do you have any pet theories?

I have one that we stumbled upon. It is possibly a little complicated to communicate, but I give it a try. I don't know if you know that in the tropical Pacific, the most diversity you'll find is in the western parts, around Indonesia. And as you move away from there, there are less and less species. And this holds true for fishes, crabs and corals and what not. Whatever you look at, the pattern is the same. So, for example, in the Indonesia-Philippines region, you have about 2500 species of coral reef fishes. In Palau, you have about 1500. In Fiji, you have around 1000, and Hawaii about 500. In Easter Island, they have about 100... so, fewer and species as you go. And this pattern is so consistent among all these organisms. There is a lot of scientific discussion going on about what causes that pattern, and there are two main ideas. One, is that species evolved along the periphery of the Pacific and accumulated in this area as they, over time, migrated and that is why you, in this area, have this mixing of species from all over the place. That is why there are so many here.

Richard Pyle

as the magnitude of the exposure, the amount of extra time I spent on the ten-foot decompression stop, the strength of the current, the clarity of the water, the water temperature, how much sleep I had the night before, the level of dehydration...you name it...but none of these obvious factors seemed to have anything to do with it. Finally, I figured out what it was—fish! Yup, that's right... On dives when I collected fish, I had hardly any post-dive fatigue. On dives when I did not catch anything, the symptoms would tend to be quite strong. I was actually quite amazed by how consistent this correlation was.

Finally I figured out what it was—fish!

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nothing, the symptoms would tend to be quite strong. I was actually quite amazed by how consistent this correlation was.

The problem, though, was that it didn't make any sense. Why would these symptoms have anything to do with catching fish? In fact, I would expect more severe symptoms after fish-collecting dives because my level of exertion while on the bottom during those dives tended to be greater (chasing fish isn't always easy).

There was one other difference, though. You see, most fishes have a gas-filled internal organ called a

"swimbladder"—basically a fish buoyancy compensator. If a fish is brought straight to the surface from 200 feet, its swimbladder would expand to about seven times its original size and crush the other organs. Because I generally wanted to keep the fishes I collected alive, I would need to stop at some point during the ascent and temporarily insert a hypodermic needle into their swimbladders, venting off the excess gas.

Typically, the depth at which I needed to do this was much deeper than my first required decompression stop. For example, on an average 200-foot dive, my first decompression stop would usually be somewhere in the neighborhood of 50 feet, but the depth I needed to stop for the fish would be around 125 feet. ▶

Not being a person who enjoyed confrontation, I kept quiet about my practice of including these “deep decompression stops”.

The other theory is that species evolve in a hotspot—in the middle and radiate outward. And the farther you get from that hotspot, the fewer species you find because of the distance. Both of these mechanisms, which the scientific community are arguing about all the time, are operating at evolutionary timescales—in other words, at least hundreds of thousands or millions of years. So, they are thinking of it in terms of biology.

But we found cue patterns that we didn't expect on deep coral reefs as compared to shallow reefs. The first pattern we found is that there is a higher rate of endemism here. So, if you go to a particular island and go down deep, you'll find that 70 percent of the species are only found at that island. On the other hand, if you go shallow, perhaps only ten percent of the species are endemic. The deeper you go, the more unique the species are to that one island, which is strange, and we did not know why this would be. The second pattern is, if you go to say Fiji and

Endemism is the ecological state of being unique to a place. Endemic species are not naturally found elsewhere. The place must be a discrete geographical unit, such as an island, habitat type, or other defined area or zone.

dive in 15m and then looked at Cook island also at 15m, the difference is huge. Fiji has thousands of species, Cook island a few hundred. It is a completely different diversity. But if you go down to 100m instead, then the islands look comparable. There is no more diversity in one place than in the other. So, this pattern of high diversity versus low diversity seems to only apply in the shallow areas.



NASA Astronaut image of Astove Island (Aldabra Group, Seychelles) in the Indian Ocean

So, it is almost like the ocean is layered?

Yes, so it appears. And that makes you think, what is it about the deep reef fishes that 1) makes them unique to each island and 2) makes them no more diverse in the Western Pacific than in the Eastern Pacific? We started the deep reef stuff in the Cook islands—which is low diversity—and we found all these new species and thought, “Wow! If we go over to the Western Pacific where the diversity is higher, we are going to find five times as many new species down deep

because it is more diverse.” But once we got there, we did find new species but in no greater numbers than we found on Cook. We thought that this was strange, and it was perhaps because we were just not in the right place. But as we went on to visit more and more locations, we found that the emerging pattern was the same—new species, but not a greater number of new species over there than here.

So, here is my pet theory about this: It occurred to me that the sea level goes up and down every hundred thousand years with the cycles of ice ages and glaciation. How much does it go up and down? About a hundred meters. Where is the break between shallow and deep reef fishes? About a hundred meters.

What I think happens is that every hundred thousand years, the sea level drops, and the species of the shallow reefs die out because all the shallow habitats, the lagoons, the fringing reefs, all of that disappears. Because when you look at an atoll, they come up straight to the surface and are flat on the top. And if you dropped the sea level a hundred meters the island just sticks out of the water it just doesn't erode away. So, when the sea level is high like it is now, you have a lagoon and all of these habitats up shallow. When the sea level then drops again, these habitats dry out, and all the species on the oceanic island's shallow reefs may die out. But if you go to the Western Pacific, which lies on the continental shelf, a shallow

So, whenever I collected fish, my ascent profile would include an extra 2-3 minute stop much deeper than my first “required” decompression stop. Unfortunately, this didn't make any sense either. When you think only in terms of dissolved gas tensions in blood and tissues (as virtually all decompression algorithms in use today do), you would expect more decompression problems with the included deep stops because more time is spent at a greater depth.

As someone who tends to have more faith in what actually happens in the real world than what should happen according to the theoretical world, I decided to start including the deep stops on all of my decompression dives, whether or not I collected fish. Guess what? My symptoms of fatigue virtually disappeared altogether! It was nothing short of amazing! I mean I actually started getting some work done during the afternoons and evenings of days when I did a morning deep dive.

I started telling people about my amazing discovery, but was invariably met with skepticism, and sometimes stern lectures from “experts” about how this must be wrong. “Obviously,” they would tell me, “you should get out of deep water as quickly as possible to minimize additional gas loading.” Not being a person who enjoyed confrontation, I kept quiet about my practice of including these “deep decompression stops”.

As the years passed, I became more and more convinced of the value of these deep stops for reducing the probability of decompression sickness (DCS). In all cases where I had some sort of



Technical Diver doing a deep decompression stop

post-dive symptoms, ranging from fatigue to shoulder pain to quadriplegia in one case, it was on a dive where I omitted the deep decompression stops.

Here is my method for incorporating deep safety stops:

- 1) Calculate a decompression profile for the dive you wish to do, using whatever software you normally use.
- 2) Take the distance between the bottom portion of the dive (at the time you begin your ascent) and the first “required” decompression stop, and find the midpoint. You can use the ambient pressure midpoint if you want, but for most dives in the “technical” diving range, the linear distance midpoint will be close enough and is easier to calculate. This depth will be your first deep safety stop, and the stop should be about 2-3 minutes in duration.
- 3) Re-calculate the decompression profile by including the deep safety stop in the profile (most software will allow for multi-level profile calculations).
- 4) If the distance between your first deep safety stop and your first “required” stop is greater than 30 feet, then add a second deep safety stop at the midpoint between the first deep safety stop and the first required stop.
- 5) Repeat as necessary until there are less than 30 feet between your last deep safety stop and the first required safety stop.

— Richard Pyle ■

GRAPHIC BASED ON PHOTO BY AARON P. - VIA FLICKR

profile



Depth profiles (left) over the Pacific show that the archipelagoes of Indonesia, Malaysia and Philippines sit on the shallower continental shelf. If compared to a chart of biodiversity (above) the high biodiversity on the shallow reefs correlates with these areas

plateau, you don't have all these islands just sticking up from the deep bottom. When the sea level drops here, all what happens is that you move the habitats down a slope, so you don't destroy them. Whereas, in the Eastern Pacific, they die. However, if you go down deep, the fishes are already living along a vertical habitat, the wall, so if the sea level changes the fishes just move up and down with it, nothing really changes. That means that the deep fishes don't get wiped out every hundred thousand years or so. If this model is true, the shallow reefs gets wiped clean every time the sea level goes through a cycle, except in the Western Pacific—where the deep fishes don't get wiped out. They survive for many hundreds of thousands of years or millions of years, and therefore, have the time to become unique new species, because they are isolated there.

The species in the shallows, on the other hand, are never there long enough to become new species. Instead, what happens when the water comes back, the shallow reefs are repopulated from the Western Pacific. So, the idea is, that it is not evolutionary time scales that creates this pattern, but ecological. You wipe it out, you fill it out, you re-populate it—over and over again. Down deep, it just goes up and down, up and down.

This hypothesis would be predict two things: One, that there are more endemic species on these islands because they would have more time to become endemic; and two, you wouldn't expect the same pattern in the east and the west. And what do we find? Exactly that pattern. So, it is a very complicated equation. I presented this idea at a meeting in Taiwan a couple of years ago,

which was full of these people arguing about the two theories, and amidst all their bickering, they all became quiet.

Can't this be settled somehow?

Yes, and it is going to be. The only way you settle it is to contrast the shallow reef fishes to the deep fishes. If there were no deep reef fishes, you couldn't settle it—even with DNA techniques. But since the deep fishes are higher endemics, and the shallower species are more connected to the Western Pacific, that means that they came from there—while the deeper ones have been there all the time. The shallow ones have been recolonising, whereas the deep ones were unique there. That is what we have a grant proposal submitted to do—to investigate this phenomenon. We just have to have more preliminary data to support to the applica-

tion. and I expect that there will be no problems, as the question is both exciting, interesting and important.

Well, I get excited and interested and ask myself, what I am doing on a dive magazine?

It all comes back to the nerd thing. You are also a biologist and understand. But usually, when I explain this to the dive nerds, they just go, "Uh... Okay—if you say so."

Richard Pyle

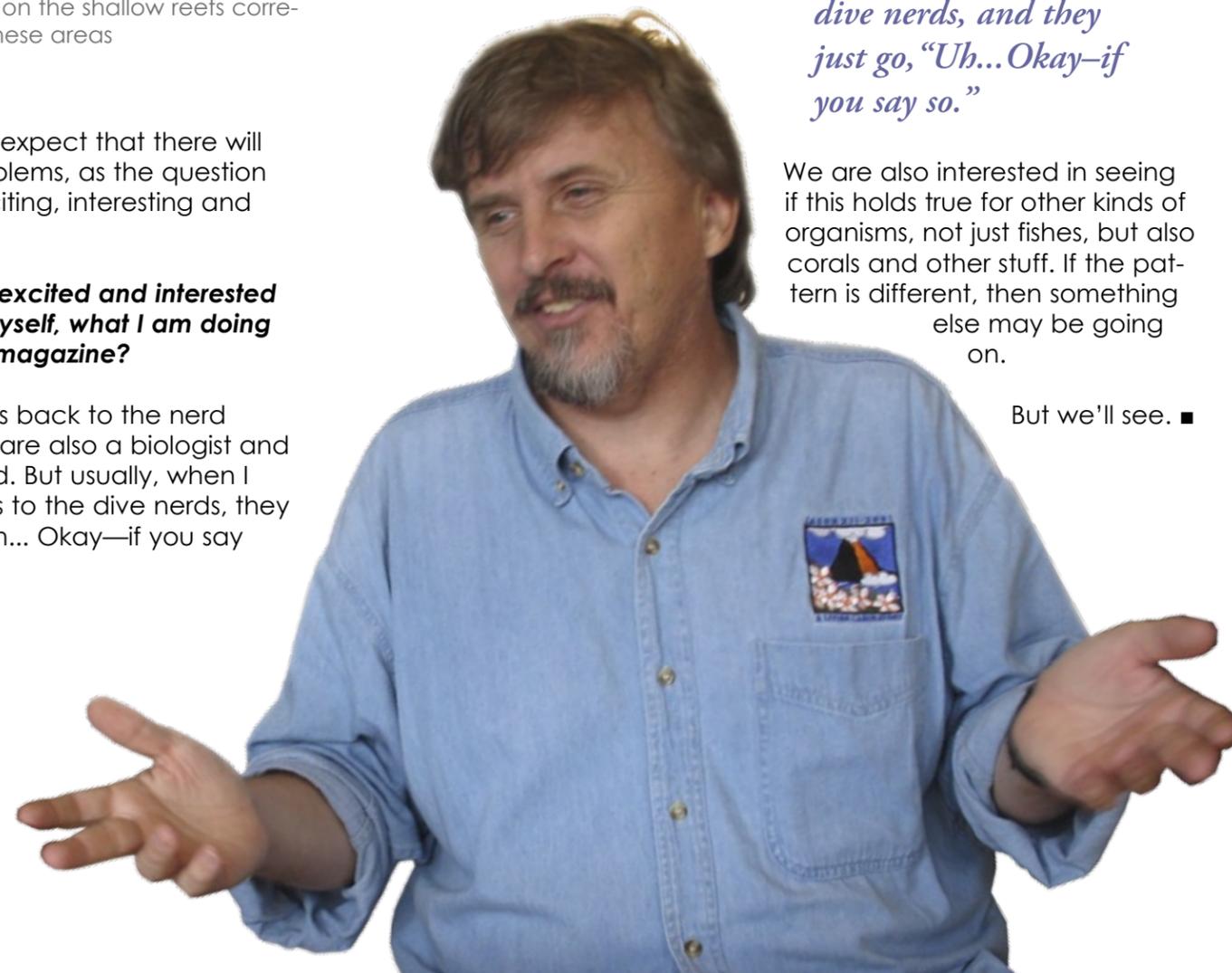
Richard Pyle was instrumental in developing the original Cis-Lunar CCR rebreathers into an useful tool for researchers in the 1980s. Two decades later, his experiences were put to use by Poseidon, who had acquired the Cis-Lunar brand, in developing the new CCR for sports-divers that is being launched on the worldwide market in 2008

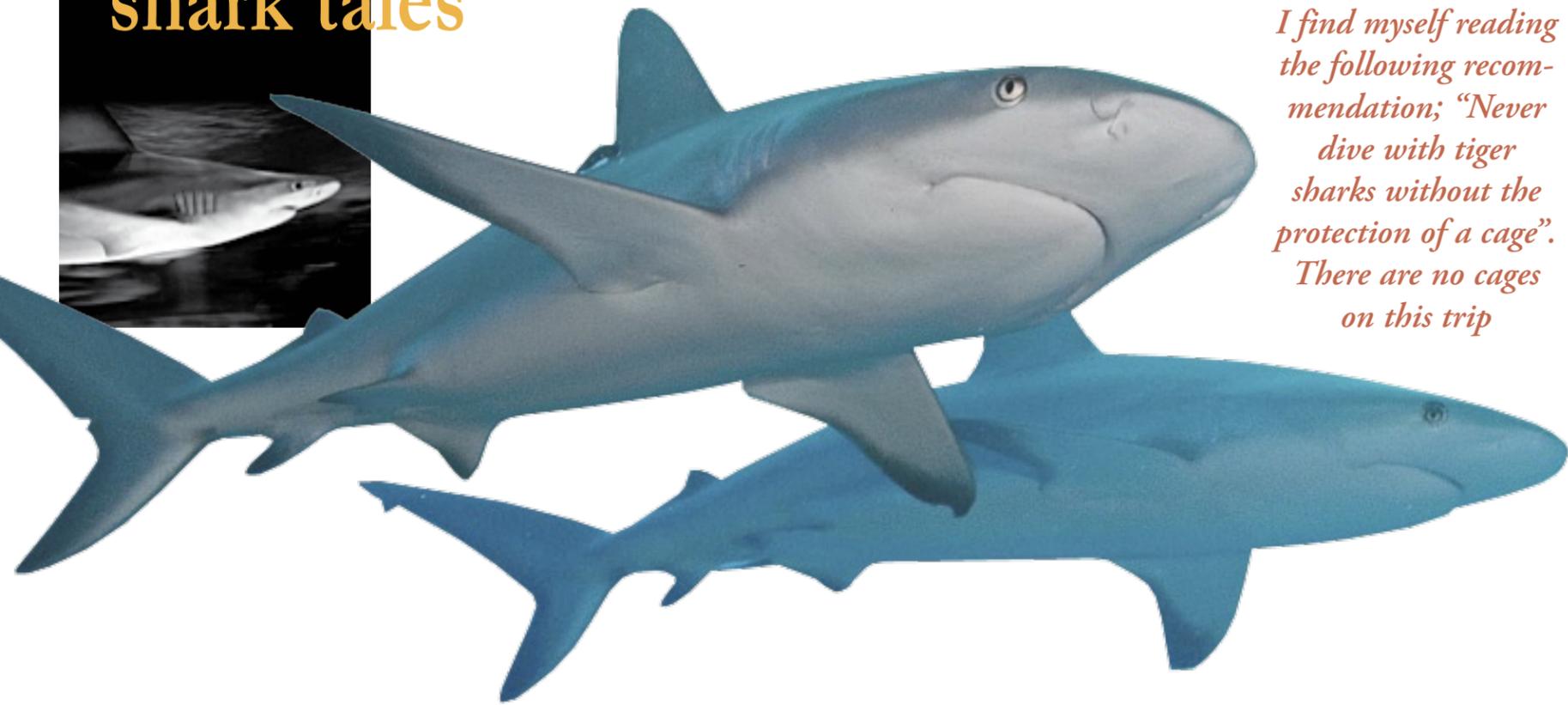


I explain this to the dive nerds, and they just go, "Uh... Okay—if you say so."

We are also interested in seeing if this holds true for other kinds of organisms, not just fishes, but also corals and other stuff. If the pattern is different, then something else may be going on.

But we'll see. ■





I find myself reading the following recommendation; "Never dive with tiger sharks without the protection of a cage". There are no cages on this trip

Spring 2006, I was sitting behind my desk as I was surfing the internet. A review about a shark expedition in the Bahamas drew my attention. The pictures that accompanied the article were very impressive. I had always dreamt about diving amongst sharks. My enthusiasm took control over me, and ten minutes later, I had booked the trip.

That night I lied awake. *What had I done?* What would my impulsive act bring? I wondered what species of sharks I'd meet and whether the trip would be safe. I spent the rest of the week searching the internet for information. The main target of the expedition was spotting tiger sharks and great hammerhead sharks. I Googled the first species, the tiger sharks, and I found myself reading the following recommendation: "Never dive with tiger sharks without the protection of a cage." There were no cages on this trip.

One year later, I was heading for the Bahamas from West Palm Beach, Florida, on the vessel *M/V Shearwater*. The expe-

dition was started, and I must admit that the word *expedition* was rightly chosen. The vessel was very small, and it took a lot of effort to get everyone with their luggage on board.

Because of the size of the vessel and its shallowness in the water, one felt every movement of the sea. The weather was bad, and we faced an impetuous night crossing. As I stood on the rear deck staring at the horizon, I felt sick. On top of that, I was pretty nervous for what the next week would bring. Was it wise of me to book this trip? Maybe I was just a bit tense because of the challenging week I was about to experience.

Text and photos by Karen Brussard

Shark expedition off the Bahamas **Lemon snapping**



Never look longer than 5 seconds through the viewfinder of your camera and immediately search the area in a 360 degree angle to be absolutely sure no Tiger shark is surprising you.



Sharks Tales

to hold the tube vertically in front of themselves.

Photographers could, of course, use their camera to protect themselves from curious Tiger sharks.

Finally, we received one very important instruction: never look longer than five seconds through the viewfinder of your camera and immediately search the area in a 360 degree angle to be absolutely sure no Tiger shark is surprising you.



According to Abernathy the present sharks in these waters are not dangerous to humans. There is one exception and that's the tiger shark. Whenever a tiger shark is near it's very important that the divers work together as a team

Tiger shark grabs camera

I was sitting on the vessel's diving platform for my first dive, and I could see lots of Caribbean reef sharks in the water beneath me. Before entering the water, I had to think twice.

During the dive Reef sharks were circling around the divers. They were making movements towards the so-called bait boxes—boxes with fish remains meant to attract the sharks.

I was beginning to deal with my fears and actually started enjoying diving among the sharks.

When the third dive was about to start, I was the first diver in the water. At first, I was a bit cautious, but then I let the sharks approach me at short range in order to take



Safety

After dealing with the formalities at the customs in West End, Jim Abernathy, owner of Abernathy's Scuba Adventures (JASA), provided us with a thorough briefing.

Jim informed us how to act as a group in the presence of sharks. "Safety first" was his statement, and anyone ignoring the safety rules would receive a warning. A second warning would mean immediate and absolute exclusion from the trip.

Our diving gear and its details were not allowed to be finished in bright colors. We were obliged to wear gloves because white hands can be mistaken for fish by sharks. A shark could "accidentally" bite a diver.

We were instructed to slide cautiously into the water and immediately descend to the bottom of the sea. Leaving the water should also be done quickly as the greatest danger for the diver is on the surface. Tiger sharks often attack

their prey, for example turtles, when breathing for air on the surface. For this reason, snorkeling was not an option this trip.

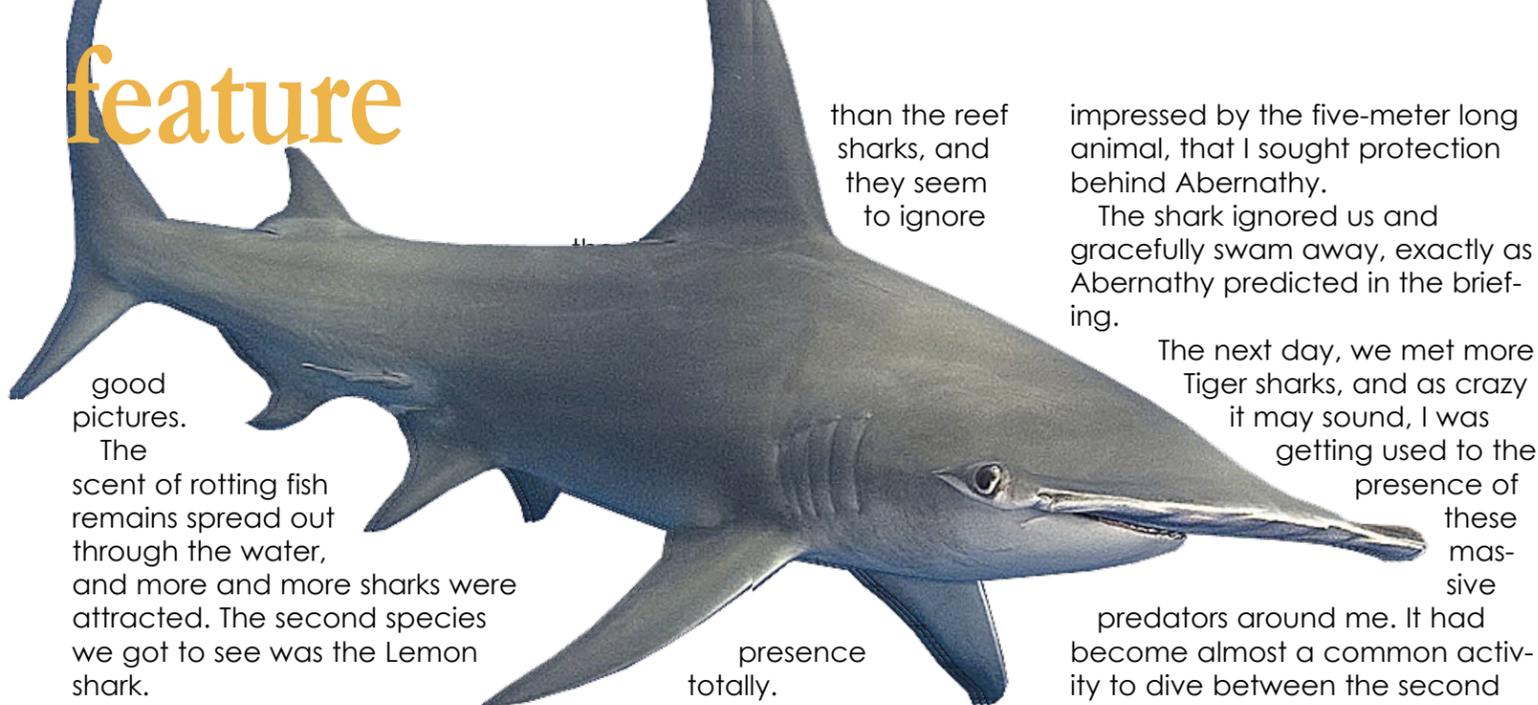
According to Abernathy, the sharks present in these waters were not dangerous to humans. There was one exception, and that was the tiger shark.

Whenever a tiger shark is near it's very important that the divers work together as a team. Divers should point out the shark to each other so that every diver could turn towards the direction of the predator.

Tiger sharks will approach anything they meet, and everything of interest to them would be investigated with their noses. When the shark realizes that the object is not edible, it will continue on its way.

A safety precaution is, therefore, to hold an object between yourself and the shark. Jim Abernathy provides everyone with a PVC tube about one meter in length. The divers are obliged





than the reef sharks, and they seem to ignore

impressed by the five-meter long animal, that I sought protection behind Abernathy. The shark ignored us and gracefully swam away, exactly as Abernathy predicted in the briefing.

The next day, we met more Tiger sharks, and as crazy it may sound, I was getting used to the

presence of these massive

predators around me. It had become almost a common activity to dive between the second most dangerous sharks species of the world.

During our dive just before sunset, we spotted four large Tiger sharks. The divers worked as a team, and we took pictures in

good pictures.

The scent of rotting fish remains spread out through the water, and more and more sharks were attracted. The second species we got to see was the Lemon shark.

Lemon sharks are recognizable by their yellowish to light brown-gray color. They look very impressive because of their crooked teeth. They approach the divers even more closely

presence totally.

Occasionally, I felt the Lemon sharks touching my fins on their way around the divers. At that point, the first Tiger shark showed itself at a distance of about ten meters. I was so

turns.

At a certain moment, one of the divers was approached by a shark from behind. The diver didn't see the shark, because he looked through his camera too long.

Abernathy took action. He pushed the shark away using his camera, but the shark was not amused. The shark opened its enormous mouth, grabbed the camera and aggressively swam away with it.

I felt very uncomfortable with the situation and again wondered why I was so keen on making this trip. Fortunately, the shark dropped the camera before disappearing into the depths of the sea.

“Are you crazy?”

Back on board, Abernathy asks whether anyone managed to take pictures of the frightening scene. “Are you crazy?” I asked the man.

But that night, I found out that one crazy person had taken pictures, and that crazy person happened to be me.

We talked a lot that night about what happened, and, more importantly, how a scene like that is to be prevented. I become more and more aware that we were dealing with lethal predators. I realized that one must not think lightly about it, and I felt forced to sharpen the safety precautions.

Supermodel

The next day, we dived at Tiger beach. According to its name, one would expect a beach, but there is none. During the expedition we only saw one island,

The shark opens its enormous mouth, grabs the camera and aggressively swims away with it. Fortunately the shark drops the camera before disappearing into the depth of the sea.



As crazy it may sound, I'm getting used to the presence of these massive predators around me



Do White Sharks Lurk In the Waters Around Britain?

A mutilated gray seal found washed up on a lifeboat slipway in Norfolk, England, may have been attacked by a great white shark.

Lifeboatman, Chris Taylor, who has a biology degree and studied sharks and found the seal's body in Sheringham, told BBC News that the wound to the seal bears all the hallmarks of a great white attack. "The bite measures over a foot (0.3m) across, so I don't know what else could have taken a chunk of this size. Seals hit by boat propellers have a zipper-like pattern across the top of the neck, because they don't swim upside down—but this seal was hit from below, which is how sharks attack their prey," he said.

Mr Taylor sent photographs of the carcass to Dr Ken Collins, of the National Oceanography Centre, Southampton, who confirmed that the injury is indeed consistent with the bite from a great white shark. ■

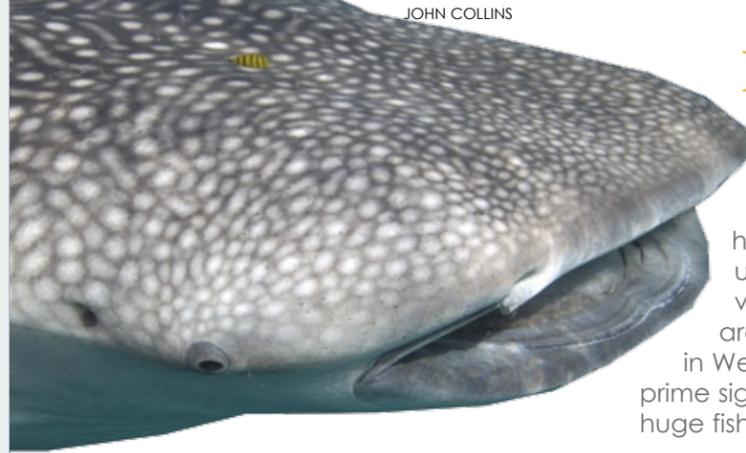
Great White Shark Tracked Over 3000km

A great white shark's record-breaking swim between New Zealand and Australia could be far more impressive than previously thought.

The 4.4m shark, nicknamed Kerri, started its journey at Stewart Island in March with an electronic tag attached to its dorsal fin. The tag recently showed up 3000km away, near the Great Barrier Reef. The journey is the longest ever recorded by a shark from New Zealand.

But Department of Conservation scientist Clinton Duffy said it could have been thousands of kilometres longer. "I would say it's unlikely it would have been a direct route with her being at large for nine months. She could have been all over the place."

Duffy said sharks were known to travel up to 1000km a week. ■



JOHN COLLINS

which was uninhabited. Sunbathing and relaxing under palm trees is not what this trip was about.

Tiger Beach is a dive spot with a shallow sandy bottom. Depending on the tide, we would dive to a depth of three to five meters. There are a huge amount of Tiger sharks in this spot, and we got to meet one of them—Emma, a six-meter long Tiger shark. She is called a supermodel because of her graceful movements in the water.

Lemon snapping

Between two dives, Abernathy suggests we'll go "lemon snapping". Ten surprised guests on board stare at the captain because no one knows the meaning of this word.

It turns out that the crew attracts the Lemon sharks with bait towards the rear end of the boat. The sharks will snap at the bait, and at that point, we get the opportunity to take pictures of the wide open mouths of the sharks. To do so we have to hold our cameras half under the surface and take shots at random hoping for the best.

Big bang

It was not so easy to take pictures on a rocking boat with snapping sharks at my feet. It certainly provided me with a lot of adrenalin, which was rushing through my veins!

But the activity was absolutely safe, according to the crew. At a certain moment, I heard a loud bang, and I real-

ized that a Lemon shark had bitten into the domeport of my underwater housing.

Fortunately, the domeport is made of an acrylic material. What remained was a big scratch mark—a souvenir—and an image I had always dreamed of taking.

During the last part of the expedition, we searched for the Great Hammerhead shark and the Bull shark. The Great

Hammerhead is a very shy animal, and it will not show itself easily to us.

End of the Map

We were heading for a place called, The End of the Map. Again, we dived a spot with a sandy bottom, but this time, we dived to a depth of 23 meters. Upon descending, we immediately spot the first Bull sharks. They can be recognized by their strong, muscular bodies.

Tiger sharks are not to be missed, and a large one was swimming right towards me. I could feel my heart pounding in my throat. The shark hit the port of my camera with his nose, and I made a turn following the movement of the shark.

I had to make three turns with the shark striking my camera with its nose before the shark continued on its way. Abernathy made clear that I acted in the right way.

No time to relax

I had no time to relax, because a bit after this adventure, I heard someone shouting through his regulator. I thought I could hear the word *Hammerhead*. When I turned around, I saw my first

Have we met before? You look familiar

Facial recognition software used in forensic science has now been put to use to identify individual whale sharks around Ningaloo Reef in Western Australia, a prime sighting area for these huge fish.

Using thousands of photos submitted by researchers and others, Bradley Norman of Murdoch University in Perth managed to adapt software originally developed for telescopes to recognize patterns of stars and other celestial objects to identify individual sharks.

In a paper to be published this month in the journal, *Ecological Applications*, the researchers report repeated sightings of many individual sharks from year to year, suggesting that the shark population, in that part of the ocean at least, is healthy. ■

Great Hammerhead ever!

This shark moved in a very different way than all the other sharks I had ever dived with. The movement started at the head and then the body followed. I was very impressed by this animal.

I had always wanted to see Great Hammerheads, and had never managed to actually see them. This moment made me a very happy diver!

Later that day, we balanced behind the boat for our safety stop, and three Hammerheads came to take a look at me and my buddy.

When holding your breath, they approach you at short range, but the slightest movement makes them disappear as quickly as they had arrived.

Because the sharks swim just under the surface, we needed not worry about our decompression time. We dived in two groups taking turns every two hours until dawn to enjoy as much as we could of these amazing and magnificent animals.

When dawn fell and it became too dark for shooting, we realized that this exciting and very special expedition had come to an end. ■

Counterfeit Shark Fins Start Hitting the Asian Markets

Wang Chia-chuan, a chef specializing in cooking shark fin soup and working for a restaurant in Taichung has warned consumers that many shark fins bought on Taiwan's market are fake and might pose a hazard to their health.

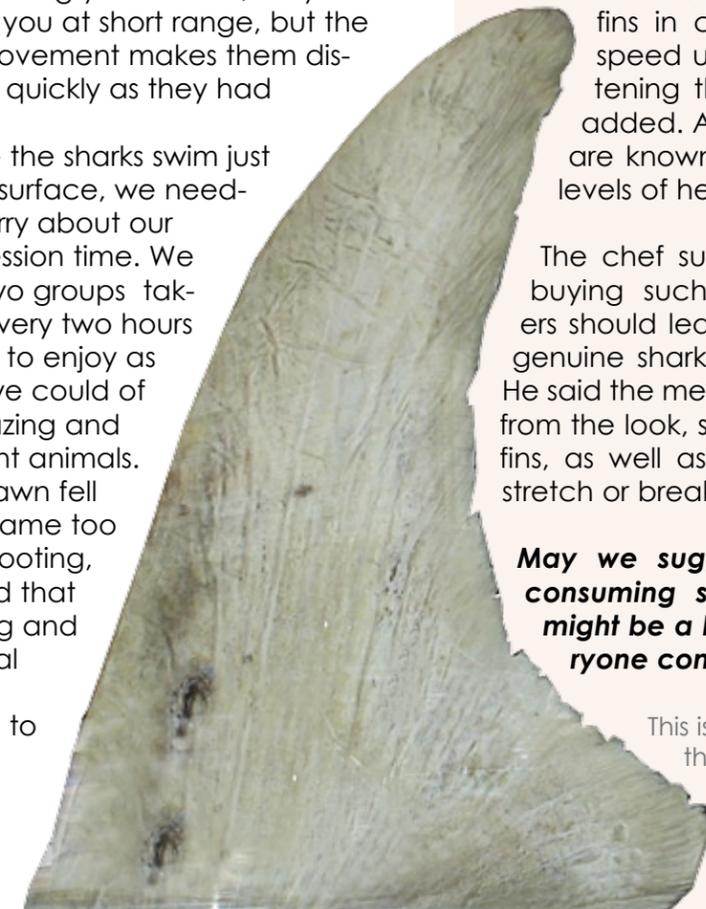
He said that many of the shark fins sold on Taiwan's market are actually made of a mixture of mung bean starch gel, fish skin and gelatin—a substance extracted from the boiled bones, skins and tendons of animals.

According to Wang, the manufacturers of these fake shark fins would use hydrogen peroxide solution to bleach their products to make them look like genuine shark fins, and that those who unknowingly consume the look-alike shark fins could be endangering their health. Even real shark fins are not all safe to consume, because some restaurants soak dried fins in chemical solutions to speed up the process of softening them for cooking, he added. Also shark fin products are known to have dangerous levels of heavy metals.

The chef suggested that before buying such products, consumers should learn how to distinguish genuine shark fins from fake ones. He said the method involves judging from the look, smell and taste of the fins, as well as using the fingers to stretch or break up the cartilage.

May we suggest that giving up consuming shark fins altogether might be a better option for everyone concerned? ■

This is, unfortunately, how the real product looks as seen on display at a high street restaurant in Bangkok



I had always wanted to see Great Hammerheads, and had never managed to actually see them. This moment made me a very happy diver!



Books Film DVDs

Edited by
Catherine GS Lim

**POINT & CLICK
ON BOLD LINKS**



How Do I Woo Thee? Let Me Count the Ways

It's been said many times that sex sells. Well, if that's the case, this book is bound to find its way into the bestseller lists in no time. After all, with a name like *Kama SEAttra: Secrets of Sex in the Sea*, what else would you expect?

In this new book, aquatic scientist Sheree Marris describes the mating behaviour of some marine creatures that can be intriguing, mysterious and oftentimes just plain weird. The females of some marine species tend to be the dominant partner, getting the males to bear the burden of pregnancy or become their permanent sex slave.

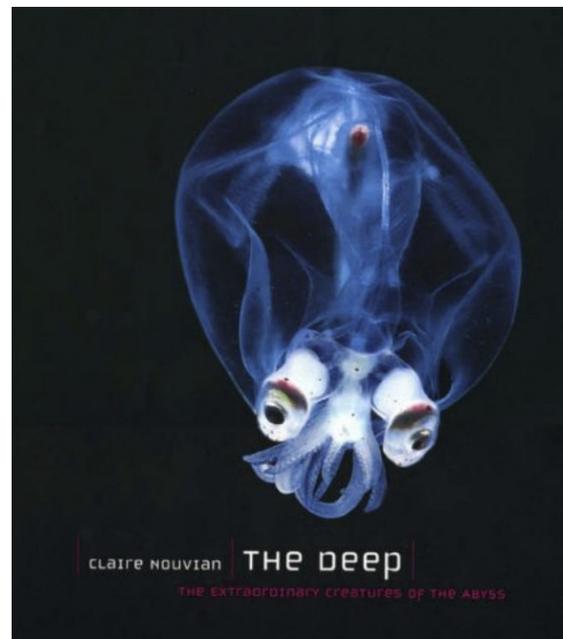
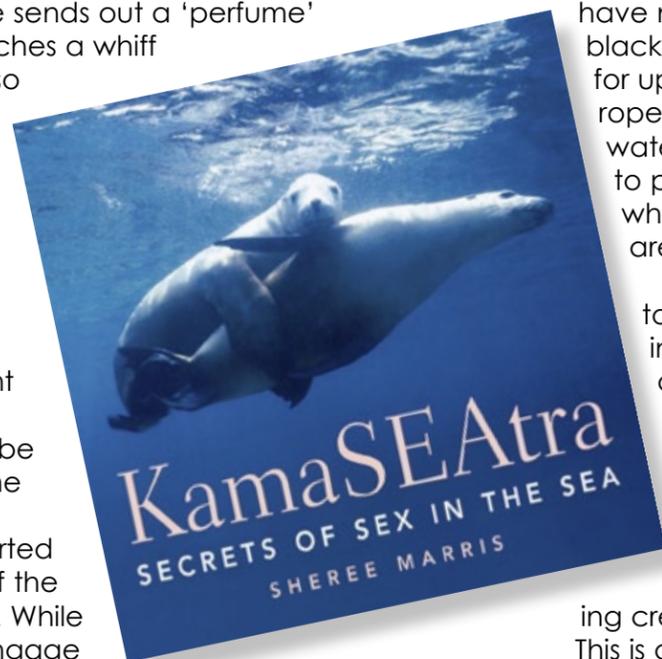
And then, there is the deep sea angler. When the female is in the mood for love, she sends out a 'perfume' into the water. Any male that catches a whiff goes into a mad frenzy, so much so that he bites onto her and never lets go. In time, he becomes fused into her body, and all that is left of the love-sick male is a pair of testicles.

Talk about giving up everything in the name of love....

Then there is the other side of the coin, in which female elephant seals choose the biggest males in the colony as their mates, only to be sometimes crushed to death by the heavier male during copulation.

In all, this book gives a light-hearted insight into the little-known facts of the amorous lives of marine creatures. While it entertains, it also manages to engage and educate anyone who picks up this book.

- ISBN: 9780330423687
- 128 pages
- Paperback
- Publisher: Pan Macmillan Australia



Be Enchanted by the Creatures of the Deep

We forgive you if you had flipped through this book and wondered if the photos were actually meant for a sci-fi book. After all, with creatures like the glass-head grenadiers, spookfish and pigbutt worms, where else would you have found such intriguing weird creatures?

Well, the answer is simply: The depths of the oceans. Yes, we do share our world with such creatures, which dwell in places we could never

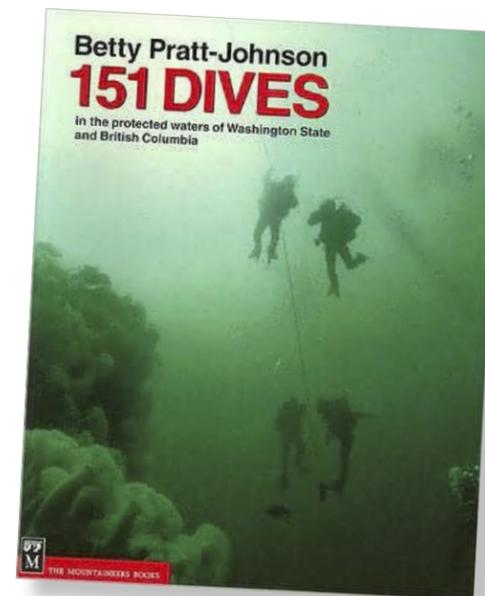
hope to venture. The deep ocean occupies 85% of the oceans, and is therefore the world's largest habitat. Yet, while many of us look towards outer space in the spirit of exploration, it is sobering to note that only 5% of the ocean floor has been properly mapped.

It was this fact that prompted journalist Claire Nouvian to embark on *The Deep*. There are more than 200 photographs in this book, some of which depict creatures that have never been photographed before. There is the black-eyed squid that carries its 2,000 eggs in a pouch for up to nine months, the siphonophore, a 40-metre rope-like superorganism that swims silently through the waters and the naked sea butterfly that uses hooks to pull sea snails out of their shells and swallows them whole. A few of the creatures featured in this book are unnamed, being still unknown to science.

Concise non-technical write-ups and essays by top marine biologists accompany the photos, giving background and explaining the behaviour and personality of these fascinating creatures. A depth chart, glossary, oceanic statistics and bibliography also provide useful information.

To call this a coffee-table book seems to diminish its contribution to marine science, both as an archive of deep-sea creatures, and also a beautiful treasury of the fascinating creatures that inhabit the depths of our oceans. This is a must-have on any nature lover's bookshelf, offering up endless opportunities to be awed by the variety of the creatures of the deep.

- ISBN: 978-0-226-59566-5
- Cloth
- 256 pages
- 220 color plates



Where to Dive when in Washington or British Columbia

The title may be a mouthful, but don't let it deter you from picking up this book if you are headed for Washington State or British Columbia. *151 Dives in the Protected Waters of Washington State and British Columbia* features some 151 recommended dives in the two areas. Writer Betty Pratt-Johnson has dived in all the locations featured in the book, so you can be sure that the information in the book is based on first-hand knowledge. Whether you are a diver or a snorkeller, this

book details what you can expect from each site, be it marine life, corals, marine parks, wrecks, etc. Other useful information include nautical charts, photographs, maps, GPS coordinates for the boat dive, as well as the contact details of dive shops, charter boats and marinas.

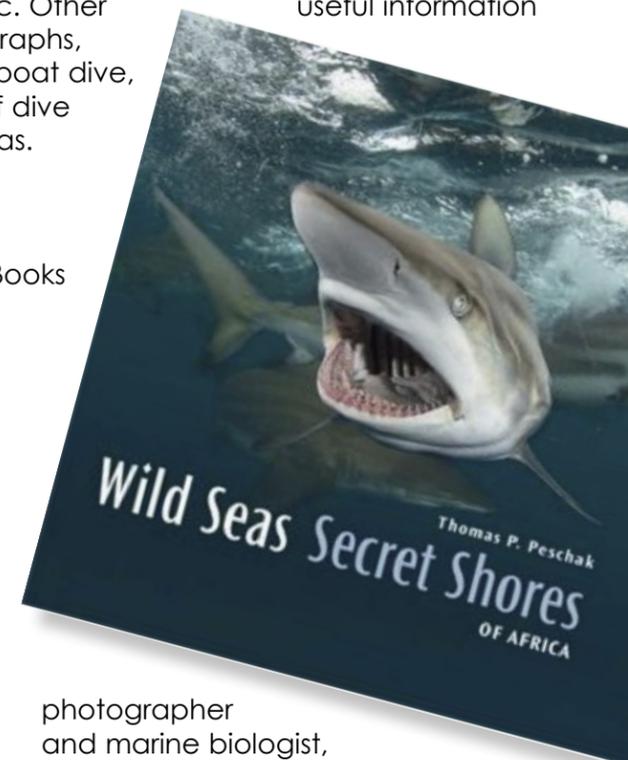
- ISBN: 978-1-59485-043-1
- 432 pages
- Paperback
- Publisher: The Mountaineers Books

Diving in Africa - Looking Beyond the Red Sea

Think Africa, and if you're like us, diving the Red Sea is one of the first things that come to mind. Well, this new book by Thomas P Peschak - *Wild Seas, Secret Shores of Africa* - is here to expand on this thought. You see, diving the African waters does not have to be limited to the region up north - have you ever thought about the marine environs in the other lesser-known African waters?

Flip through Peschak's book and be taken on a captivating photographic journey through the kelp forests and coral reefs (and more!) of southern and eastern Africa. His technical mastery with the camera enables every photo to tell a story, through characters as diverse as tiger sharks, whales, dolphins, jellyfish and starfish.

As an underwater



photographer and marine biologist, Peschak specialises in writing and photographing Africa's oceans. He is also a photojournalist for WWF-South Africa and Save our Seas Foundation. This is his third book focussing on Africa's marine environments and animals.

- ISBN: 9781770075900
- Hardcover
- 184 pages
- More than 145 photos
- Published: 2007-10-01
- Publisher: Struik Publishers



Visit America's Marine Sanctuaries with the Cousteau Family

This book reads like a great adventure into the underwater realms of America, a journey the reader is privileged to share with members of the esteemed Cousteau family. It chronicles the

experiences of the Cousteau family as they explore the 13 American National Marine Sanctuaries and one Marine National Monument for a two-hour PBS television special. America's Underwater Treasures depicts the beauty and variety of marine environments in America's backyard. Readers can expect to venture into kelp forests, coral reefs and even historical shipwrecks.

In the words of co-author Jean-Michel Cousteau, "People around the world know the names Yellowstone, Yosemite or the Grand Canyon. But, few have ever heard of Cordell Bank, the Gulf of the Farallones, Gray's Reef or Flower Garden Bank."

In the process of doing the book, Cousteau's team had an adventure of their lives as they traversed thousands of miles from the Northeast to Key West to American Samoa. These protected waters turned out to be a microcosm of the world ocean, both in the variety of their ecosystems, marine life and the problems they face.

This book shows how the sanctuaries differ from one another, yet all require proper management to preserve their unique wonders that are frequently under attack from human intrusion. All copies of this limited edition title (only 1,000 copies have been printed) have been autographed by Jean-Michel Cousteau.

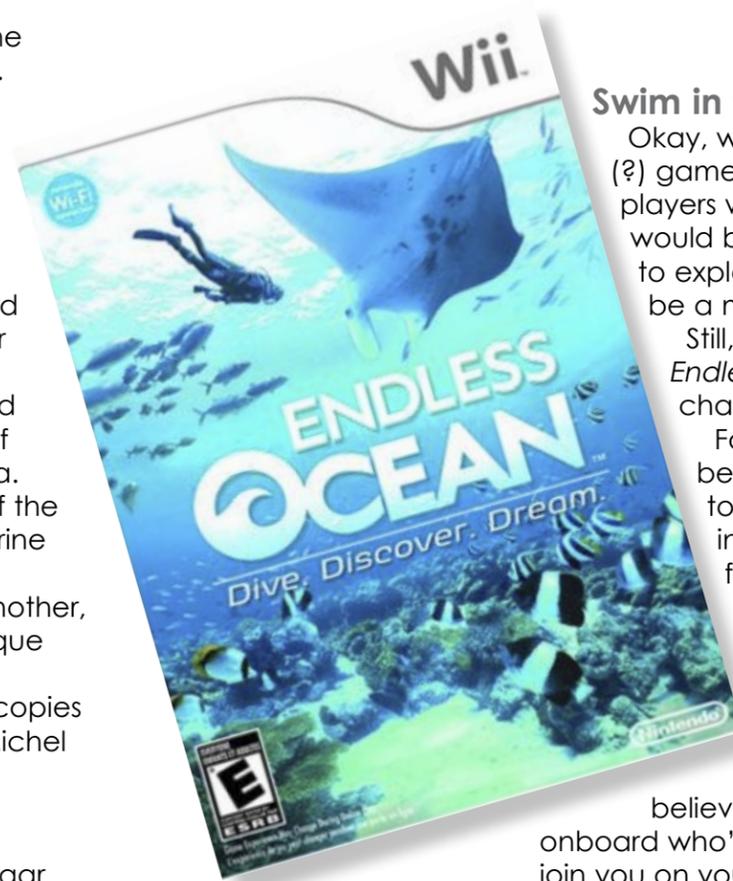
- Hardbound with dust jacket and slipcover
- More than 250 colour photographs by Carrie Vonderhaar
- Written by Jean-Michel Cousteau, President, Ocean Futures Society, and Julie Robinson
- Published by Ocean Futures Society

Learn about Decompression Illness to Prevent Decompression Illness

When it comes to decompression illness (DCI), ignorance is definitely not bliss. This becomes more relevant when one notes that DCI can even strike divers who follow proper diving procedures. So, to help divers learn more about DCI and what to do if they get it, DAN has come up with a new DVD, I May Be Bent... Now What?

This 40-minute programme highlights the symptoms of DCI, reiterating the fact that they may be similar to other health conditions. So it is important to be alert at all times and not succumb to self-denial, as this often leads to delays in seeking help, thus compromising the diver's treatment and long-term health.

Presented by DAN Medical Informational Specialist Marty McCafferty, the DVD is available free of charge to dive clubs and dive centres. It is perfect to be used as part of a dive training syllabus, or at your next dive meeting.



Swim in the Ocean Without Getting Wet

Okay, we admit being a little skeptical about this video (?) game. Before we got our hands on it, we were told that players would not be issued with any weapons, as there would be no bad guys to eliminate. All we had to do was to explore and enjoy the ride. There wasn't even going to be a mission, no damsels (or dashing Mr Right) to save.

Still, we gamely played the game, aptly called *Endless Ocean*, secretly expecting a whaling ship to charge in out of nowhere.

Fortunately, there was none. And we say fortunately because this game is soothing and idyllic. You get to swim around, explore the underwater realm, investigate shipwrecks, photograph marine life, feed the fishes, etc. Along the way, you learn about more about the fishes (there are some 150 varieties), and even get to befriend and train some dolphins.

For a break, dive up topside and plan your next dive. Like on a real dive trip, you can even watch the sunset, check your emails (make-believe ones, of course!) and even chat with a friend onboard who's a marine biologist. You can even get a friend to join you on your next dive, via Wii's WiFi Connection Service.

In all, this game is a welcome alternative to contemporary action-pack shoot-'em-up games. But play it at the end of a long day at the office, when you are in need of a little solitary R & R to calm those fazed nerves.

Learn Yoga to Dive Better

It's not every day that you come across fellow divers exerting themselves in yoga poses before they enter the water. Well, if Kimberlee Jensen Stedl and Todd Stedl, the writers of a new book *Yoga for Scuba Divers*, have anything to say about it, this scene may well become more common in the near future.

According to them, yoga can help divers improve their diving skills, and train up the muscles used during a dive. The poses and techniques featured in the book run the gauntlet from pre-dive warm-ups, general conditioning, post-dive recovery, pose positions, etc. The mental aspect is also covered, in the form of visualization techniques that divers can indulge in. A unique skill featured in the book is a special way of breathing that simulates the way one breathes from a regulator. This is especially useful for divers as it helps divers to learn to breathe calmly when underwater.

Writers Kimberlee Jensen Stedl and Todd Stedl are both certified divers, so don't worry about having to read a lot of metaphysical mambo-jambo in this book. What you'll get is solid and practical advice and instruction on how to incorporate yoga techniques into your dive routine, with the aim of achieving a more fulfilling and efficient dive experience.

- 128 pages
- Soft cover
- Publisher: 8th Element Yoga

Yoga for Scuba Divers



Practice on land to build strength, increase your air efficiency, and become a better diver

Kimberlee Jensen Stedl and Todd Stedl, Ph.D.

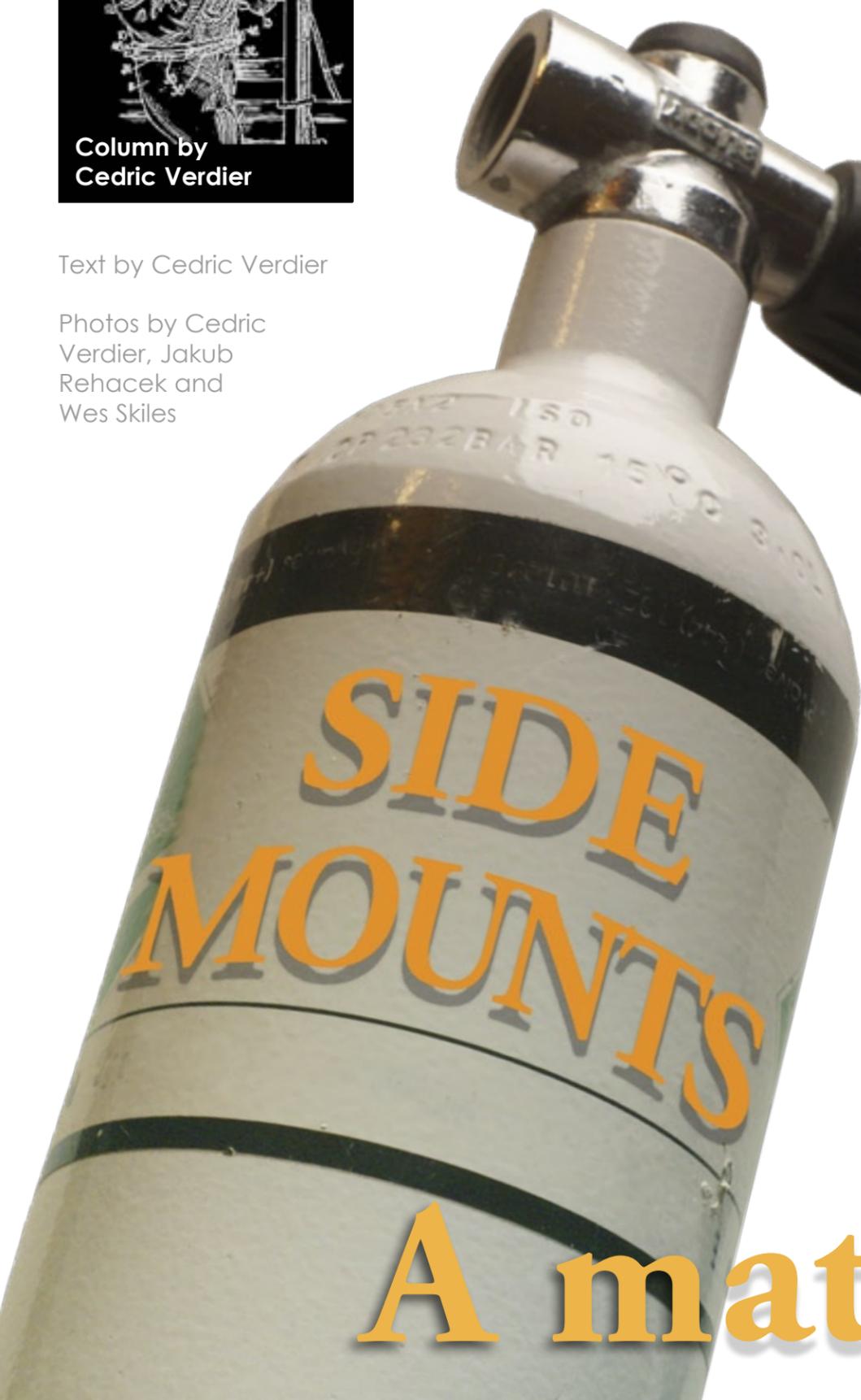


Column by Cedric Verdier

Text by Cedric Verdier

Photos by Cedric Verdier, Jakub Rehacek and Wes Skiles

Try something different...



It has been a year now since I started to exclusively side-mount the off-board tanks of my rebreather—either a Megalodon CCR or an Evolution CCR. Why? Simply because it's much more convenient!

Open Circuit

A few years ago, there was no commercially available side-mount kit for open circuit cave explorers. In the dark ages of cave diving, those who wanted a sidemount configuration had to build their own equipment, mainly based on BCs and inner tubes.

Then some kits like the Armadillo or the Dive Rite came into the market and gained in popularity as there are definitely some advantages in using this kind of configuration.

Carrying each tank on the side, under the armpits, makes away with the large bulk a twinset strapped on your back is. Side-mounted tanks give a very streamlined profile when swimming horizontally or exploring low passages for a long time. Side-mounted tanks are also easier to detach and brought in front of the diver when the time comes to go through a major restriction.

Also, in some locations, you can't find a twinset with an isolation manifold, a side-mount configuration is a good alternative to the traditional independent tanks. It's simple, reliable and much easier to carry than a twinset, which is a clear benefit when you have to carry all the equipment for a long distance, either for sump diving, or for a long trip to an unexplored Cenote deep in the Mexican jungle.

But like so many other things in diving, it takes practice and experience as the diver now has to manage two independent gas supplies instead of the traditional

twinset configuration with an isolation manifold—not really DIR but used by a fair amount of Open Circuit cave divers worldwide.

Rebreathers

Unfortunately only very few (and they are homebuilt) rebreathers can be truly side-mounted. Tanks and canisters are worn on one or both sides of the body to streamline the complete rig. Some manufacturers speak about a side-mounted rebreather as the ultimate solution for a bail-out rebreather, but nothing is commercially available yet.

So, for most of the units, the canis-



A matter of convenience



a big bungee loop coming from the top of the back-plate. The goal is to hold the tanks just under the armpit along the axis of the body.

The off-board tanks

Instead of a sling tank rig, the attachment is very simple. A cam-band with a dog clip is positioned in the middle of the tank (depending on the size of the tank and the diver). This clip will be connected to the "butt-plate". No hardware is really necessary on the tank valve as the bungee loop does all the work. Nevertheless, some people prefer to have a clip here, mainly when they carry the tank on land or want to stage it somewhere. The cam-band can also be used to put a lead weight to offset the buoyancy of the tank. With an aluminium 80 (11 liter), it's only necessary for an Open Circuit diver who will breathe the gas in the tank. A full bail-out tank (that is not supposed to be used during the dive) will stay neutrally buoyant all dive long.



How to use it

I toyed around with the idea of a sidemount kit for my CCRs for quite a while. My first attempt was a homebuilt project based on an old OMS butt-mounted EDS (the soft plate you use to store SMBs and small canister) I found in Thailand. The idea was good, but the final result didn't last more than 20 dives.

Everything fell apart during a dive. That was all it took to convince me that while the configuration was clearly interesting for a rebreather diver, the manufacture had to be much stronger.

My next project was to use the local Thai industry, find a small workshop that could understand my poor drawing skills and my even poorer Thai lan-

ter has to be carried on the back. Therefore mounting the cylinders on the side doesn't really change much in regards to streamlining. Or does it?

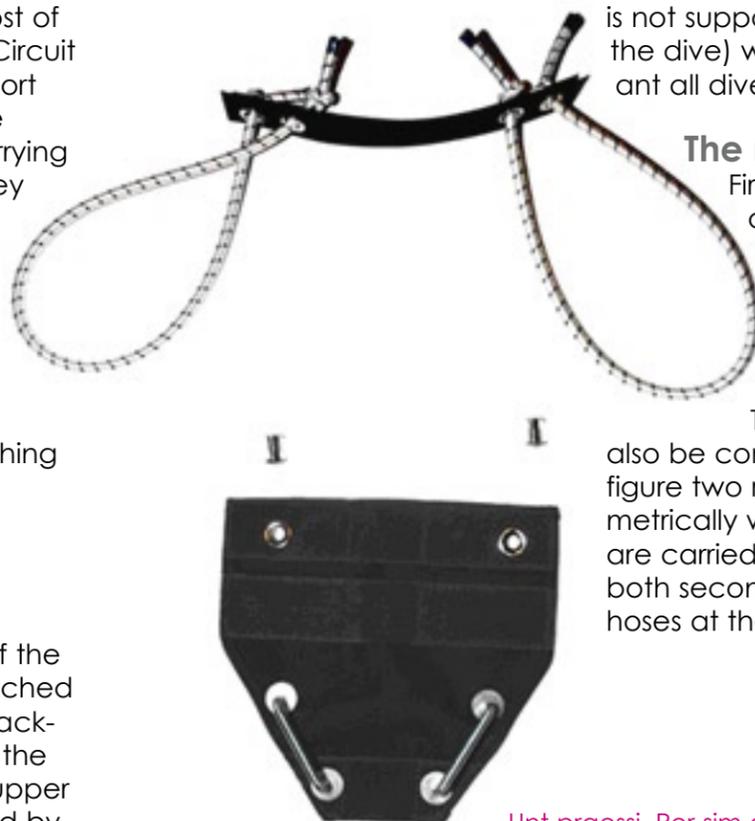
In fact, most of the Closed Circuit Rebreathers on the market use very small on-board cylinders either inside the casing or simply attached to a central canister. In either case, side-mounting these tanks do not make much of a change. You can save a little bit of space on your back, but then you need longer LP hoses everywhere, and it becomes difficult to keep your rebreather as simple as possible. I tried it and didn't like it.

On the other hand, side-mounting comes in really handy when it comes to changing the position of the off-board sling tanks and bail-out tanks that most rebreath-

er divers carry with them. Most of the divers rely on the Open Circuit bail-out option as the last resort to come back to the surface alive, and it often means carrying at least one or two tanks. They are usually clipped on the chest and waist D-rings and, honestly, it's not a good place for them. Their valves protrude, and the cylinders push on the front-mounted counterlungs, increasing the Work Of Breathing and uselessly opening the OverPressure Valve.

Anatomy of a Side-mount kit

The "butt-plate": The core of the kit is an additional plate attached to the bottom of the usual back-plate as an extension to clip the lower part of the tanks. The upper part of the tanks is simply held by



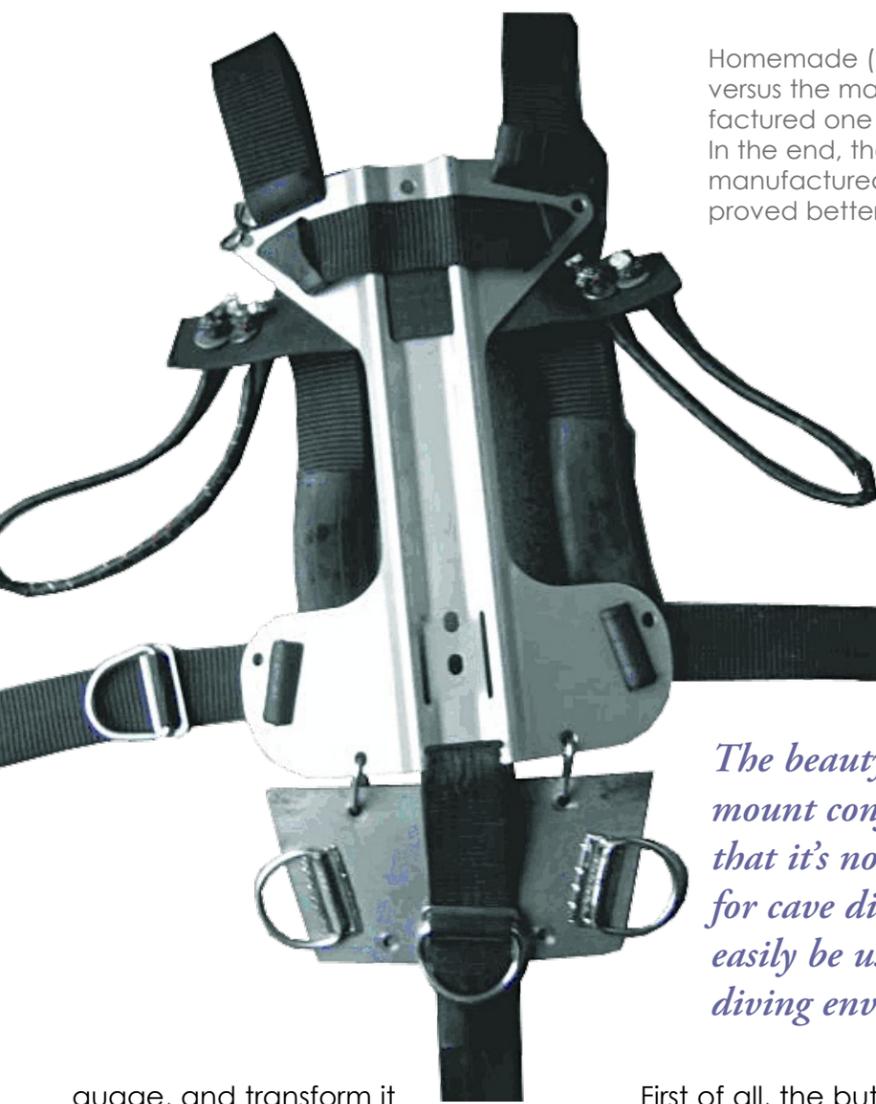
The regulators

First stage and second stage, a small SPG and a LP hose with a quick connect fitting (if the rebreather has this option). That's it. It could also be convenient to configure two regulators symmetrically when two tanks are carried. It helps to have both second stages and LP hoses at the place.



Unt praessi. Per sim dolorperci bla





Homemade (left) versus the manufactured one (right). In the end, the manufactured one proved better



The beauty of a side-mount configuration is that it's not only designed for cave diving. It can easily be used in any diving environment

guage, and transform it into a shiny and almost indestructible Stainless Steel "butt-plate". The concept of a Side-mount configuration is quite simple, and I became the happy owner of a Side-mount kit. The result was not that bad, but not as cheap as I expected in this part of the world. The plate looked nice, but the welded D-rings were not all that practical. The only black bungee I could find came from a motorbike shop, and the quality was questionable.

The kit I use now is the Armadillo CCR Side-mount kit designed by Jakub Rehacek. It comes from a completely different world, and I sometimes wonder why people like me even attempt to built their own equipment when people like Jakub can do it much better for almost the same price, in less time and with so much less hassle!

First of all, the butt-plate is not made of metal, so it doesn't hurt my back anymore, and it doesn't add any weight to the usual butt-heavy rebreather diver position. Consequently, the trim is better and the rig is still as robust as my previous one. The two rings onto which the tanks are clipped on are much more accessible as they slightly protrude on the back. And there's even a place to put the crotch strap!

The attachment strap holds two bungee loops that are actually much thicker and more elastic than the ones I used, and it definitely helps to quickly and safely attach the tank valves. I don't know how many times I used to squeeze my fingers between the valve and the bungee before. So, all in all, Jakub made a wonderful kit really adapted to rebreather divers. I would have preferred black bungee, but that is a minor detail...

The CCR Side-mount kit is clearly simple to use, but most divers need a few dives to properly adjust the tanks and the regulators. A good idea is to measure the distance between one's armpit and waist, as it will be the distance between the cam band and the tank valve.

Only a little bit of practise is necessary to clip the tanks at the surface or to remove them underwater. The trim is great. You really feel streamlined, as there is no tank in front of you. Everything is under your arm, but the bail-out second stages are still ready to be deployed within seconds. With Aluminium 80s (11L) tanks, you can easily go through restrictions or small passages you will never imagine doing with conventional sling tanks. With Aluminium 40s (5.5L) tanks, you simply forget them, as you don't feel them at all.

The beauty of a CCR Side-mount configuration is that it's not only designed for cave diving. It can easily be used in any diving environment.

THE GOLD STANDARD

EVOLVED



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SOPHISTICATED ENOUGH TO DIVE FOREVER

The Gold Standard of sport dive computers, the Cochran Captain has been re-invented as the Cochran EMC-14. The EMC-14 is packed with all the features you need to feel safe and confident on any dive. And when you're ready for more advanced environments the EMC-14 is there with constant FO₂ and NITROX handling.

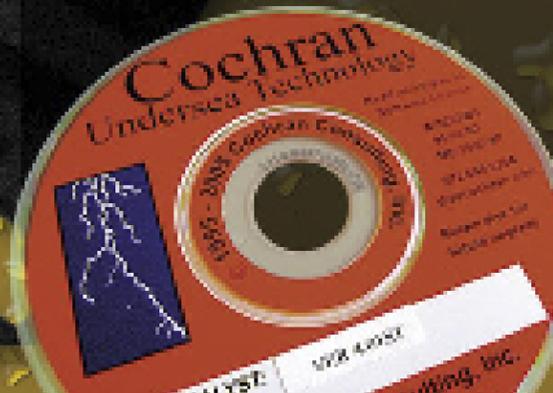
And that's only the beginning. The EMC-14 has expanded memory, maximum depth alarm and like all dive computers in the EMC family, takes many environmental factors into consideration when calculating decompression data using Cochran's EMC decompression model. Add to that a direct interface with your PC using the powerful Analyst 4.01 software.

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On Friday night, Frédéric and Jean-Michel Vallon went on a dive and brought back some photographs, so we spent the first part of Saturday studying their images in preparation for the task ahead. Then, we went on the test dive bringing the stretcher down to a depth of 25 meters.

The end of the afternoon was then dedicated to the preparing of all the gear, analysing the gases, planning the stages and decompression stops under the watchful eye of the camera. That day, the outside temperature did not make it above 0° C (32° F), so we enjoyed being inside the relative warmth of the cave.

The next morning, we were joined by Michel Labat and his small team. Their task was to photograph the evacuation as the stretcher exited the sump. We completed the last preparations and suited up.

The conditions were a bit tricky with four divers trampling around in the confined space of the nar-

row sump. The rebreather divers had to go in while trying to balance the stretcher. Our main concern was whether we had enough space for the stretcher at the bottom. If we inflated it too much, the handling would become very challenging. We took the stretcher down around noon. I was in the front, Jean-Michel was in the rear, while Olivier Lanet oversaw the management of gases and stops. Frederic handled the camera and acted as the fourth man.

The beginning of the descent went quickly through a small gallery sloping at 45 degrees. Olivier did not have enough space to keep his position through this section, so Jean-Michel had to untie the ropes in his place.

Handling the stretcher was difficult. It was necessary to make stops, as our victim (Michel Ribera,

A Stretcher In Deep Water

That's it! We managed to take a stretcher to a depth of 54 meters and a total distance of more than 450 meters. What a human and technical achievement!

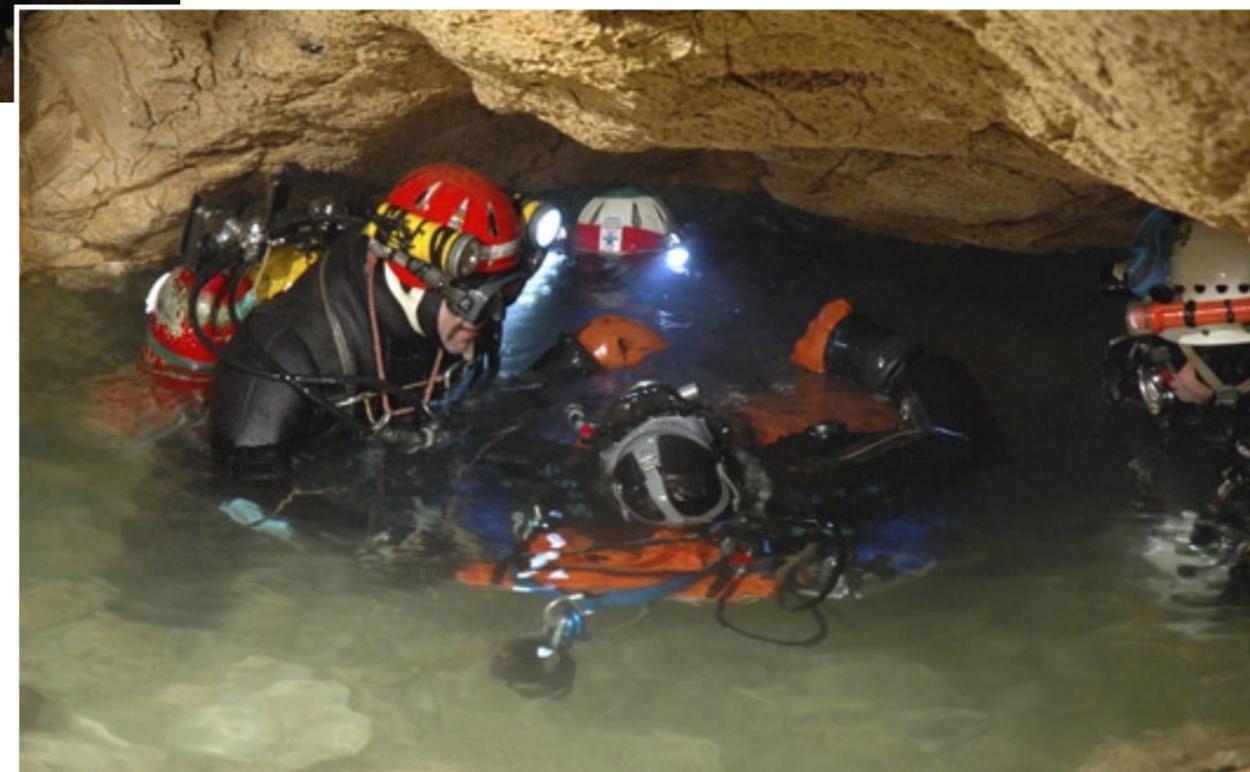
By Jean-Pierre Baudu
Spéléo Secours Français
Reporting by Michel Ribera
Photos by SSF

Vaucluse, Southern France – The calendar shows it is the weekend of December 29-30, 2007. We have already spent long evenings and weekends in preparing this test. With Frédéric Martin, we finally wanted to do a live test of our stretcher under the real conditions of a real current dive.

At the same time, we had to observe the rules set forth by the Spéléo Secours Français—the French Cave Diving Association. We set up a trimix dive, with nitrox decompression and oxygen.

The group Spéléo-Ragaïe was there to shoot a film and brought in hundreds of meters of electric cables, dozens of spotlights and cameras everywhere. The cave seemed to be transformed into a film studio.

Our group was made up of ten divers, and we didn't have one quiet moment as we had to bring in 70 tanks, of which the biggest was a 50-liter heavyweight and the smallest was a 2-liter tank. Two of our divers use rebreathers.





commenced the ascent two minutes later.

Suddenly, at 50 meters, everything stirred up, and I had no idea of where I was. I had a grip on the stretcher, and I could only hope that my team member had the life line in his hands. Minutes seemed endless while I sat in the middle of that cloud clenching my fists.

Finally, we got out of the fog, and I saw Jean-Michel's hand grasping the life line. Everything was fine, and the continuation of the ascent was just going to be very physical.

At 30 metres, we reached our first stop and change of tanks. We now breathed 40 percent nitrox after using Trimix 21/37 for the bottom parts. Sebastien Rocheil, Carlos Placido and Thomas Parnet now joined us to assist us during the ascent up to six meters while Olivier oversaw the decompression.

We ascended slowly, three meters at a time. At 24 meters,

Olivier joined me and informed me that the computer did not indicate the planned stops. Apparently, some handling error had messed up the computer. I took out my backup tables and joined the stretcher to assist in the ascent.

We connected the oxygen and hoses. Everything went well. Meanwhile, other team members collected the tanks at the bottom and brought them out. The stretcher finally made it up 93 minutes after it went in.

It was a good experience. We achieved our objective, made a deep dive with our stretcher, using different gases, while handling a team member's rebreather or open system. This simulation also allowed us to test the full face mask, the safety set-up, the dry garment and the team work.

Points to be improved are the balancing of the stretcher in constricted spaces, the location of tanks, the protection of the VR3 against the manipulation band and the communication with the victim during the landings. If everything had gone perfectly, we would have already been at -100m.

But still, we negotiated the narrow passages of a 450-meter siphon with a stretcher and took it down to a depth of 54 meters of depth: This is a record! The next exercise will take place in March where we will attempt to carry the stretcher across a sump of 1400 meters. ■

Michel Ribera acted as the victim in this valuable exercise



X-RAY MAG co-editor) had trouble equalizing his ears. The gallery then became horizontal for 45 meters. We reached the lowest point at a depth of 46 meters and turned the stretcher around. We kicked up some sediment in the process, but the visibility remained very good, and we ascended to 40 meters to re-position the stretcher.

The final stretch was in a gallery sloping downwards at a 45-degree angle, so we brought the stretcher forward slowly. We made it to 54 meters, and I decided to turn around. After crossing out our checklists, we

Finally here, it seems: Ambient Pressure Diving put their long-awaited Bailout Mouthpiece on display



Other News From the Tech Diving World

— seen at BOOT

Not the very latest news, but almost. The Sentinel can in many respects be seen as the younger sibling of the high-end Ouroboros Closed Circuit Rebreather.

The Sentinel came about because more recreational divers want to move into rebreathers, but the vast majority of divers will never be able to fully utilize the performance of the advanced and costlier units. The Sentinel is a bid to make a rebreather more cost effectively but still have an acceptable (and high) degree of performance and be designed for a wider spectrum of the general diving market.

The Sentinel comes with an intelligent but simple to use life-support system (LSS), which provides the user with a simple Check-and-Dive functionality that makes the Sentinel the quickest and safest LSS to prepare for diving.

It uses intelligent monitoring and design experience to determine the appropriate tests and checks that the diver needs to perform to get the LSS ready for diving. Any problems or remedial action are described clearly on the full-colour graphics screen. ■

Sentinel is available in 3 user levels:

- Level 1 - 40m no decompression
- Level 2 - 60m Normoxic
- Level 3 - 100m Trimix





Photo & Videography

Edited by
Kurt Amsler
& Peter Symes

Doing it right: Holding eye-contact with the subject, maintaining perfect buoyancy, and finning carefully is precisely how the photographer gets his or her camera into the perfect shooting position



A matter of balance

It is sad, but true—underwater photographers do not have a good track record or reputation for behaving well in nature. But being environmentally aware and conscientious about conservation issues should be as much part of the preparations as loading the camera with a memory card and fresh batteries.

Text and photos by Kurt Amsler

Environmental Awareness

For Underwater Photographers



photography

It just seems that quite a lot of divers do not remember, or worse still, were never taught properly how to be in control of their buoyancy

The underlying fundamentals for underwater photography is mastering the basics of diving. In order to obtain good photographs, it is paramount to be able to control buoyancy.

Mastering hovering is, essentially, down to what we were taught in our first diving course. It just seems that quite a lot of divers do not remember, or worse still, were never taught properly how to be in control their buoyancy. So, let's start with a short recap. If you are fully equipped with an empty jacket, drifting vertically in the water, the water surface should be, while normally breathing, at the level of your mouth. Once you exhale deeply, you should slowly begin to sink.

Trim

To find the perfect pose underwater for photography, it is of the utmost importance that two criteria are met: 1) Your weights must be distributed correctly, and 2) your jacket must fit snugly. It may sound silly, but if your jacket is just a little bit too big, it will move around and make it quite difficult to obtain and maintain neutral buoyancy.

For underwater photographers, wing jackets with integrated weights seem to be the most suitable buoyancy system. Their lifting



In order to obtain good photographs, you must be in complete control of your buoyancy

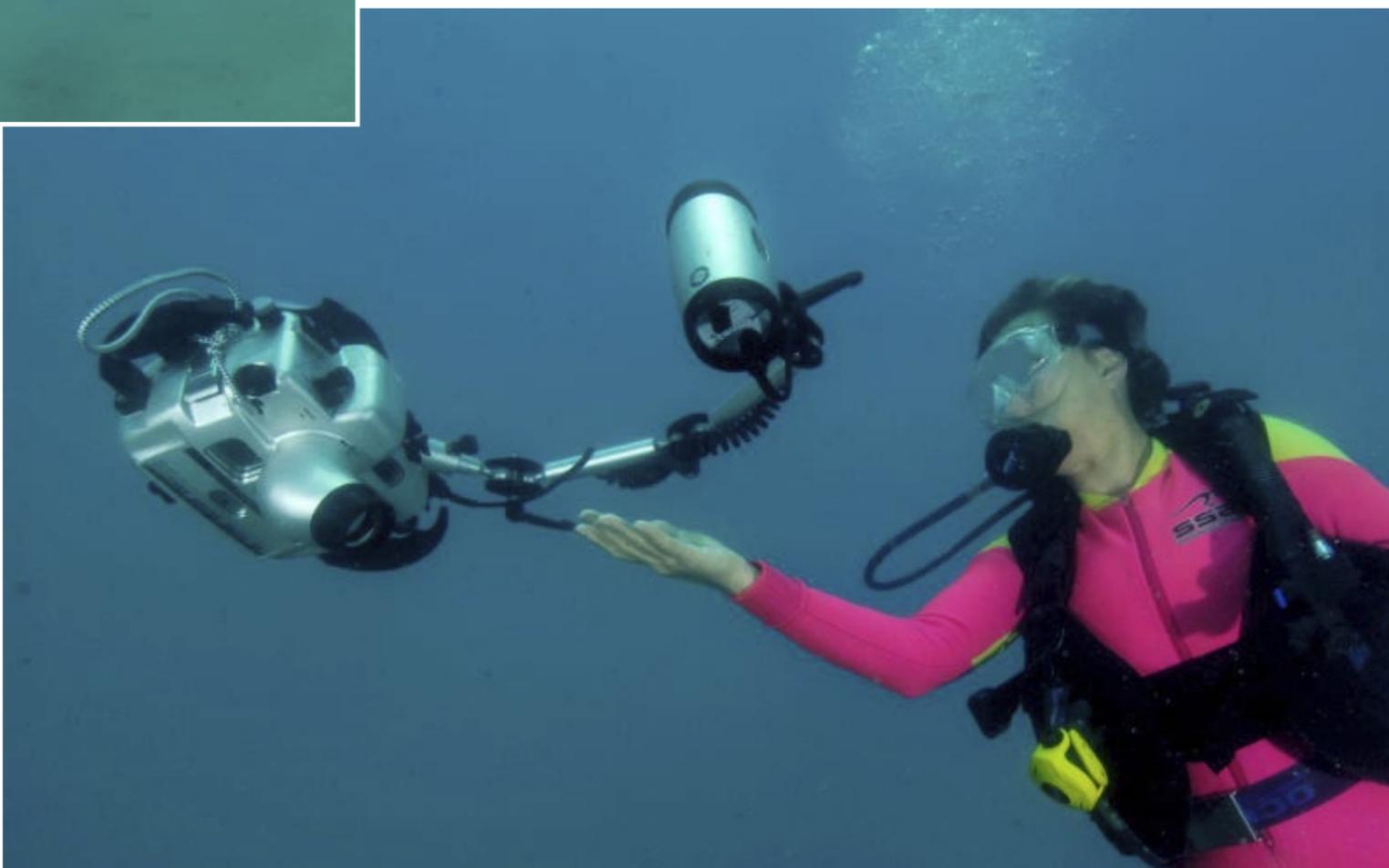
body surrounds the tank at the back of the diver. That creates a constant and firm dive position. Also, the depth gauges and hoses should be tucked in and fixed close to the body, so that they will not dangle and damage the reef. What is of importance to divers in general also applies to those handling camera-equipment. Experience shows that the complete photographic equipment system should not have more than 250 grams of negative or positive buoyancy.

Procedures

Most of us have witnessed the following scenario: An underwater photographer has made his shot, and then, with two or three sudden fin kicks, turns around hunting for the next subject. Unfortunately, in doing so, he also manages to kick up a lot of sand and sediment and chase away the fish, leaving nothing to be seen for other members of the dive group! It's necessary to show consideration towards both the

environment and your fellow divers, not just be fixated during those important moments on getting close to the subject. It is of equal importance to think about how to get away in an orderly and smooth manner once the shot is taken.

In this regard, wide angle photography is easier to deal with. It is more of a challenge for macro photographers, who need to remain steady on the reef to avoid camera shake. To avoid damaging the reef, the photographer should take a lot of care in regards to where and how to touch the reef. To obtain the smallest possible contact with the reef, the photographer should use the so-called "finger grip" (images next page) to stabilize his position. After the shot, it is easy to push oneself back into the free water without using the fins. Another way to leave the subject is to use lift. Just take a deep breath or inflate your jacket, remain still and be happy about your shot while you drift clear of the reef.



The complete rig should have less than 250 grams of negative or positive buoyancy



Camera of dream





photography



First you adjust the camera and flash



Then move in closer to the subject



Pause for the right moment for the shot



And then slowly slide away from the subject

Applying positive buoyancy by inhaling or inflating your vest can gently lift you clear of the reef



Side kick: Move the fin blades sideways in a horizontal sweeping motion. Try to angle the blade against the motion



The duck kick employs a gentle circular motion, a bit like a propeller

How to use the fins

It is sometimes just the way you use your equipment that makes for perfect results. The technique of using fins is much more complicated than commonly thought. Using the right finning technique helps to preserve the environment and makes working with photography much more comfortable. What I refer to is the "flutter", "sidekick" and "duck kick". If you are diving just above bottom, the flutter kick with wide angled knees is best and keeps sand and sediment where it belongs.

The movement of the fins is not up and down but goes in a semi-circle done by the knees. If you need more power and speed, you can use the duck kick: Knees are bent while the fins are being flipped up and down through ankle movements. These techniques are mostly used by cavern divers where avoiding stirring up sediments is a priority.

Another finning technique is the side kick. With this technique, the fins are not moved up and down but sideways in a swaying or fanning movement. The result-

ing wave is then also directed sideways rather than down where it would disturb sand and sediments.

These techniques can be learned and practiced by any diver, especially by those who are beginners or have less experience. The time invested in training these buoyancy and finning techniques will benefit any diver but in particular underwater-photographers!

Why? Because a perfect buoyancy and optimal use of fins will make it easier and more enjoy-

able to dive, and make the hunt for the perfect shot more effective and comfortable. And, by the way, if you consider yourself to be engaged in environmental protection issues and a careful diver, you will be respected and welcomed at any dive center in the world. Certainly, only this kind of underwater photographer will be introduced to the hidden secrets and secret dive spots of the diving center—spots that a photo-rogue will never be offered the chance to encounter. ■

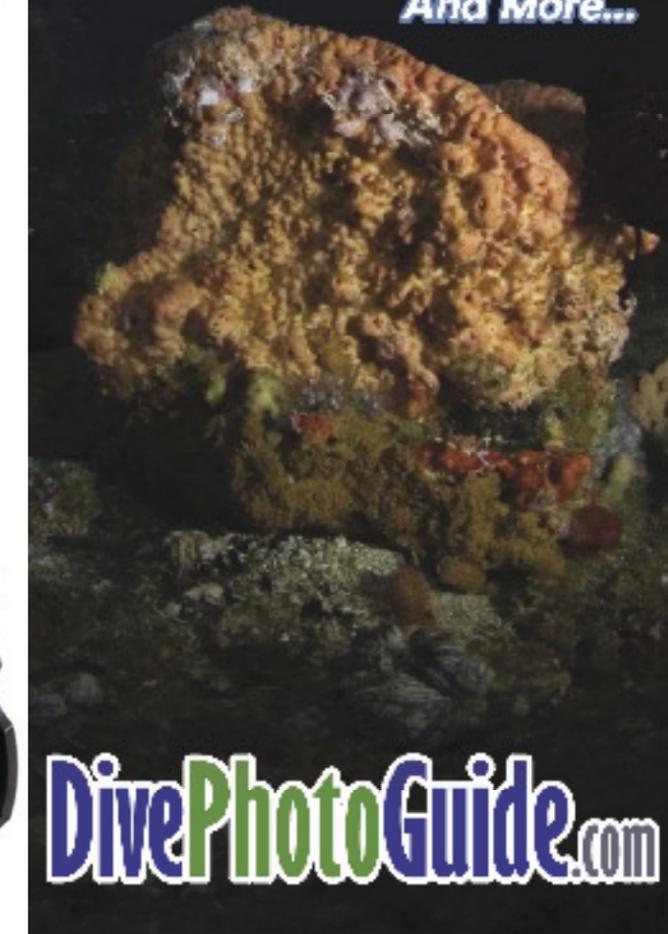


Macro-photos require a steady hand and a calm situation around the subject. Look for a dead spot of the reef and use the "finger grip" to steady yourself



Once you have your shot, gently push yourself backwards





Fit a Nikon lens onto a Canon body

16:9, known for their tests and reviews of lenses by a variety of manufacturers, has introduced an adapter that allows Nikon G-type lenses to fit Canon EF-lens compatible cameras. 16:9 states the motivation was to enable the use of Nikon's "new 14-24mm f2.8, which provides the sweetest ultrawide solution for the 22MP 1Ds Mark III."

The adapter includes an AF-confirmation chip and maintains infinity focus, but disables VR, auto-focus, and auto-aperture functions. At £79, only the lever-free version (where the lens is stopped open or stopped down by rotating the lens in the mount) is currently available with a 35-day turnaround, but a lever-operated version is also planned. www.16-9.net (VIA MATT SEGAL, WETPIXEL.COM)



Sealux CX580II housing for Canon Speedlite 580EXII flashgun



Berkley White runs D300 through the paces

His conclusion: "Nikon D300 offers the most significant advance in underwater digital photography since the Nikon D100. It's beyond instant digital feedback and produces images on par and arguably better than results I've ever achieved with 35mm film. When considered at ISO 400, the results are clearly better than scanned slide film. The Sea & Sea MDX-D300 housing might not be perfected in high end ergonomics, but it is clearly a professional level housing at a great price. If Sea & Sea continues on this MDX design and invests a little more in tactile smoothness, they could easily position themselves as the best housing / best price on the world market." **Read the full review here**

SEALUX housing for Nikon D300

The Compact and lightweight CD300 is made out of one block of aluminium, which is then hard-anodised and specially sealed. The memory card can be replaced while the camera is mounted. Get the full list of features on www.sealux.de



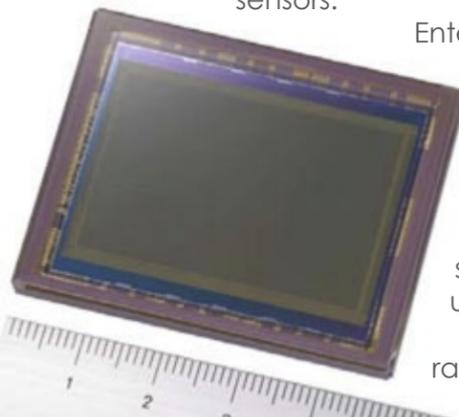
Floats

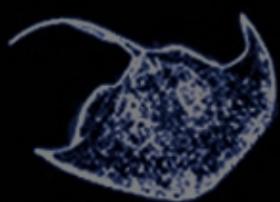
The best ideas are often the simplest ones. German photo-accessory specialist, Michael Finger, exhibited all kinds of interesting little gizmos at the recent BOOT Expo. Here, we found these floats that can add the necessary buoyancy to a heavy lamp or housing. Just strap them on and you are all set. www.mike-dive.de

Sony unveils 25 megapixel full frame chip

The increasing user requirement to shoot from the same focal length and angle as 35mm film cameras using interchangeable lenses has led to significant interest in the development of 35mm, full size CMOS image sensors.

Enter Sony who has just announced the development of a 35mm full size CMOS Image Sensor with 24.81 Effective Mega pixel resolution and extremely high signal conversion speed for use in Digital SLR Cameras. Who said the megapixel race was over?





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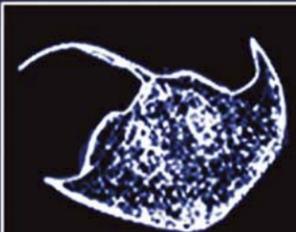
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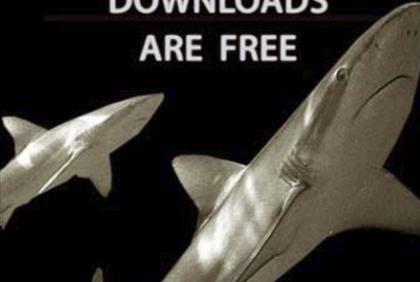
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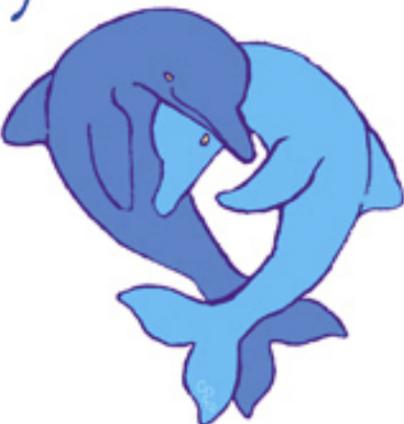


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"Tea, Nitrox and Vodka: Diving Lake Baikal"

Unique Dive Site



Lake Baikal is in every aspect something special. Not only is it the oldest and deepest of the world's lakes containing nearly 20 percent of the world's unfrozen freshwater reserve, it is also home to a unique ecosystem with an outstanding variety of endemic flora and fauna, which is of exceptional value to evolutionary science. Diving here is like touching down on another planet.

Text by Peter Symes
Photos: Topside images and ice diving images courtesy of Gennady Misan / Baikaldiving.ru
Other dive images: Peter Symes

Lake Baikal in Winter

Situated in southeast Siberia, far from pretty much everything yet easy to get to, the 3.15-million ha Lake Baikal is the oldest (25 million years) and with its 1640 m also the

deepest lake in the world. Known as the 'Galapagos of Russia', or one of the seven underwater wonders of the world, its age and isolation have produced one

of the world's most diverse and most unusual freshwater faunas. Lake Baikal, long ago, became famous for the purity of its waters and surrounding shores, a pris-

tine state that had been seriously threatened by planned industrial development in recent years. Luckily, Baikal was one of the first regions to benefit from the new

Russian government's reversal of decades of anti-environmental industrial policies. Since 1992, Lake Baikal and the entire surrounding area have been des-

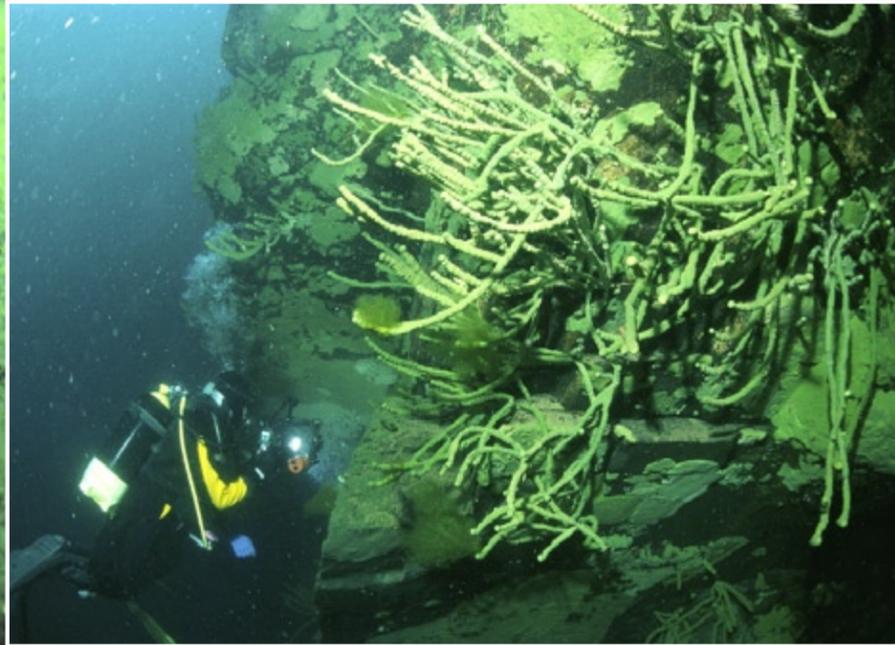
ignated as a national park, and Baikal is, today, a naturalist's paradise and an idyllic holiday destination —also for a worldwide audience of divers who are slowly

Translated by Valentin Dosiere



CLOCKWISE FROM LEFT: Giant anthropods in Lake Baikal; Diver inspects lush green corals; Packed ice stacks up on the surface of the lake; Panarama of Lake Baikal and the surrounding landscape

Lake Baikal



realizing what treasures this unique location holds. *X-RAY MAG* has described, in an earlier issue, a live-aboard safari during summer on this magnificent lake.

But you can also dive Lake Baikal during the winter. Why not join an ice jeep safari on Baikal? Lake Baikal's ice is not only uniquely beautiful, it also has a complicated structure

that allows divers to observe its beauty by swimming through caverns of ice. Siberian winter on Lake Baikal is not at all severe as some people can perceive. National Geographic has written, "Divers exploring the shallows of

Baikal might feel as if they are hovering over a meadow on a sunny day. Looking up from a depth of 20 meters, they can see clouds in the sky. Looking down, they see fields of fluffy green algae."



Lake Baikal

So what's on offer?

Accommodation of different comfort levels with diving close by where you can walk or drive a snow mobile. On Baikal ice safaris, the journey starts when you leave Irkutsk Airport. Beautiful roads leading through the forests, steppes, and mountains, is an excursion in itself that will see you occupied for nearly the whole first day.

It is just another transfer from Irkutsk to Olkhon Island, but a fascinating and informative tour to the steppes and foothills of Baikal. One passes Siberian villages and hairy cows that find their food under the snow, stop near "burkhan"—local spiritual sites—and have lunch Buriat style while you enjoy the vista of breathtaking mountains tops and panoramas over Baikal—the obligatory stop

before the ice road.

Baikal ice is a different. It forms late and, in the southern parts, not earlier than January. Whereas, the northern part of the lake gets its ice cover sooner. After all, the lake is 630 kilometers long.

Soon, as wind, changing temperatures, frost and sun starts to work, creases and shapes start to develop and form cracks, ridges and mounds. The beauty of these ice sculptures is what draws many travellers to Baikal at this time of year. Some people just walk on the

ice, others skate or take their car for spin. Some go ice fishing, others dive. Still others observe the ice through the window of "Khius"—a fast hovercraft—or perhaps from a helicopter.

4WD and ice diving trips

These tours are based in the main town of Olkhon Island, Khuzhir. There are two types of accommodation: economy and deluxe. From here, the safari starts. Diving tours take the whole day. Driving on ice roads is always tricky; there are cracks and ridges that have to be safely negotiated. Besides this, there are a lot of stops on the way: near beautiful ice formations, on the fields of completely clear ice where you feel like walking on the water, near ice caves formed in rock openings by freezing surf. The traditional places where BaikalTek guides take their jeeps for diving under the ice are Khoboy Cape, Shaman Rock and compression cracks in the middle of the Small Sea. Needless to say, all transportation on the ice is conducted in 4WD vans chauffeured by local guides who know the ice conditions very well. ■



THIS PAGE: Scenes from under the ice in Lake Baikal

Todd Essick



M E R M A I D S & M A N A T E E S





Text edited by Gunild Symes
Photography by Todd Essick

ABOVE: Mermaid, Fish and Lion. TOP LEFT: Mermaid and Child
PREVIOUS PAGE: Manatee Parade

It's been a couple of years since we last sat down with the good-humored Todd Essick to listen to his latest stories and adventures in underwater photography. We caught up with him recently to have a chat and check out his latest images. Here's what he said about his new projects and the impetus behind them.

What was the inspiration behind the project with the mermaids? When we were photographing humpback whales in the Dominican Republic, the models were having a tough time getting down to depth without wearing any fins. So, I was trying to think of a way to give them propulsion, and the best way to do that would be fins that are hidden. Well, what's the best way to hide a fin? Inside a mermaid's tail. So, that was kind of the impetus of how it happened. I am not sure I like what happened with these pictures... I am not completely convinced that it goes to the heart of my project, which is to show the connection we all share with the sea. It's our beginning. Mermaids are more of a whimsical topic. It's more of a break from what I do. I am just kind of playing with it. Through the course of it, I am finding a sub-culture of women who want to be mermaids. They want to be photographed. They are extremely motivated and get to live a



little of their fantasy. I am very amazed at how many of them, women and girls, who have made their own mermaid tails. What's interesting is that I get to hear those tales as well. I get to hear the story behind why they want to do it.

One of my models found this underwater memorial park. She thought it would be cool for some pictures. I was basically trying to create something to illustrate it, to give to the people that owned the memorial park—the fantasy image being about mermaids greeting the spirits of the departed, the mermaids as angels. It was a creative outlet.

Are you going to make another book? Maybe not of the mermaid series. I am working towards getting more and better pictures for another book with more images of whales, whalesharks and maybe man-tas. And then maybe down the road, I will put together a cu-

mulative of everything that I've shot over the years. Probably at the ten-year mark, which is three years from now, I will put out a retrospective of all the projects I've worked on. And in that book, I will probably include some of the mermaid photos, because it did garner some interesting images.

Looking at the cemetery images... you have a model with a mermaid tail and another in a white dress? What is the significance of that?

The woman in the white dress is the spirit, the dearly departed. She is sitting next to the grave markers where people who have been cremated and formed into a starfish or a piece of brain coral are placed. They put them in a cylinder and put them inside the columns. They put a name plate on each spot.

How do you feel about this practice? Fine. It's one of those

other options now. You can have ashes on land or scattered at sea or have them formed into something. I'm into choices. People should do whatever they want, you know, as long as it doesn't hurt anybody. I'm a kind of live and let live kind of guy. If you want to do it and it's an option, why not? There are so many restrictions on morality and ethics, why should anybody question this? I am so used to being questioned about my work because I work with the body. It shouldn't be such a big deal. People should be able to do what they want. There has to be a certain amount of freedom in life. If you want to be formed into something and buried under water, why not? I don't want to see restrictions on people. Why should one not be able to do it?

In the past, you have talked about the Golden Rule in your work and the ancient Greek



LEFT: *Where's my safety diver?*
RIGHT: *Shark Dreams*

year, and they got the most letters to the editor from it—almost all of them positive from all over the world. The one negative letter was from a fairly religious person in America.

When I am in Europe, people are loving the work and standing behind me. My European friends say, “Let me get this right... The place where they produce the most and the best pornography doesn't like your work, which is fine art, stand-alone beautiful pictures done very tastefully, and yet, they are afraid of those pictures?” That's pretty much the truth. It's very ironic.

Tell us a little bit about the manatee images you are now doing and what's behind it...

Well, it's kind of the thinking: Mermaids and Mermaids, based on the old mermaid story of sailors thinking manatees were the original mermaids. Some models who lived near the manatees in Florida contacted me, and it was a no-brainer. They kind of put the idea in my head without realizing it. I love going to Crystal River (Florida) and photographing the manatees. I go all the time in the winter.

It also has that kind of whimsical feel to it, and I thought that it would make some interesting pictures. Everyone knows the old stories that sailors thought manatees were the original mermaids.

The interesting aspect of manatees is that you can look at the herd, or the grouping, and you can almost tell which ones are going to be friendly by the fact that the cleanest ones are cleaner from people petting them throughout the season. They don't have any growth on them. If you see 15 or 20 manatees in an area and a few of them are really clean,

any balls! The US magazines seem to be so afraid of losing readership and offending people, that they don't want to take a chance. And what's even funnier is that I've been published in so many magazines around the world, even in what is technically a Muslim country—Singapore—and they don't have a problem printing it. They find pictures that are not offensive and can publish it there, and yet in America, even the inference that there's nudity, or you're doing something that's off the beaten path—it upsets them.

But I was published in *Scuba Diver* this

ideal of beauty. Yes, it's been around for thousands of years. You put a statue somewhere like Venus or Michaelangelo's *David*... Why should my work be more or less offensive than that? I get far more response and reception in Europe for my work. People like it here too (in America). They're just afraid to say it. In one breath, I will meet somebody at a show like DEMA, and they will love my work, and yet, they're afraid to display it and/or publish it. I always get this, “You know, I really love your work, but we couldn't put that in a magazine.” That kind of says to me that you don't have

you can almost guaranteed that those are going to be the ones that come up to you and be friendly.

Aren't there rules about touching the manatees? The Marine Mammal Protection Act has some loose wording which is called harassment, which can be interpreted in so many different ways. If you go to Crystal River and see the cattle boats drop all these people in, you could interpret that exactly what these people are doing as harassment. They touch them, play with them. It basically comes down to not impeding their travel. They are really only going to stop you when you are cornering the manatees and impeding their travel or standing on top of them. Basically, you are not supposed to go underwater with them, but any photographer knows it's really difficult to get a picture from up above, so you are going to go under the water. If they wanted to reinforce that rule, they could. In theory, you are not supposed to touch them at all, if you follow the rule

by the book. But it's interesting to see the people that come. You can really tell the people that know the rules and know how to appreciate them. And then you get the guy or the woman who has never swam with the manatees, and they are really all over the place, flying with them or chasing them. You just want to go up to them and shake them and tell them, “You know, if you just hang back, you can really enjoy this.” The manatees will eventually come to you.

I probably dove with the manatees the most times, but have the least pictures. It really has to be the perfect storm before it all works. When I say “storm”, I mean that it has to be the right cold front. The tides have to be at the right point. I can almost look at a tide chart and a weather chart and tell you if its going to work out a few weeks ahead of time. But there are certain days in January and February that I think are perfect days, tidal wise, and if there's a cold front coming through, you are almost guaranteed a great experience. Not that you





LEFT: *Stairs*, shot at the underwater cemetery. ABOVE: *Inspiration*, Essick works a model

can't have one on other days, I'm just talking about the most optimum time. It's very difficult to get the cold front, the tides right, the manatees, getting the models there—have everything fall right into place—but I keep trying. I love going and swimming with the manatees. It is never a wasted trip, but I just don't ever get exactly what I want. Which is true of all my pictures, actually. I never get what I want (laughter).

But, there's going to be some dramatic images, and I am just looking forward to people's reaction to them.

When you look around, what do you see or what would you like to see happen in the future in the dive industry? I would like to see an American dive magazine publish my work (laughter). But of course, that would be the beginning of the Apocalypse, or hell freezing over, but I would still like to see it!

What changes do you see in the attitudes towards underwater photogra-

phy? It's fascinating to me how digital photography has just opened up underwater photography to divers. Taking a new underwater photographer and letting them see instant gratification can show them so much, so quickly. Underwater, they can make the adjustments to make the good pictures. It's such a learning tool. They're going to come back from a dive trip—even with a reasonable point-and-shoot camera and housing—they will come back with some really nice pictures, which I think really promotes diving and photography and opens people up. At the same time, for all of us who have been taking pictures for a long time, it can almost be disheartening. For teaching people, it's great. It's funny how long it took me to learn through so many lessons. Now, someone can go out on a few dives and learn it instantly. The learning curve is so much shorter now.

For more information about Todd Essick and his photography or to order prints directly, visit: Toddessick.com ■

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