

Funky Gifts for Folks with Fins ... GirlDiver: Yoga & Diving



GLOBAL EDITION
May 2009
Number 29

Papua
**Leatherback
Report**

Portfolio

**Ana
Bikik**

Profile

**Odyssey
Marine**

Tech Talk

**Technical
Diving**

Photography

Illumination

BIKINI ATOLL & KWAJALEIN ATOLL

Pacific Wrecks

COVER PHOTO BY JOOST-JAN WAANDERS

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COVER PHOTO:

Diver dwarfed by propeller of the wreck of the *USS Saratoga*, Kwajalein Atoll, Marshall Islands, by Thorsten Repp

(CONTINUED ON PAGE 4)



Join Kurt Amsler's efforts to save Indonesia's endangered sea turtles. Sign the petition and donate to the cause at: www.sos-seaturtles.ch

Team divers share a deco stop above the *Saratoga* on Bikini - Joost-Jan Waanders



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Editorial

KURT AWSLER

Let me see a show of hands.

How many of you have spent hundreds or thousands on whatever your local currency is on purchasing dive equipment and perhaps camera gear, getting certified and buying manuals and spending on dive trips? It is close to everybody in this forum, it seems.

If you need a spare part, a new mask, batteries or an extra memory card for your camera, it is usually not a big deal either.

So, why is it you apparent can't, or won't, spare a few bucks to support protecting the environment and a number of those very oceanic species you venture out to experience first hand such as sharks, turtles, whales, mantas and what else? There are a number of good people out there who have taken it upon

themselves to do volunteer work for some of the many non-profit environmental organisations. They are doing all the hard work, often putting aside personal needs and more lucrative careers elsewhere.

But in doing so, they also need your support in order to protect that big blue realm we all claim to love and care about. The only thing you have to do is donate some small amounts here and there.

This magazine has, over the years, worked with a number of environmental organisations and assisted them in creating more public awareness and help to raise funds for their valuable work. This has given us some direct insight into the outcomes of various campaigns, and the result on the bottom line has often been pitiful—to put it mildly.

In some places, marine national parks have been set up and an entry fee, or a tax,

is required for you to enter—which then (hopefully) goes to fund the upkeep and protection of the park and the species therein. Where such schemes are in place, you are forced to part with a little money to go diving there, in which case you probably just accept it as fact of life—just as airport taxes and fuel surcharges.

But does the issue have to be forced through regulation or legislation?

It would be nice if we all could donate just a little here and there to one of the many good organisations on our own accord. Protect the sharks, mantas, whales or turtles, it doesn't matter—pick your favourite animal. There are plenty of options for 'adopting' an oceanic creature. It needn't cost you more than you spend on going to the movies or buying pack of cigarettes. And how cool is it being the protector of an awesome turtle or a graceful manta, which you then get to name? So, what are you waiting for? It's not going to kill you, but it just might kill off the planet if you don't.

— Peter Symes
Editor-in-Chief

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Announcing the Biggest Event of the Ocean in the Asia Pacific...

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12-14 June 2009 Manila Ocean Park, Philippines — www.CelebratetheSea.com



Last Call For Entries —

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of these prestigious titles:

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There will be medals, cash, equipment and holiday package prizes for all categories including the WOW imagery competitors. The cash and holiday prizes for the WOW Imagery competition are sponsored by the Manila Ocean Park and supporting sponsors.

All winners qualify as contenders for the 'President Grand Award of Highest Achievement 2009' with a cash prize of US\$2000. ROLEX is the main sponsor, supporting the hosting of Rolex's

ambassador. This year's visiting luminaries include David Doubilet of National Geographic, Peter Scognes of BBC Blue Planet, Planet Earth, deep sea explorer Dr Phil Nyutten and many, many more.

The Celebrate the Sea Festival is a non-profit event funded and produced by OceanNEnvironment Australia. The partner and principal sponsors for 2009 are the Department of Tourism, Philippines, and PCSSD, with Rolex continuing its unstinting support as a major sponsor since the festival's inception.

For more info, visit:

www.celebratethesea.com

or email: cts@oneocean.com ■



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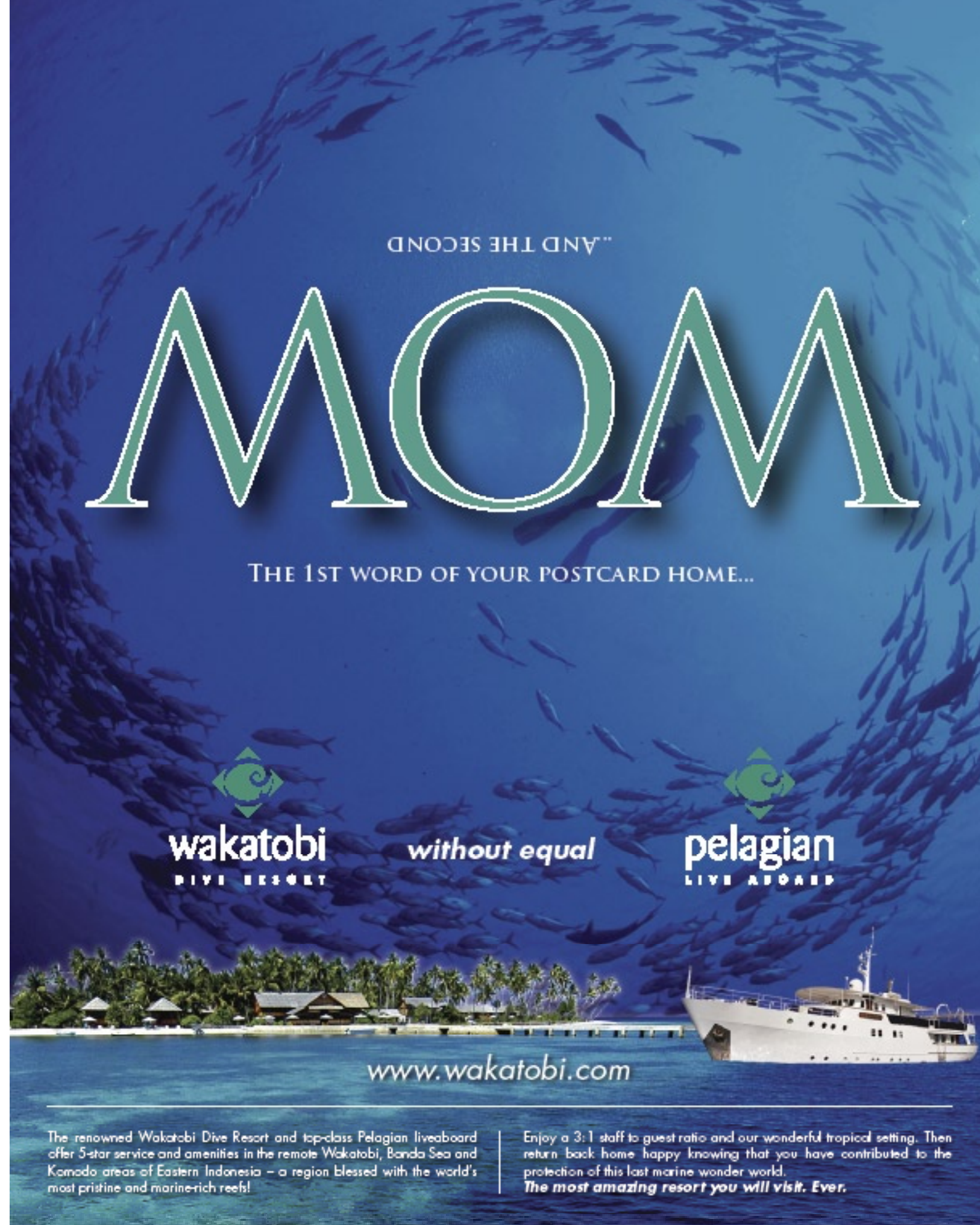
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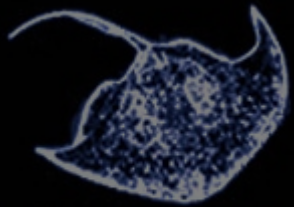
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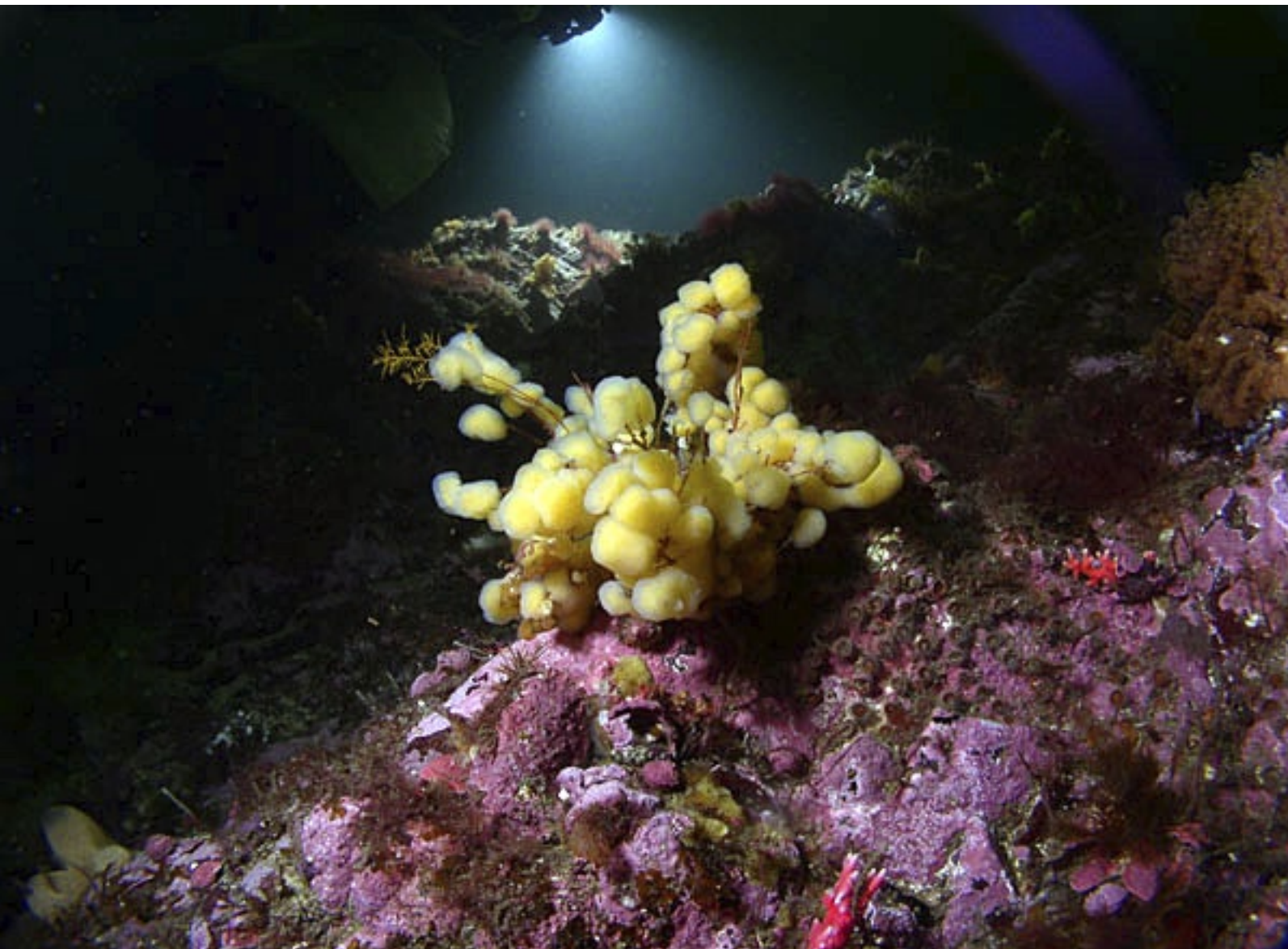


X-ray mag

News edited
by Peter Symes
& Arnold Weisz

NEWS

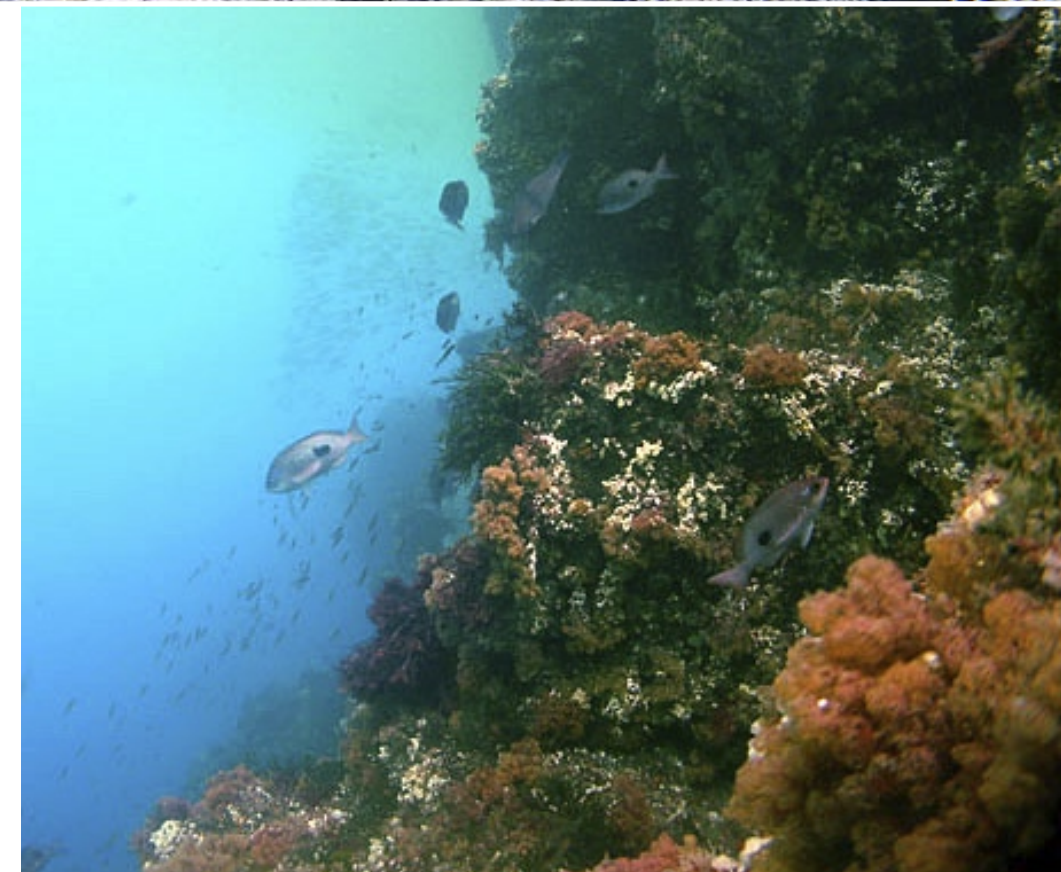
Scientific sub makes deep-sea discoveries



Images courtesy of Advanced Imaging and Visualization Laboratory WHOI

Bizarre carnivorous sea squirts, large spider-like creatures and an ancient coral reef have been discovered by scientists during a four-week expedition to explore the deep ocean southwest of Tasmania, Australia, revealed that the area was home to several species of deep sea animals previously unknown to science.

Sea squirt





"We set out to search for life deeper than any previous voyage in Australian waters. We also gathered data to assess the threat posed by ocean acidification and climate change on Australia's unique deep-water coral reefs," said Dr Ron Thresher from CSIRO.

The expedition used a remote-controlled submarine to explore the hidden depths of a near-vertical slice of the Earth's crust southwest of Tasmania. Known as the Tasman Fracture Zone, it drops below 4000m. Among the new species was a funnel-shaped carnivorous sea

squirt half-a-metre high, and a waffle-like cone-shaped giant sponge. At up to 3000m were thousands of sea spiders, about 30cm in diameter, that look like land spiders but are unrelated. And at 3500m were millions of round, purple-spotted sea anemones. All of these new species are located more than 2000 metres below the surface.

"The entire bottom was covered in these things as far as you can see, and it was just completely unexpected to see this huge dominant community down there," said Thresher.

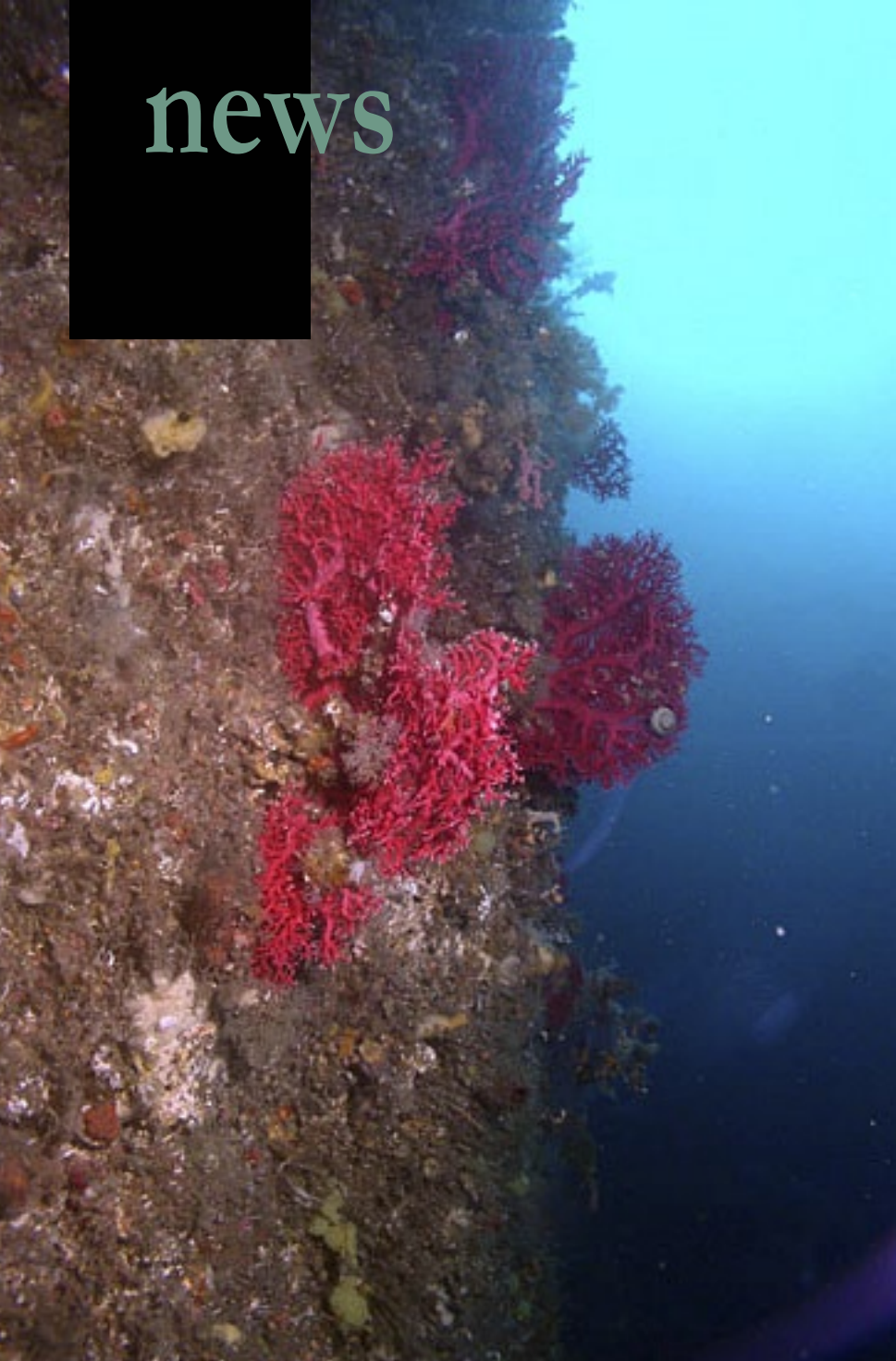


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+10,000 years old

The researchers on the joint US-Australian exploration identified vast fields of fossilized corals more than 10,000 years old located below 1400m as well as a modern reef system.

However, Thresher said images taken by the submarine provided evidence that the modern reef system was dying. Most reef-forming coral deeper than 1300m had recently died, and ocean warming and increasing ocean acidity may be the cause.

"We need to closely analyse the samples and measurements we collected before we can determine what's caused this," Thresher said. It could be the result of several factors, such as ocean warming, disease or increasing ocean acidity.

The exploration was funded by the US National Science Foundation, which spent A\$2 million to bring the research vessel *RV Thompson* to Australia, as well as the remote-controlled submarine *Jason*.

The collaborative voyage of US and Australian researchers was led by chief scientists Dr Jess Adkins from the California Institute of Technology and Dr Ron Thresher from CSIRO's Climate Adaptation and Wealth from Oceans Flagships. ■



A bright red, undescribed species of shell-less coral, called an anthomastid or gorgons-head coral, at 1700 metres deep at the Cascade Plateau, off southeast Tasmania



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Coral bleaching — corals expel their symbiotic algal partners and turn pale or white

Long-term recovery of reefs depends on local action

A new paper representing the first comprehensive review of long-term global patterns in reef recovery following bleaching events assess more than 25 years of data on reef ecosystems recovery from climate change-related episodes of coral bleaching.

Bringing together the results of dozens of bleaching studies, the article reports that bleaching episodes set the stage for diverse secondary impacts on reef health, including coral disease, the breakdown of reef framework, and the loss of critical habitat for reef fishes and other important marine animals.

Huge differences

The study finds that reefs in the Indian Ocean are recovering relatively well from a single devastating bleaching event in 1998. In contrast, western Atlantic (Caribbean) reefs have generally failed to recover from multiple smaller bleaching events and a diverse set of chronic additional stressors such as diseases, overfishing

and nutrient pollution. No clear trends were found in the eastern Pacific, the central-southern-western Pacific or the Arabian Gulf, where some reefs are recovering and others are not.

"These findings illustrate how coral reefs, under the right conditions, can demonstrate resilience and recover from bleaching, even when it initially appears catastrophic," said 2008 Pew Fellow for Marine Conservation and assistant professor Dr Andrew Baker. "What prevents them from doing so is the lethal prescription of combined, additional stressors that prevent them from recovering in between recurrent bleaching events. If we can remove or reduce these stressors, we might give reefs a fighting chance of surviving climate change." ■

SOURCE: JOURNAL ESTUARINE, COASTAL AND SHELF SCIENCE,

Coral reefs, under the right conditions, can demonstrate resilience and recover from bleaching, even when it initially appears catastrophic

Shape-shifting coral has everyone confused

Skeletal shape is currently used to differentiate coral species. This can make them notoriously difficult to tell apart as shape can change independent of reproductive isolation or evolutionary divergence, the factors most commonly understood to define 'species'.

Looks are deceiving

Zac Forsman from University of Hawaii found that appearances are very deceiving in a few groups. Some corals were genetically indistinguishable despite differing in size and shape, such as branching and massive corals, whereas some corals with similar appearance had deep genetic divergence.

The authors said: "Morphological characters previously thought capable of delineating species must be re-exam-



Appearances are very deceiving in a few groups

ZAC FORSMAN.

ined to accurately understand patterns of evolution, and biodiversity in reef-building coral. Currently used species definitions are likely to be misleading and confound attempts to identify, understand, and conserve coral biodiversity or to recognize its loss." ■ SOURCE: EURAKALERT

Fatter coral stands a better chance of surviving bleaching

A new technique offers scientists and reef managers a better understanding of the processes that can lead to high mortality rates among corals affected by bleaching and also an explanation for why some reefs appear to bounce back quickly while others never recover.

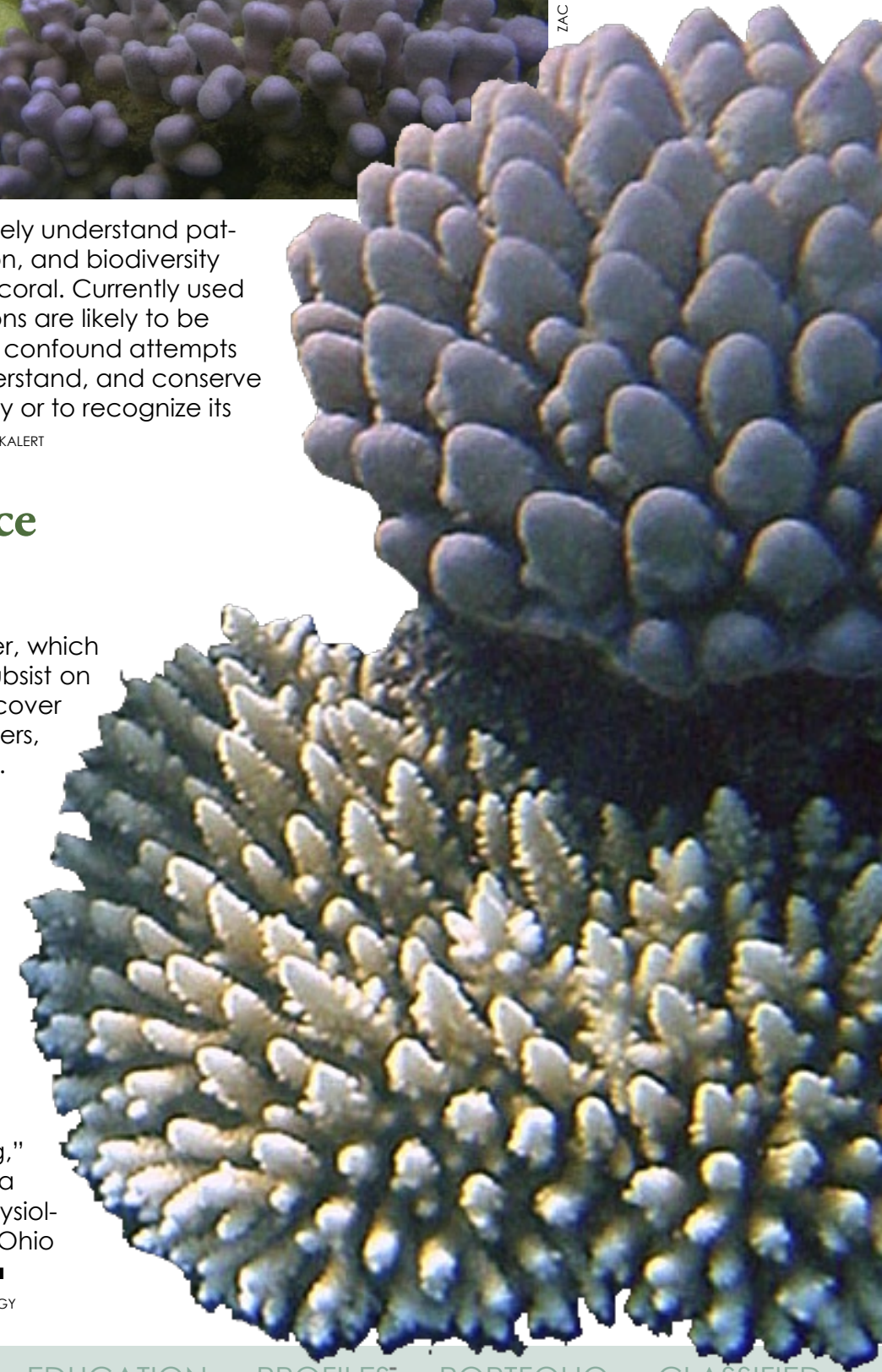
The main factor is the amount of energy stored as fat in the coral's tissues. This in turn depends on the level of the food supply in the water prior to the bleaching event, how recently the corals spawned and whether or not there have been other disturbances such as human activities, storms, low tides and competition from weeds.

After the bleaching event itself, coral survival may also depend on the amount of plankton available in the

surrounding water, which the corals can subsist on until they can recover their algae partners, said a statement.

"We believe corals on coastal reefs are generally better able to recover from devastating bleaching events because there is often enough food in the water to keep them going," explained Andrea Grottoli, coral physiology expert from Ohio State University. ■

SOURCE: FUNCTIONAL ECOLOGY





Super reefs able to withstand climate change

Some coral reefs off East Africa seem to be unusually resilient to climate change due to improved fisheries management and a combination of geo-physical factors.

A new study published in *Aquatic Conservation* provides additional evidence that globally important "super reefs" exist in the triangle from Northern Madagascar across to northern Mozambique to southern Kenya and, thus, should be a high priority for future conservation action.

Rapid recovery
Tanzania's corals recovered

rapidly from the 1998 bleaching event that had wiped out up to 45 percent of the region's corals. The authors attribute the recovery of Tanzania's coral reefs due in part to direct management measures, including closures to commercial fishing. Areas with fishery closures contained an abundance of fish that feed on algae that can otherwise smother corals, while the few sites without any specific management measures remain degraded; one site had experienced a population explosion of sea urchins—pests that feeds on corals.

Complexity is key
The findings also showed that the structure of the reefs played a major factor in their resiliency.

Tanzania's reefs are particularly complex and experience unusual variations in current and water temperature. These factors allow for greater survivorship of a higher diversity of coral species, including those that can quickly re-colonize after bleaching.

"Northern Tanzania's reefs have exhibited considerable resilience and in some cases improvements in reef conditions despite heavy pressure from climate change impacts and overfishing," noted Wildlife Conservation Society scientist Dr Tim McClanahan, the study's lead author. "This gives cause for considerably more optimism that developing countries, such as Tanzania, can effectively manage their reefs in the face of climate change." ■

Be adventurous. Be amazed. Be a diver.



Photo courtesy of David Deublet

beAdiver





Bladder Wrack, *Fucus vesiculosus*, Baltic Sea. Brown seaweeds of the genus *Fucus* occupy a wide variety of temperate coastal habitats. The genus is evolutionary dynamic with recent radiations to form morphologically distinct taxa. In the brackish Baltic Sea, fucoids are the only perennial canopy-forming macroalgae

Seaweed may have formed only 400 years ago

A couple of years ago, researchers at the University of Gothenburg and Stockholm University discovered a new species of seaweed in the Baltic Sea. Studies reveal that this species may have formed as recent as 400 years ago.

The new species, which was named *Fucus radicans*, evolved from a bladder wrack (*Fucus vesiculosus*) ancestor from the Baltic Sea. Detailed studies of *Fucus radicans* show that, from an evolutionary perspective, it was formed extremely rapidly: the

species was formed less than 2,500 years ago, and probably as recently as about 400 years ago. This discovery is one of few examples of extremely rapid species formation. The results also show that new species can also be formed in the relatively young and species-poor Baltic Sea.

"We are now working on understanding how the species was formed. *Fucus radicans* is very common in the Baltic's Gulf of Bothnia, and we want to understand its significance to the ecosystem," said Ricardo Pereyra, a researcher at the University of Gothenburg's Department of Marine Ecology. ■

Seaweed Chemical Defenses

Seaweed can mount complex chemical defenses to protect themselves from microbial threats such as fungus.

Researchers from the Georgia Institute of Technology have described a sophisticated chemical defense system that uses 28 different compounds to protect a species of seaweed against a single fungus.

Immune response

the researchers analyzed recently-collected samples of the seaweed and found groups of potent anti-fungal compounds in light-colored microscopic surface patches covering what may be wounds on the surface of the seaweed.

In laboratory testing, these bromophycolide compounds and callophycoic acids effectively inhibited the growth of *Lindra thalassiae*, a common marine fungus.

It is possible that the alga is marshalling its defenses and display-

ing them in a way that blocks the entry points for microbes that might invade and cause disease. Seaweeds don't have B cells, T cells and immune responses like humans do. But instead they have some chemical compounds in their tissues to protect them.

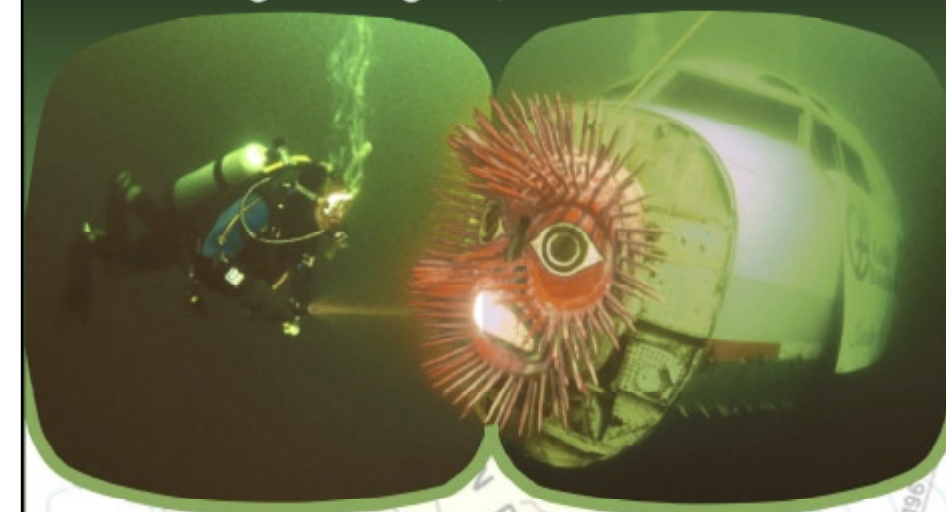
Though all the seaweed they studied was from a single species, the researchers were surprised to find two distinct groups of anti-fungal chemicals. From one seaweed subpopulation, dubbed the "bushy" type for its appearance, 18 different anti-fungal compounds were identified. In a second group of seaweed, the researchers found ten different anti-fungal compounds—all different from the ones seen in the first group. ■

SOURCE: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES



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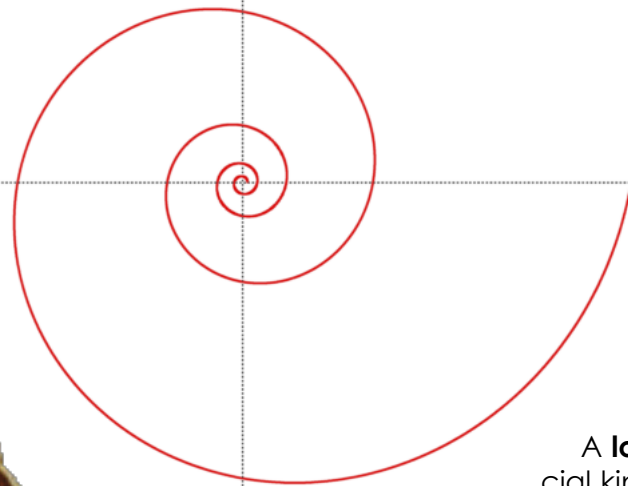
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Math rules Snails and shells

Logarithmic spiral



In polar coordinates (r, θ) the curve can be written as

$$r = a \cdot e^{b\theta}$$

with e being the base of natural logarithms, and a and b being arbitrary positive real constants. The spiral has the property that the angle between the tangent and radial line is constant.

The manner in which a gastropod shell coils has long intrigued laypersons and scientists alike. A gastropod shell generally exhibits logarithmic spiral growth, right-handedness and coils tightly around a single axis.

A **logarithmic spiral**, or growth spiral, is a special kind of curve that often appears in nature. The logarithmic spiral was first described by Descartes and later extensively investigated by Jakob Bernoulli, who called it *Spira mirabilis*, latin for "miraculous spiral" because he was fascinated by one of its unique mathematical properties:

While the size of the spiral increases its shape remains unaltered with each successive curve. Also it looks the the same regardless of scaling,

Atypical shell-coiling patterns (e.g. sinistroid growth, uncoiled whorls and multiple coiling axes), however, continue to be uncovered in nature.



Cutaway of a nautilus shell showing the chambers arranged in an approximately logarithmic spiral



Simple principles rule

A simple neural network model of seashell growth based on a simple principle discovered 140 years ago can generate realistic mollusc shells. George Oster, a biophysicist from Berkeley, working with mathematical neuroscientist Bard Ermentrout of the University of Pittsburgh, has written a computer program that, by using simple principles, generates the complex patterns of seashells closely resembling the real shells.

Only nine paramaters

Based solely on nine parameters, Boettiger, Oster and Ermentrout were able to reproduce the shapes and patterns of almost every known sea mollusc.

Interestingly, they found that all shell patterns fall into three basic classes: stripes perpendicular to the growing edge, bands parallel to the growing edge, and complex patterns created by asymmetric "traveling waves" of pigment or calcium deposition.

The "neural net" model explains how mollusks build their seashells based on the finding that the mollusk's tongue-like mantle, which overlaps the edge of the growing shell, senses or "tastes" the calcium carbonate layer laid down the day before in order to generate a new layer.

"The pattern on a seashell is the mollusk's memories," said Oster, a professor of environmental science, policy and management and of molecular and cell biology. "The shell is laid down in layers, so the mantle is sensing the history of the mollusk's 'thoughts' and extrapolating to the next layer, just like our brains project into the future." ■

Size Matters too

Molluscs in the northwest Atlantic Ocean have undergone a dramatic increase in shell size during less than a century since 1915. Atlantic dogwhelk, *Nucella lapillus*, has had its shell length increased by an average of 22.6 percent during the past century, with no evidence of changes in other shell characteristics.

Why bigger?

Overfishing of native predators of dogwhelks, such as fish, and increases in temperatures could have lowered mortality and increased growth, both of which would cause an increase in size. Also, arrival of new predators as invasive species could have selected for larger body size.



Changes in the shell architecture of marine snails enhance defenses and greatly improve survival against predators. Stouter and thicker shells have been reported for *N. lapillus* and several other species following the introduction of predatory crabs early in the 20th century. When the snails are exposed to crab cues, shells of small snails first thicken and then, once defended against shell-crushing predators, grow in length to a size beyond the abilities of the crab. ■

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Text and photos by Barb Roy and Wayne Grant

Over 3500 attended the festivities over the April 24-26 weekend in Tacoma, Washington, USA, during the second annual Dive & Travel Expo, organized by Bedrock Publication and Northwest Dive News (NWDN). The three day event included a Treasure Hunt for divers on Friday at Owen Beach with 190 entrants and a consumer dive show featuring 250 exhibitor booths and other fun activities on Saturday and Sunday. Throughout the weekend participants also had the opportunity to win over 800 give-a-way prizes with a retail value in excess of \$100,000.00!



CLOCKWISE: The Greater Tacoma Convention and Trade Center in the heart of the city; Tacoma Museum of Glass with works by world renown glass artists such as Dale Chihuly; Nearby eateries: Grassis Garden Café and Woody's Restaurant

Both John Chatterton and Jeff Bozanic offered extended workshops: "Diving in the Overhead Environment" and "The Benefits of Rebreathers for Technical Divers". Also offered were a series of mini-seminars on subjects like: local dive travel, diving in British Columbia, scientific projects, dive equipment, gear maintenance and photography-related subjects.

Non-divers of all ages could try scuba in an on-site pool while certified divers tried out new gear during hourly demo sessions. Crowded aisles hinted that consumers were enjoying the selection of exhibitors coming from around the world to share their lines of dive equipment, special warm-water destinations, non-profit projects and local dive getaways.

"We have a captivating sport," states show organizer and NWDN publisher, Rick Stratton. "Our northwest area is equally as captivating, and this show is meant to demonstrate to divers they have a choice



on where to dive, who to dive with and actually meet the owners from these various businesses in British Columbia and Washington."

During the Friday evening Industry Social, business owners and their staff were able

to mingle and meet each other for some serious networking to plan co-marketing projects and share ideas on how to 'grow the sport' as an industry.

"Growth of the sport is very important in these economic times," continued



RIGHT: John deBoeck and Nancy McGee at the Browning Pass Hideaway booth
BELOW: X-RAY MAG columnist and rep, Cindy Ross of GirlDiver.com, was the leading lady at X-RAY MAG's booth



TOP TO BOTTOM: Annie Ceschi tells us about BC diving; Ron Steven is artist Rogest with the Expo Poster and artwork by kids; Venders provide info on diving in Washington State; Historic dive gear display at the expo

Northwest Dive & Travel Expo
www.nwdiveandtravelexpo.com

- Silver Cloud Inn in Tacoma
www.silvercloud.com/13home.htm
- Woody's on the Water
www.woodystacoma.com
- Paddy Coyne's
www.paddycoynes.net ■



During the Saturday evening Film Festival show, attendees enjoyed watching winning selections from the Underwater Photo and Video Contests, presentations by Nancy McGee, Stuart Westmoreland and other entertaining guests, emceed by Anne Crawley.

Show dates for the 2010 Tacoma Dive & Travel Expo and Underwater Treasure Hunt are May 21-23, which will once again be held at the Greater Tacoma Convention & Trade Center. Exhibit space will be increased to 278 10X10 booths, costing \$750 (\$850 after 1 January 2010). Consumer entry cost will be \$15 at the door, with 50 percent off coupons distributed at dive stores offering NWDN. New additions to the show will include action water sports to broaden the show appeal and access new avenues of attracting new divers to the sport.

During our stay in Tacoma, we enjoyed the comfy accommodations of the Silver Cloud Inn on North



Ruston Way by the water. The coastal view was relaxing and the complimentary breakfast was excellent.

A short walk from the Convention Center, next to the Glass Museum is Woody's on the Water, a delightful restaurant serving fresh seafood and steaks. Menu choices, appetizers, meal selections and desserts were superb. Another eatery we tried was Paddy Coyne's, an Irish Pub style establishment offering hearty pub-style dishes and a wide selection of beer on tap.

Travel Information

- Tacoma Regional Convention & Visitors Bureau
www.traveltacoma.com

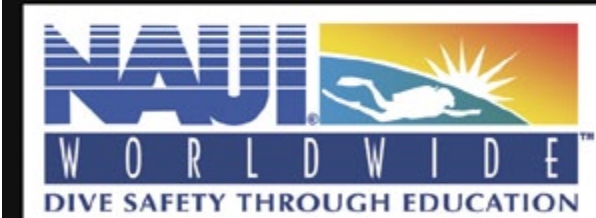


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Sea squirts able to regrow entire body from just one blood vessel

Our closest invertebrate relative, the humble sea squirt, can regenerate its entire body from just tiny blood vessel fragments in as little as a week, Israeli scientists have found.

The ability to regenerate a whole body from a fragment is typically restricted to less complex invertebrates, such as sponges, worms and jellyfish, whereas no vertebrate (animals with backbones) could regenerate their bodies if they were cut in two, only lesser parts. Salamanders are for example capable of regenerating limbs or tails while humans are capable of regenerating portions of skin, lungs and livers.

Biologists Ram Reshef and Yuval Rinkevich at Technion Israel Institute of Technology in Haifa took a closer look at the sea squirt, by carefully peeling off colonies from underneath stones in shallow waters along the Mediterranean coast of Israel.

Each colony is composed of up to thousands of genetically identical individuals, each two to three millimeters long and embedded in a gelatinous

matrix.

A network of blood vessels connects all modules within a colony. The scientists removed fragments of blood vessels from the colonies and placed them on microscope slides for investigation. Each roughly one-millimeter-long fragment contained one or more ampullae, which are the pear-shaped endpoints of the vessels, as well as 100 to 300 blood cells. Of 95 fragments, 80 regenerated an entire functional adult within one to three weeks.

Illuminating evolution

The entire regeneration process, which in part resembles the early stages of embryonic development, could illuminate not only the evolutionary origins of regeneration in all organisms, but also subsequent changes to it during vertebrate evolution.

Aquatic life emits gases too

Now livestock are not the only creatures to be blamed for emitting greenhouse gases. Underwater creatures such as molluscs also contribute to the greenhouse effect as they feed by emitting nitrous oxide—commonly known as laughing gas—as a by-product of their digestion when nitrate was present in water.

“Aquatic animals have never before been shown to emit this greenhouse gas,” the German and Danish researchers recently wrote in a report in the US journal *Proceedings of the National Academy of Sciences*. However, as nitrate is often used in fertiliser, the amounts of nitrous oxide from underwater creatures were likely to rise because of widening use of fertilisers in tropical nations. Nitrate fertilisers can be washed off farmland by rains into rivers and the sea. ■



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The blue-ringed octopus is not bigger than the size of a golf ball, but its venom is powerful enough to kill humans. There is no known antidote.

All cephalopods are poisonous

While the blue-ringed octopus remains the only species dangerous to humans, other groups have been quietly using their venom for predation, a study by scientists from the University of Melbourne, University of Brussels and Museum Victoria finds.

A broad study of cephalopods—more commonly known as octopuses, cuttlefish and squid—has shown that they all possessed toxic proteins that perform functions such as paralyzing the nervous system of prey.

The scientists analysed tissue samples from cephalopods from Hong Kong, the Coral Sea, the Great Barrier Reef and Antarctica.

The different species' genes were then studied for venom protection, and it was found that a venomous ancestor produced one set of venom proteins, but over time, additional proteins were added to the chemical arsenal.

The way to new drugs

One of the lead scientists behind the study, Bryan Fry from

the University of Melbourne explained that these venoms remained an untapped resource for drug development. "We hope that by understanding the structure and mode of action of venom proteins, we can benefit drug design for a range of conditions such as pain management, allergies and cancer," Fry said. ■

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... but some are medicinal or healthy food

Taiwanese researchers extract brain-boosting nutrient from squid skin

A Taiwanese research team has successfully extracted a brain-boosting nutrient PL-DHA (phospholipid docosahexaenoic acid)—which is a substance that can improve memory and enhance learning ability—from squid skin.

PL-DHA was better than TG-DHA—another form of docosahexaenoic acid that is commonly found in deep-sea fish oil—in inhibiting degradation of the intellect because it can cross the blood brain barrier and be absorbed directly into the brain.

As squid skins are tough and unpalatable, they are usually

processed into powder that is used as an additive in animal and livestock feed. Following the discovery of PL-DHA in squid skins, Taiwanese officials said the Fisheries Research Institute would step up the development of squid skin-based health products.

Full of protein

While there are no less than 16 grams of protein for every 100 grams of octopus served, it is a relatively modest source of calories. Octopus is also an excellent source of the amino acid taurine; Taurine works to reduce triglyceride levels and eliminate excess cholesterol from blood ves-

sels and helps prevent arteriosclerosis and the formation of blood clots. In Chinese medicine, eating octopus is also said to strengthen heart function and improve irregular heartbeats.

Octopus is also an excellent source of potassium and zinc. Zinc works to envelope harmful heavy metals contained in foods in order to remove them from the body. It is also said to promote the absorption of vitamin A. Moreover, the cause of impaired taste, a disorder that has recently been gaining a higher public profile, is said to result from a deficiency of zinc. ■



Edited by
Mathias Carvalho

Ancient Shipwreck's Stone Cargo Linked to Apollo Temple

At a site off the Aegean coast of western Turkey, a 2000-year-old shipwreck's main cargo was 50 tons of marble, to be used as construction material for a local temple. Back in 2007, archeologist Deborah Carlson narrowed her search down to a few possible options — nearby temples in use around the first century BC and may have established a possible link to the famous Temple of Apollo, at Klaros.

The area at the temple is filled with Doric style columns, built from roughly the same sort of marble found on the ship, and looked like having the proper size. Carlson measured remains of columns with a tape measure. "I thought, wow, this is definitely a candidate."

By the second semester of 2008, using a variety of techniques, she managed to link the shipwreck's cargo to its likely intended destination, the Klaros temple—as well as to its origin, a marble quarry 200 miles (322 kilometers) away on an island in Turkey's Sea of Marmara. This is the first time archaeologists have pinpointed both where the marble came from and where it was going

The shipwreck was one of five found in Kizilburun in 1993 on a survey of Turkey's Aegean coast by the Institute of Nautical Archaeology (INA) at Texas A&M University, where Carlson works. ■



INA.TAMU.EDU



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Low tide at Akko

The ancient seaport of Akko (Acre) is one of the world's oldest continuously inhabited cities. The first recorded mention of Akko dates back to the reign of the pharaoh Thutmose III, who ruled from 1504 to 1450 b.C. Remains of a unique and impressive floor, discovered at a depth of one meter underwater in Akko harbor, constitute the first evidence of a low sea level during the Hellenistic period.

The floor remains were discovered during archaeological excavations and inspections that the Israel Antiquities Authority Marine Archaeology Unit is carrying out within the framework of rehabilitating Akko's southern seawall.

The part of the floor that has been revealed so far extends for a distance of 15 meters and is four meters wide

(the full dimensions of the floor have not yet been exposed). Built of rectangular, smoothly dressed "kurkar" stones, the floor area also revealed numerous fragments of ceramic jars of Aegean provenance (from Rhodes, Kos and elsewhere) that were used to transport wine, as well as tableware and cooking vessels. Among the other artifacts recovered were a Greek style bronze arrowhead and bronze coins that are covered with marine encrustations.

The floor constitutes an extremely important indicator for studies that deal with changes in sea level and in the location of the shoreline during the Hellenistic period in Akko. This find raises other questions regarding the tectonic changes that occurred in Akko, which is located on a geologic fault, and sea levels. ■



WWI battleship found in deep water

The *Danton*, a French battleship, sunk in the Mediterranean by German torpedoes in 1917, was found by accident sitting upright and almost intact with many of its gun turrets still intact in over 1,000m of water.

The wreck was unexpectedly discovered by a unmanned submarine during a seafloor survey for a proposed gas pipeline between Algeria and Italy. At first, the technicians didn't realized what a remarkable find they had stumbled upon, but it was confirmed by the French Navy Commission, that the vessel was the *Danton*, built in Brest, France, in 1910, one of the largest French naval vessels in WWI.

Excellent condition

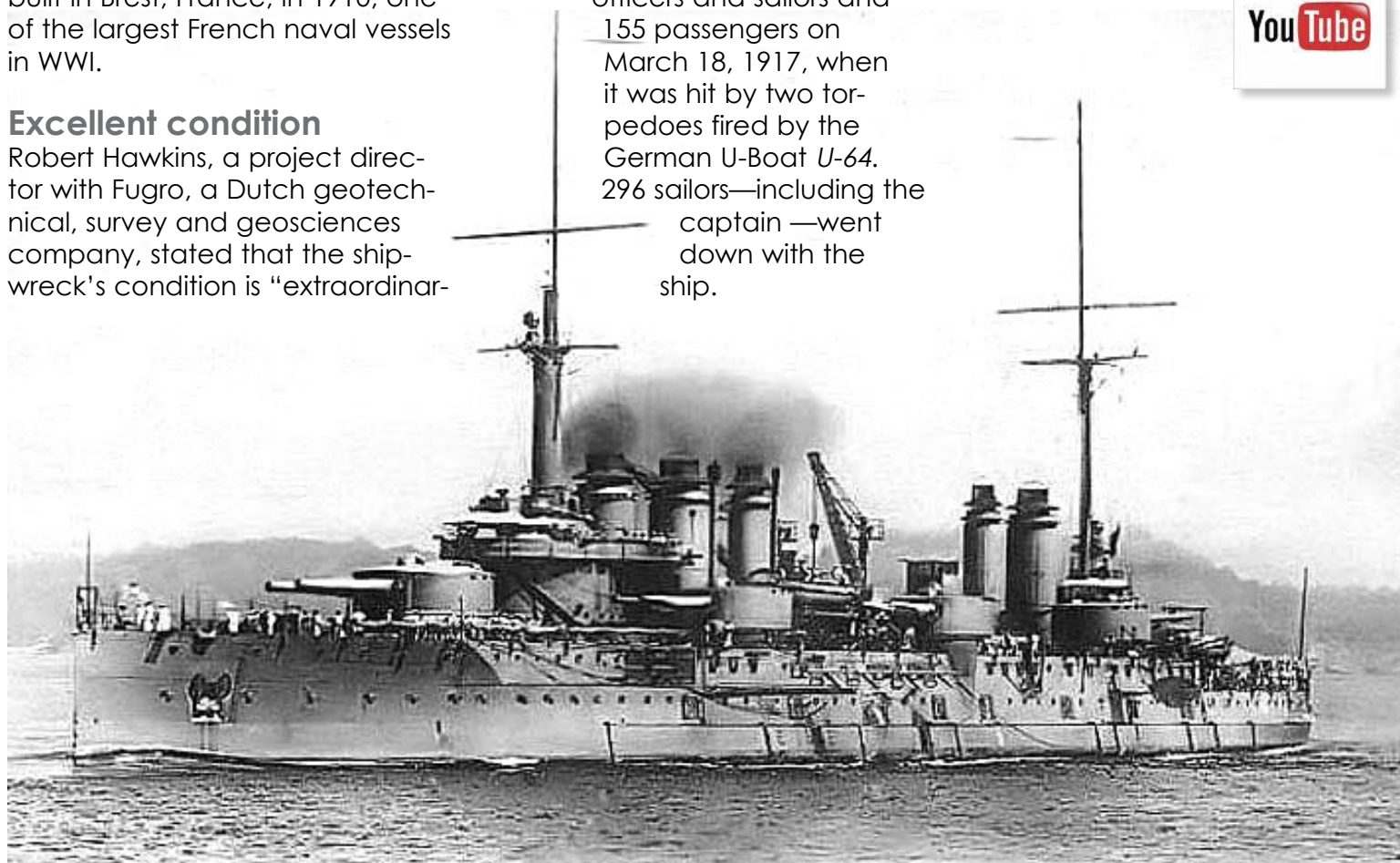
Robert Hawkins, a project director with Fugro, a Dutch geotechnical, survey and geosciences company, stated that the shipwreck's condition is "extraordinar-

ily good". *Danton* served in World War I in the French Mediterranean Fleet, helping to protect French troop and supply ships from attack by the Austro-Hungarian Navy. She also helped keep the Turkish battlecruiser *TCG Yavuz Sultan Selim* bottled-up in the Black Sea.

The *Danton* was carrying 946 officers and sailors and 155 passengers on March 18, 1917, when it was hit by two torpedoes fired by the German U-Boat *U-64*. 296 sailors—including the captain—went down with the ship.

After being hit, she turned upside down, then rolled again before landing on the seabed, where it slid before coming to its final resting place, about 22 miles southwest of the island of Sardinia.

Although the ship lost some of its superstructure, for the most part it is relatively intact, Hawkins said. ■



The *Danton* was a pre-dreadnought battleship of the French Navy. Serving in World War I, she was torpedoed and sunk by a German U-boat in 1917, only to be rediscovered in 2009



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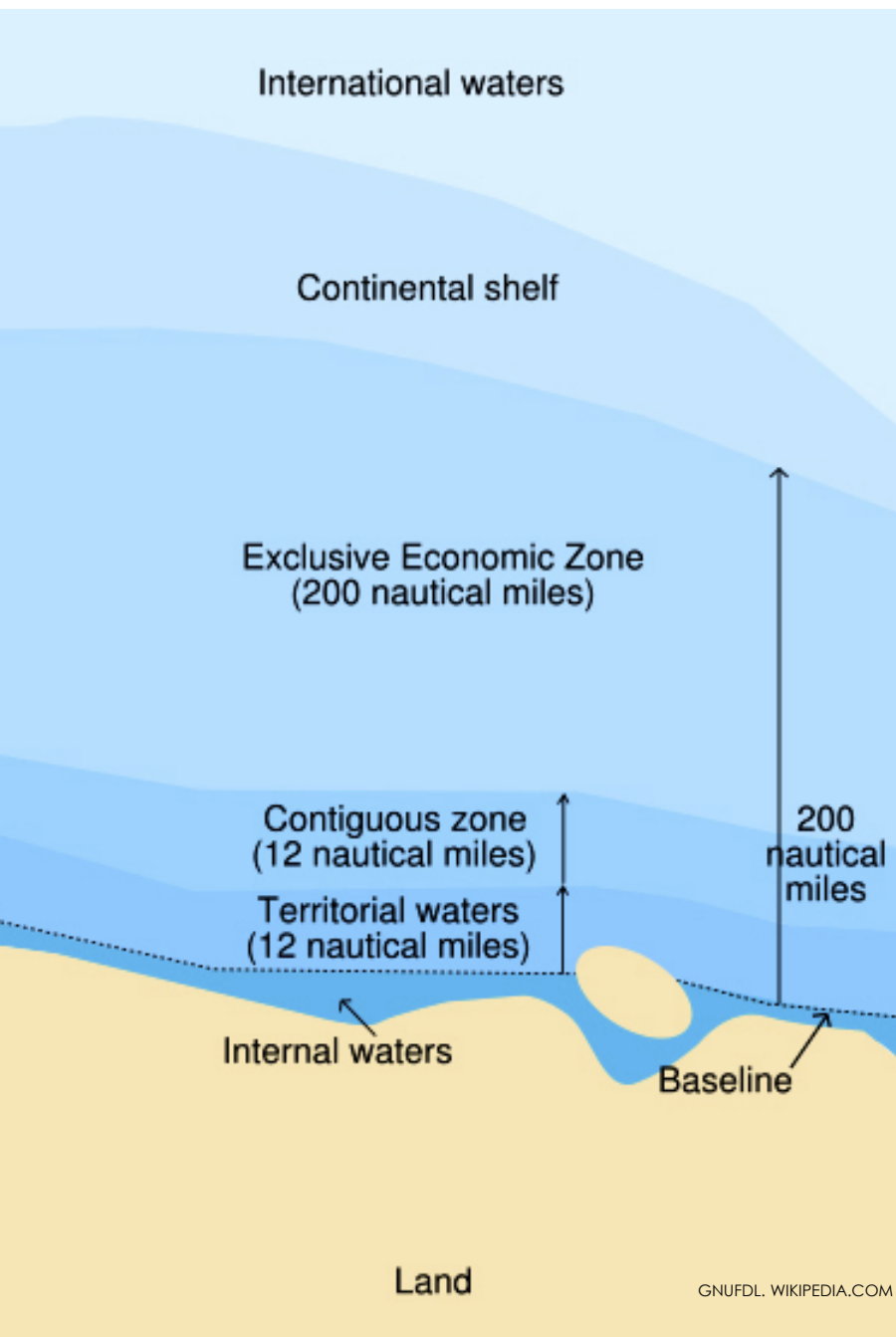
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Who Owns a Shipwreck?



Maritime zones are outlined on this schematic map

New technology now allows for the exploration of deep-water wrecks previously not accessible. But, who really owns a shipwreck? And, do governments have jurisdiction over a wreck site?

Most countries, especially coastal states, have their own legislation that regulates the exploration and exploitation of shipwrecks as a cultural or economic resource. In Canada, a new federal policy aims to better protect and preserve archaeological resources found within that country's national parks, both on land and underwater. It stresses "minimal intervention" and applies to wrecks such as the *HMS Breadalbane*, considered the most northern shipwreck in the world. It was declared a national historic site in 1993.

There are several international regulatory bodies that also govern shipwrecks. These include the Committee Maritime International, the United Nations Division of Ocean Affairs and the International Maritime Organization. The United Nations "Law of the Sea Convention" applies to areas beyond the territorial waters or legal jurisdiction of any nation.

The "Convention on the Protection of the Underwater Heritage," was put forward in 2001 by the United Nations Education Scientific and Cultural Organization (UNESCO). But, it only applies to the 20 countries that have ratified it. The United States is not one of these! Nor is the United Kingdom, France, Germany, Canada, Japan, China, Russia and most countries in the developed world.

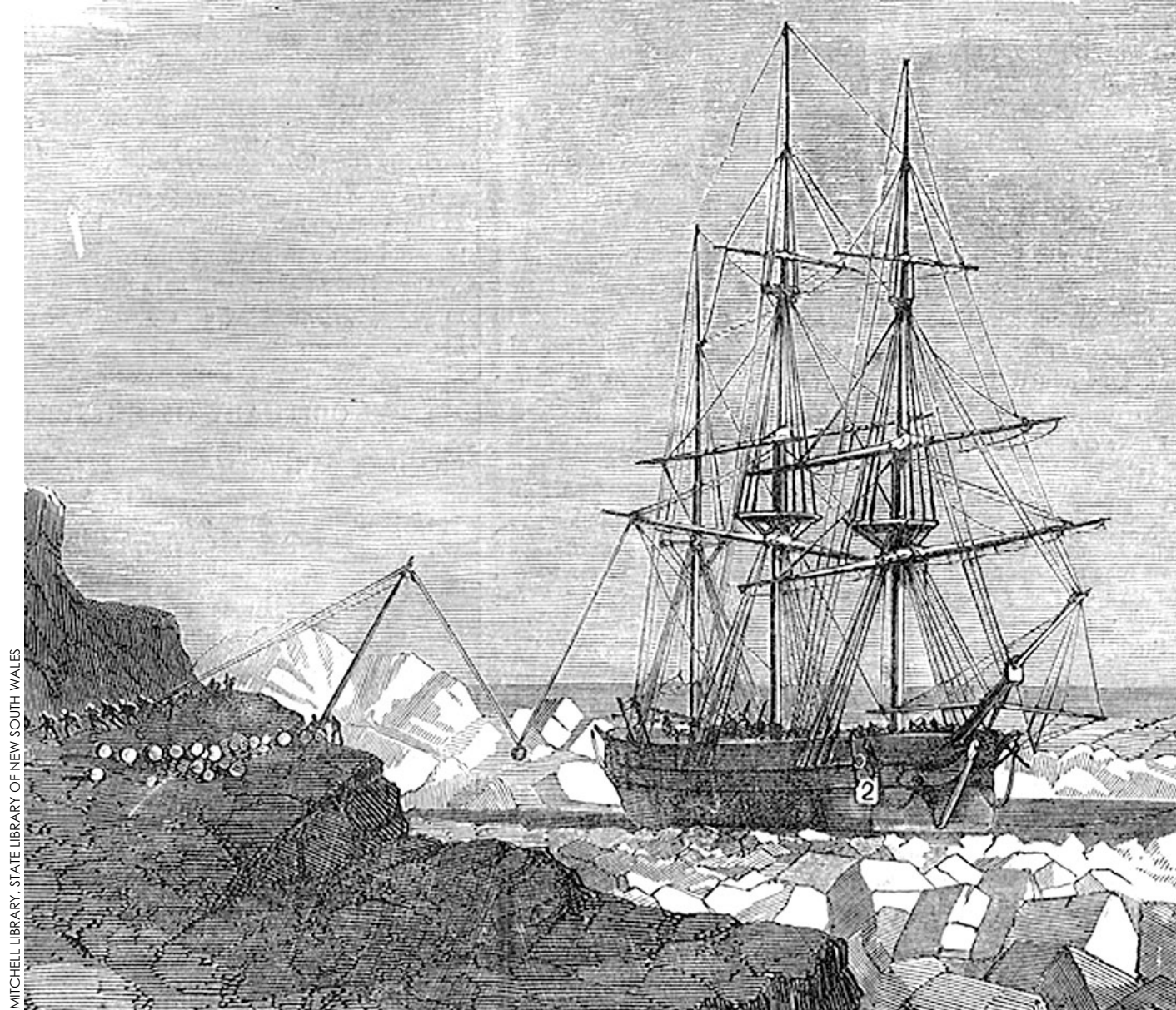
Military Colors

Military shipwrecks less than 100 years old remain the property of their mother country under the terms of "Sovereign Immunity" (Law of the Sea Convention). If a warship lies within the territorial waters of a sovereign nation (the Coastal State) that nation shares jurisdiction with the wreck's "Flag State."

Sometimes, a wreck's flag state isn't as clear-cut as one might think. A warship may have been handed over freely, taken by force, or surrendered by one state to another. Take for example several German u-boats that were transferred to Japan, and re-designated as "I-boats," in the end days of WWII. Under the terms of international Sovereign Immunity, such a wreck belongs to Japan and not Germany. The United States, Spain and Great Britain, argue that Sovereign Immunity applies to warship wrecks older than 100 years.

Titanic Effort

The United States leads the way when it comes to protecting the world's most famous shipwreck, the former ocean liner, *Titanic*. After it was discovered in 1985, Congress



HMS Breadalbane

approved "The *RMS Titanic* Maritime Memorial Act of 1986."

The Act made it unlawful for anyone in the US to trade in artifacts from the wreck. Further to the Act, only one American company, *RMS Titanic Inc.*, was granted permission to remove artifacts from the shipwreck, but only for the purposes of public exhibition.

In 2007, the US implemented further legislation to protect the wreck, as part of an international agreement with the United Kingdom and Canada. The National Oceanic and Atmospheric Association (NOAA) will represent the US, regulating dives to *Titanic* from the United States.

The United Kingdom was the first country to sign the international agreement in 2003. And, while acknowledging that *Titanic* is, "a historical wreck of exceptional international importance," that country has not stated how it plans to protect the wreck.

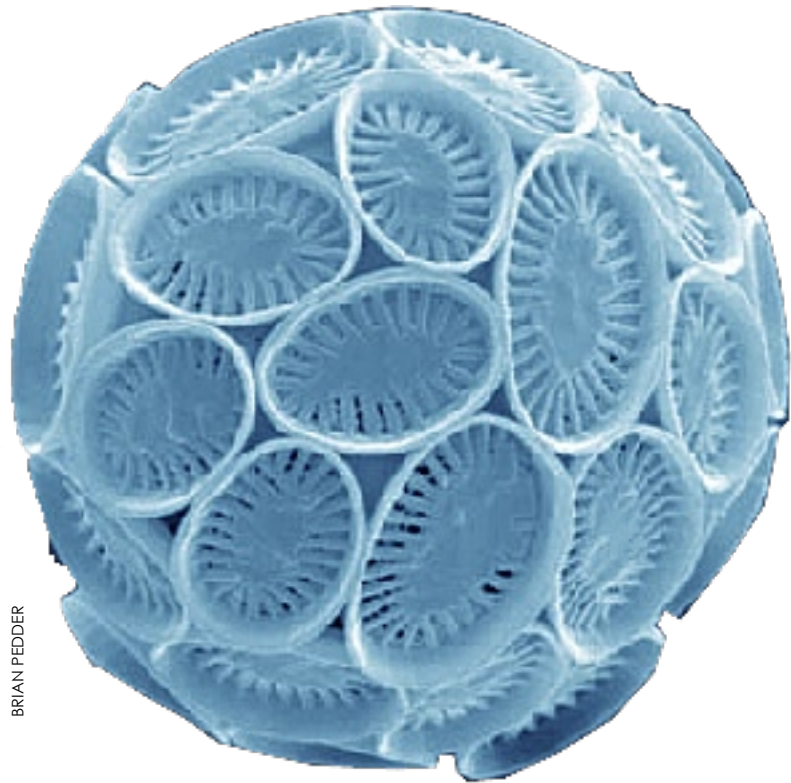
Canada has not yet signed the international agreement.

And, the Agreement has no jurisdiction over expeditions to *Titanic* that originate from other countries, such as Russia or France.

—Rob Rondeau
Marine Archaeologist
www.procomdiving.com ■

Phytoplankton reinvent their structure

Phytoplankton are responsible for providing nearly half of the oxygen that sustains life on Earth. Now American scientists have discovered that phytoplankton in the open ocean may be adapting to the low levels of phosphorus by making a fundamental change to their cell structure.



BRIAN PEDDER

Coccolithophores are marine-dwelling phytoplanktons that live in the mixed upper layer of the sea and are eaten by zooplankton and small fish). They can grow in nutrient-poor conditions that other phytoplanktons cannot flourish in. Covering up to 1.4 million square kilometres of ocean surface each year, coccolithophores have tremendous effects on both local and global environments

Climate change reduces nutritional value of phytoplankton

Micro-algae are growing faster under the influence of climate change. However, the composition of the algae is changing, as a result of which, their nutritional value for other aquatic life is decreasing. And because algae are at the bottom of the food chain, climate change is exerting an effect on underwater life, Dutch researchers conclude. ■

Until now, it was thought that all cells were surrounded by membranes containing molecules called phospholipids—oily compounds that contain phosphorus, as well as other basic biochemical nutrients including nitrogen.

Enter a substitute

However, Van Mooy and his colleagues from WHOI, have found phytoplankton in the Sargasso Sea that make their cell membranes without using phospholipids, using non-phosphorus-containing 'substitute lipids' instead.

These substitute sulfolipids apparently allow the plants to continue to grow and survive under conditions of phosphorus stress, a unique strategy for life in the sea.

These substitute lipids were once regarded as merely a molecular peculiarity of phytoplankton grown in the laboratory, but are now recognized to be used by phytoplankton throughout the world's ocean.

Sargasso Sea

The Sargasso Sea is in the middle of the Atlantic Ocean—an area known for its short supply of phosphorus and nitrogen.

A molecule of phosphorus dissolved in the Sargasso Sea remains there for perhaps an hour or two before a phosphorus-starved cell greedily absorbs it. For comparison, in the Pacific Ocean, phosphorus may linger for nearly a year before being used by plankton. ■



Smooth flower coral, *Eusmilia fastigiata*

Algae outwit coral

New research show that symbiotic algae sneak inside coral cells in a stealth manner, rather than being actively welcomed by their coral host.

Early in development, juvenile corals acquire a wide range of different algal strains that are later winnowed down as the coral matures. This process is important to weed out all but the select few algae that form long-term symbiotic partnerships into adulthood. But what drives the coral's initial acceptance and later purging of algae was unclear.

"They are the most abundant membrane molecules in the sea but essentially unknown until now."

A nice conundrum

Most researchers assumed that the interaction between coral and algae would be quite complex, involving active gene expression in both the coral host and algal symbiont. But now a team led by Mónica Medina of the University of California, Merced, has shown that the coral host often has a passive role in this process.

Analyses revealed that the coral host had a strong immune response to "bad" algae that didn't make good partners. By contrast, "good" algae seem to be able to somehow cloak themselves from immune detection or manipulate the coral's response in some way.

The study has important implications for how coral reefs will fare in the face of climate change. If symbiotic algae evolve higher thermal tolerance, they might only be accepted by the corals if "there's some process of coevolution that allows the coral to relax its guard further and to allow in more strains."

Since algal uptake is largely passive, one would expect evolution to occur at surface receptors, for example, rather than at actively expressed genes. This finding narrows the number of options for how that evolution can happen," study researchers said. ■

Saharan Dust Storms Sustain Life in Atlantic Ocean But Also Carry Elements Toxic to Marine Algae

Dust blown off the continents and deposited in the open ocean is an important source of nutrients for marine phytoplankton, the tiny algae that are the foundation of the ocean food web.

But new findings show that some sources of dust also carry toxic elements that can kill marine phytoplankton. Researchers discovered the toxic effects during a study of how phytoplankton respond to atmospheric aerosols deposited in the northern Red Sea.

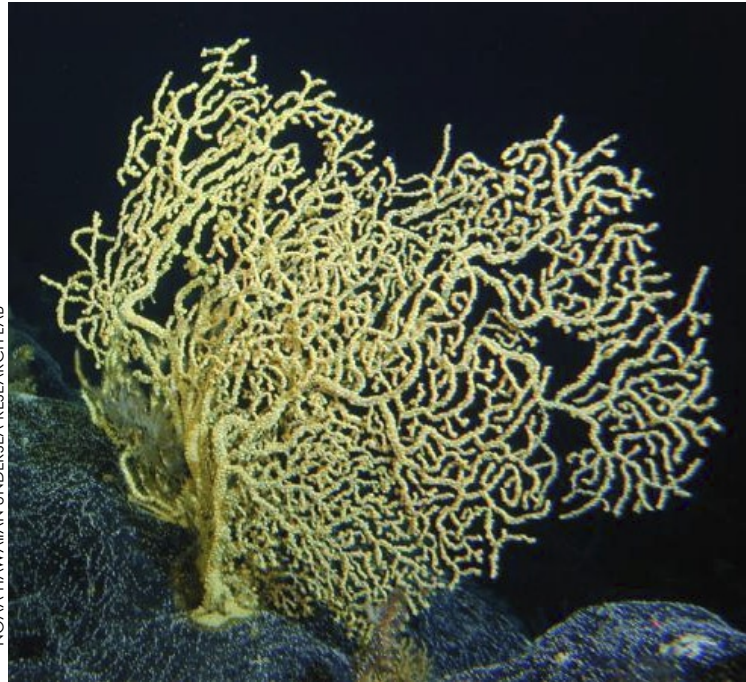


Aerosols from both sources supplied key nutrients such as nitrogen and phosphorus, but the Sahara sources also contained high concentrations of copper. "When we added the Sahara dust, the phytoplankton died within 24 hours. We found that copper was really high in those samples, so we suspected that copper was causing the toxicity," the researchers write. ■

SOURCE: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES

Deep-sea Corals May Be Oldest Living Organism

Deep-sea corals from about 400 meters off the coast of the Hawaiian Islands are much older than once believed and some may be the oldest living marine organisms known.



NOAA HAWAIIAN UNDERSEA RESEARCH LAB

Using radiocarbon dating to determine the ages of *Gerardia sp.*, or gold coral, and specimens of the deep-water black coral, *Leiopathes sp.*, researchers from Lawrence Livermore found the two groups of Hawaiian deep-sea corals are far older than previously recorded.

The longest lived in both species was 2,740 years and 4,270 years, respectively. At more than 4,000 years old, the deep-water black coral is the oldest living skeletal-accreting marine organism known. ■

SOURCE: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES



PETER SYMES

Pakistanis thrilled to discover they too have coral reefs

The coral reefs were found on the Daraan and Gunz coasts of Balochistan in a four-day survey of the coastal areas of Balochistan. The survey team also found dead coral reefs on the coastal hills of Balochistan.



Crabs Feel Pain

Crabs have well-developed senses of sight, smell and taste. New research now shows that crabs not only suffer pain, too, but also retain a memory of it.

A new study conducted by researchers from Queen's University demonstrated that hermit crabs reacted adversely to the small electric shocks but also seemed to try to avoid future shocks, suggesting that they recalled the past ones.

Professor Bob Elwood, who carried out the research, told BBC the research highlighted the need to investigate how crustaceans used in food industries are treated, saying that a "potentially very large problem" was being ignored. "We know from previous research that they can detect harmful stimuli and withdraw from the source of the stimuli but that could be a simple reflex without

the inner 'feeling' of unpleasantness that we associate with pain. This research demonstrates that it is not a simple reflex, but that crabs trade-off their need for a quality shell with the need to avoid the harmful stimulus.

Experimental setup

As part of the research, wires were attached to shells to deliver small shocks to the abdomen of some of the crabs. The study revealed the only crabs to get out of their shells were those that had received shocks, indicating that the experience was unpleasant for them.

Trade-offs

Dr Nedim Buyukmihci, professor of veterinary medicine at the University of California, Davis, explained: "Pain is a universal biological phenomenon in the animal world. It serves to protect an individual from internal or external adverse conditions. All animals studied to date have

been demonstrated to have at least some means of responding to stimuli, which would cause pain.

Even invertebrates such as insects and earthworms have been shown to possess pain modulators, which were commonly thought to exist only in vertebrates such as mammals. It is, therefore, completely rational and biologically sound to state that crabs would be able to feel pain. Moreover, their behavior is consistent with this principle." ■

"Trade-offs of this type have not been previously demonstrated in crustaceans. The results are consistent with the idea of pain being experienced by these animals."

Edited by
Scott Bennett



MAIN NEWS ON OUR WEBSITE

Philippine government advocate higher charges for tourists

Tourism Secretary Joseph Ace Durano said the towns and cities which have jurisdiction over marine protected areas are undervaluing themselves by charging small fees.

[Read the story here >>>](#)

23 Red Sea dive centers black listed

The Chamber of Diving and Watersports (CDWS) of Egypt has so far black listed 23 dive operations in their certification drive, to heighten the industry standards.

[Read the story here >>>](#)

Philippines awarded as top dive site

The Philippines remains as one of marine explorers' most preferred diving destinations, besting several other international diving sites based on a survey done during the 17th Marine Diving Fair in Tokyo, Japan.

[Read the story here >>>](#)



WIKIPEDIA.COMMONS.ORG

Algarve historical treasures draws divers and tourists

Tourists from all over Europe are increasingly choosing the Algarve for diving holidays to visit historical treasures hidden deep in the region's waters.

Tourists have long flocked to Portugal's Algarve for its stunning beaches and turquoise waters. Now, its marine treasures are drawing attention, as the waters of the Algarve are teeming with a bevy of attractions ranging from a 17th century ship to a WWII aircraft.

Spearheading the development of underwater tourism in the Algarve is a company called Hidroespaço. Underwater tours commenced in 2004 when Hidroespaço signed a protocol with the Portuguese Institute of Archaeology. Some of the highlights are a B-24 Liberator bomber from World War II and a 17th century ship with its weapons and cargo strewn across the sea bed. Both are situated off the coast of Faro in less than 20 metres of water.

While people from across Europe contact the company for underwater tours, it is the Portuguese themselves who show the most interest. Promoters view the tours as a great alternative to the traditional beach and sun tourism and believe demand will keep on rising. Dives cost between €30 and €50. ■

Boom time for whale shark lovers

The Gascoyne coast of Western Australia is experiencing a whale shark bonanza, with enthused tourists being treated to daily sightings of the elusive yet gentle giants. The region's sharks have arrived earlier than usual and in huge numbers, providing a boom to the region's dive operators. Marnie Hunt, co-owner of Exmouth's Ocean Eco Adventures, said sightings had rarely been so reliable. "Usually one shark is a bonus, but we have been getting multiple sharks — up to three or four a day," she said. "All the conditions have just been really good — clear days, good visibility and lots of whale sharks."

They typically congregate to feed around Ningaloo Reef, one of the world's premier locations for viewing the world's largest shark species. Feeding only on plankton, the benevolent creatures are beloved by divers the world over and have even been documented "playing" with humans.

Conservationists hope the species, officially listed as vulnerable, are now receiving protection from fishing. Since 1998, several countries including India, the Philippines and Taiwan, have banned the fishing and sale of whale sharks. ■



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Airlines, dive travel and the recession

Worldwide Airlines Announce Capacity Reductions

The worldwide economic downturn has forced the world's airlines to implement cutbacks in service. Frequency of flights has been reduced on many routes while suspension of service has been implemented on others. In other cases, smaller aircraft are being utilized to cut costs and ensure fuller capacity of seats. There do appear to be some glimmers of hope on the economic horizon, so the airline situation could change dramatically once things improve. Be sure to check airlines' websites for service information updates well before you plan to travel.

Bad Times Equal Good Deals

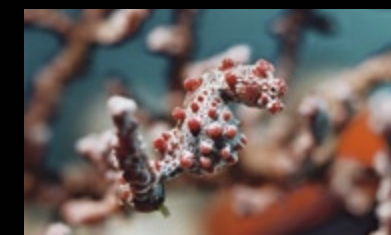
"TIMES ARE TOUGH!" Negative headlines such as these bombard us on a daily basis. All the bad news is enough to make you want to stay in bed every morning. Yet, despite all the apparent doom and gloom, all is far from lost. Right now, there isn't a better time to travel. Airfares are more competitive than they've been in years, and tour operators are offering a bevy of amazing deals to entice people. When things inevitably get better, prices will rise and once again, everyone will bemoan the high cost of travel. No matter what happens, life goes on, so enjoy it. Do your part for the world economy and get out and dive! ■



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Edited by
Scott Bennett

Greeks concerned about divers looting treasure

A new law, which recently opened most of Greece's coastline to scuba diving except for about 100 known archaeological sites, has archaeologists worried that priceless artifacts beneath the eastern Mediterranean could disappear into the hands of treasure hunters.

"The future of archaeology in this part of the world is in the sea," marine archaeologist Harry Tzalas told Reuters. "This law is very dangerous; it opens the way to the looting of antiquities from the seabed, which we don't even know exist."

Greece's 1932 antiquities law says all artifacts on land and in the sea belong to the state, but it does not regulate scuba diving. The new law, which Greece's archaeologists' union and two ecological societies have appealed for to be rescinded, was implemented in 2007 and designed to promote tourism. ■

Sorry divers, it's hands off



Galapagos liveboard dive trips to Wolf and Darwin Islands now available aboard the M/S Alta

Operating for over 20 years, Quasar Expeditions (Quasar Nautica) is one of the region's longest-running dive operations and has recently received approval from the Galapagos National Park for the 2009 dive season. Their previous liveboards, the *M/S Lammer Law* and *M/Y Mistral* have been replaced by their new state-of-the-art liveboard, the *M/S Alta*. Carrying a maximum of 16 passengers, seven night/eight day trips are now being offered from from July through November of this year.

With its well-trained crew and staff, *Alta* carries the signature service that have long characterized Quasar Expeditions. Two expert dive masters and Galapagos park naturalists are on board to ensure guests see and experience the best the islands have to offer. www.galapagosexpeditions.com ■

Airline Credit Cards Consumer Tip



PUBLICDOMAINPICTURES.NET

In the days of yore prior to the computerized age, supermarket patrons collected Green Stamps, painstakingly pasting them in books and exchanging them for merchandise. The more stamps, the more merchandise. In today's hi-tech environment, consumers are utilizing the green stamps' 21st century equivalent: Frequent Flier Programs (FFP).

With the simple click of a mouse, "stamps" are collected, counted, and redeemed for free airline tick-

ets. With seemingly limitless programs available, obtaining a mileage-earning credit card may seem like a non-decision. Before taking the plunge, however, there are a number of factors to consider first.

Earning rewards should be a natural benefit based on your current spending habits. Avoid falling into the trap of spending more just to earn the reward. The quickest way to earn miles is to fly and use an airline FFP.

If you travel often, you may want

to supplement a FFP with an airline affiliated credit card, which allows you to combine earned points with FFP points. Try to keep the cards to a minimum; miles spread out over different airlines, cards, and FFPs will never get you your desired reward.

On the other hand, if you are a bigger spender than flyer, consider using a bank card that is not branded with a particular airline. With lower annual fees, interest rates and a variety of airlines to choose from, these cards are generally not limited by airline capacity controls and blackout dates. Also, fees tend to be higher for airline reward cards than

other types of credit cards. If you don't charge a lot on your card, then the high fees may cancel out any reward benefits.

CardRatings

A good source of information is CardRatings.com, which evaluates and compares the different airline reward cards available. Finding the right card will take a little research, but the payoff in the end will be worth it. ■

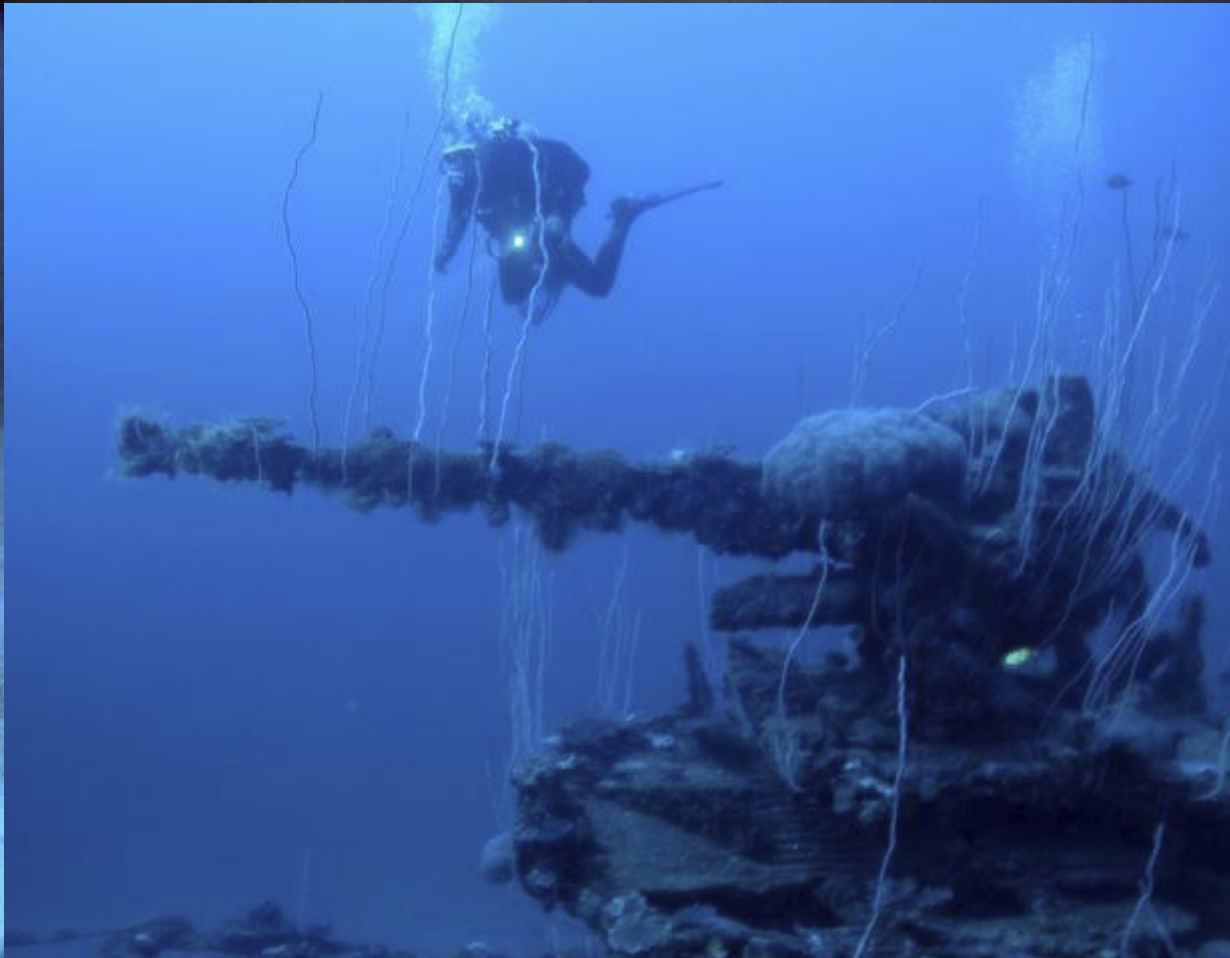
Lock your credit card

Some European banks are now offering their customers a novel way of protection against fraudulent use of their credit card following trips and use on the internet. Account holders at the Scandinavian 'Handelsbank' are now able to lock their credit cards via their online banking, so they can't be billed from abroad or from the internet. According to APACS, the UK trade association for payments, abuse of stolen cards abroad, or credit card information obtained abroad, accounts for more than 40 percent of credit card fraud committed in the United Kingdom. ■



Bikini Atoll

Expedition to the wrecks of Operation Crossroads



Text and photos by Joost-Jan Waanders

First official Dutch Dive Expedition to Bikini Atoll, 2-20 May 2008 —

In 1996, I heard for the first time about the unique possibility to dive on WWII shipwrecks at Bikini Atoll, one of the main atolls of the Marshall Islands, located in the triangle between the United States, Japan and Australia. This boy's dream, to dive these wrecks, came through after an intensive planning and preparation phase of 2.5 years as the Technical Explorers Team (four divers, initially we were five) finally arrived at Bikini on 7 May 2008. The preparation period was also like a dream, which became more and more real as time passed, including all the excitement counting down to the ultimate moment of diving on the wrecks at Bikini Atoll. The highlight of the week at Bikini, one of the most beautiful dive destinations on Earth, were the spectacular deep dives on the sunken WWII war fleet wrecks, which went down as a result of the nuclear test bombings during "Operation Crossroads".

The Mission

Today, the Bikini Atoll stands known as one of the most beautiful dive destinations on the planet. But underlying this great paradise is a dark side of history that has cost many lives of the original people living here, including many men suffering of thyroid cancer. The Technical Explorers Team went as one of the very first Dutch divers to this atoll to make a documentary, write an article and create a presentation for the lecture circuit to tell the Bikinian story and

THIS PAGE: Scenes from the nuclear wrecks of Bikini Atoll





the Bikini Atoll in the Marshall Islands. The purpose was to check the radio active effects on test animals and blast effects against the surface ships in the target array.

The second shot, "Baker" was detonated beneath the surface of the lagoon in the centre of the target ship array. This test was designed to determine the hull damage caused by the hydraulic effect of the underwater nuclear detonation. A fleet of more than 90 vessels was assembled in Bikini Lagoon as a target. This target fleet consisted of older U.S. capital ships, three captured German and Japanese ships, surplus U.S. cruisers, destroyers and submarines, and a large num-

ber of auxiliary and amphibious vessels. Between 1946 and 1958, a total of 67 nuclear tests were performed at the atoll, which became heavily infected with radioactive radiation. Nowadays, the nuclear wrecks of the Bikini Atoll are quiet witnesses of the disaster that happened here 63 years ago.

Just in time

Due to aircraft problems with Air Marshall Islands (AMI) Airliner Company, there were no divers for the last nine months before the Dutch expedition team arrived at Bikini. However, after 13 great but challenging years as one of the premier wreck diving tourism sites in the Pacific, Bikini Atoll was closed to tourists



Bikini Atoll

to help promote tourism from Europe to this particular area of the Pacific.

History

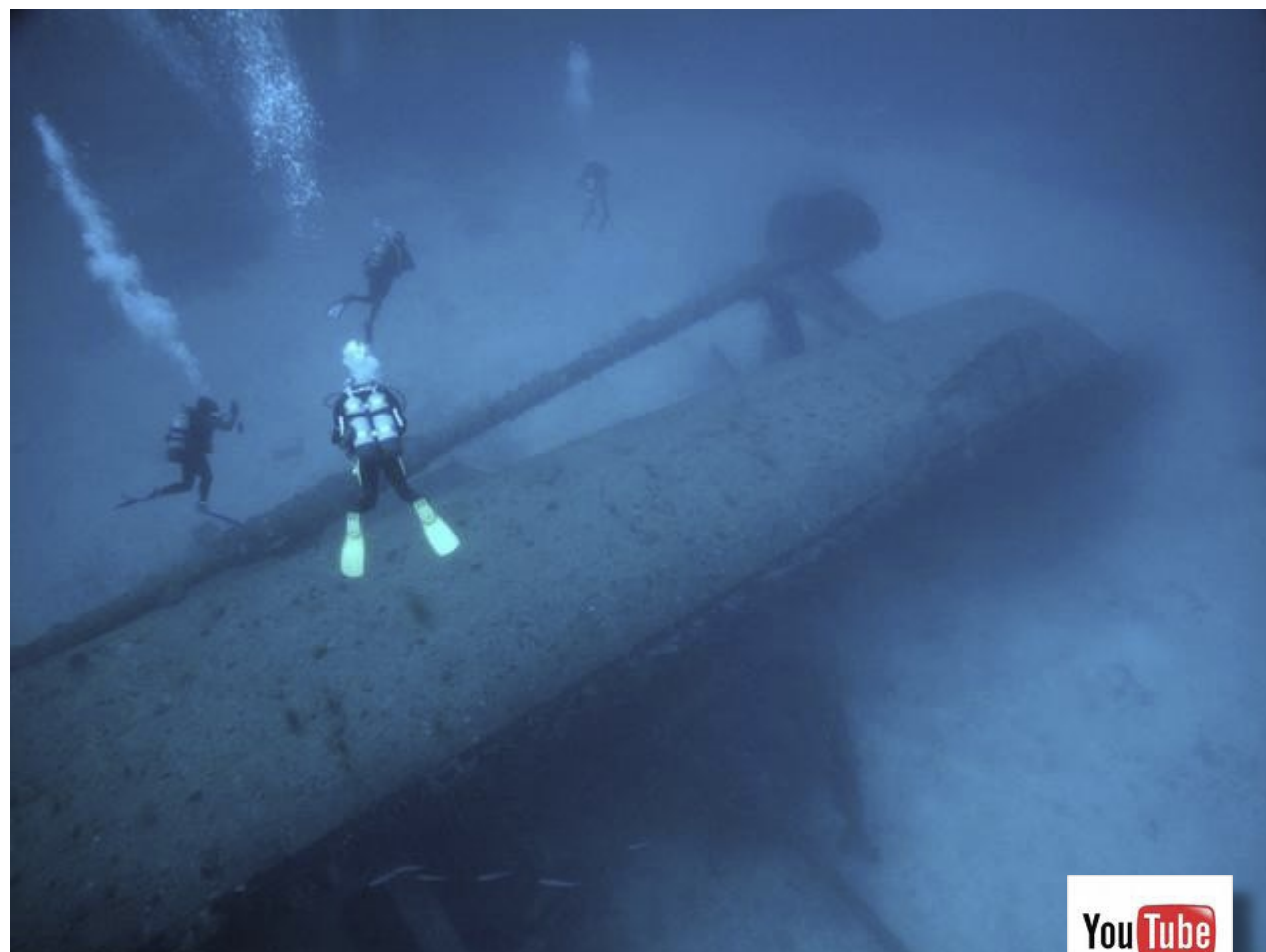
Prior to July 1946, only three atomic bombs were detonated by the United States. Bomb number one detonated in the New Mexico Desert in the "Trinity Test" on 16 July 1945. The second exploded over Hiroshima on 5 August 1945, which was the first military use of atomic power. Four days later, on August 9, the third flashed high over Nagasaki. This convinced the Japanese to surrender five days later on 14 August 1945. Thus, the first three atomic detonations took place in a one month period, and two of them were fired in anger and, thus, no data was collected regarding their performances.

By early 1946, the scientific community was curious about the effects of nuclear bombs

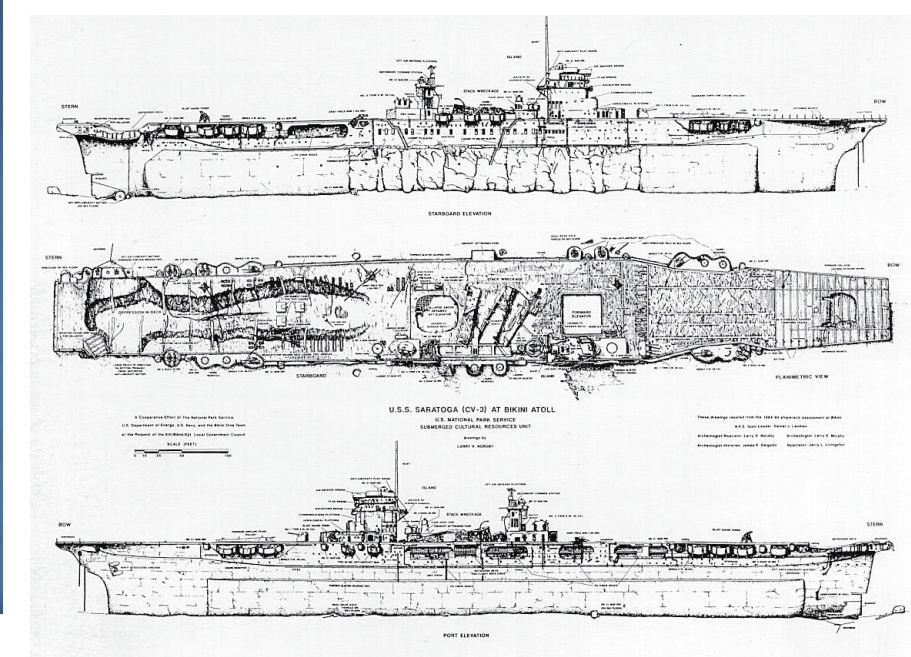
against naval vessels. They also wanted to study different techniques to protect vessels against a nuclear attack and possibly change the design of future naval ships. On 10 January 1946, a presidential order (by President Truman) created Task Force ONE, with an assigned mission, to discover the answers to these questions.

The commander of "Operation Crossroads" was Vice Admiral W. H. P. Blandy who was responsible for 200 ships, 40,000 men and 150 aircraft. He would ultimately detonate two atomic bombs against a target fleet that consisted of obsolete American vessels and captured ships from Germany and Japan that the US received at the conclusion of WWII.

The first detonation, called "Able" was dropped from a B-25 over the target fleet in



THIS PAGE: Divers explore the wrecks. ABOVE: Divers descending at stern





as of 11 June 2008.

This decision had to be made due to the very bad serviceability of the local airliner, Air Marshalls, and the rapid rise in the world price of fuel, which has made all of the operating expenses just skyrocket beyond their means.

In August of this year, the local government, during the annual budget meeting, will decide whether or not they can afford to open Bikini Atoll in 2009.

At this point in time, given these challenges, their trust fund is facing big deficits because of the recent poor performance of the US stock markets and a recession-bound US economy; the prospect of opening next year appears very doubtful. This news has been very hard on the Bikinian leaders and their people as all of the proceeds from the operation have gone toward purchasing food for their communities on Kili Island, Ejit Island and Majuro Atoll.

But most importantly, this dive destination should be available for everybody and should stay open in the future. Bikini Atoll divers are looking for business proposals as to how they might solve their problems, please email bikini@ntamar.net.

A long trip

The initial planning for March 2008 had to be postponed with seven weeks due to the unavailability of a serviceable aircraft flying between the capital city of the Marshall Islands, Majuro and the Bikini Atoll. The Dutch Technical Explorers team arrived after a 36-hour journey, via Honolulu, Hawaii, on Majuro.

Twelve hours before our departure from the Netherlands, we received the message that the flight between Majuro and Bikini was questionable as the only plane of Air Marshall Islands (AMI) flying to Bikini had broken down again. During our crossing from Hawaii to Majuro, we were informed that the necessary spare parts had been shipped with our flight and that technician would work all night to get the plane repaired and serviceable for the final trip to Bikini, the next day.

We were "relieved" that the repair was successful and that the technician would accompany us to Bikini Atoll, as there was no time available for a test flight.

In the middle of Eden

Upon arrival to Bikini Atoll, we were speechless and excited that we had final-

ly made it to Bikini. After our luggage was unloaded, we were shipped directly from the landing strip to our accommodation by boat.

The water was crystal clear; the white sand beach, with its waving palm trees, was breath-taking, and this paradise was completed by a blue sky with beautiful white clouds. If paradise on Earth exists, we found it here.

From our verandah, we looked over the lagoon where, at a distance of three miles from the coast line, the remains of the sunken military fleet is still witnessing history. It is really unbelievable that after exactly 63 years after Operation Crossroads, and a total of 67 nuclear explosions later, we are now able to safely walk on the beaches. The local radiation is even less than that of an average large town.

In fact, we were exposed to more radiation during all our flights than during our stay on Bikini Atoll. That is a strange feeling considering that there were so many nuclear explosions here. There is still some remaining radiation which can be found at deeper level under the surface. However, the raised concentration of cesium 137 is still absorbed by the roots of palm trees and consequently coconuts and coconut crabs are still not consumable.

Dive briefing

Our dive programme includes two dives a day—getting up at 06.30 hrs, breakfast at 07.00 hrs, and the dive briefing at 08.00 hrs. Our head divemaster, Jim Akroyd, explained the morning dive, the details and the extremities of the wreck such as her position, what's to be seen, her history and details of the dive to be performed.

After the briefing, all divers were commuted by truck to the pier, one kilometre away from the accommodations, to embark on the small boat. Upon our arrival, the staff of the Bikinian Atoll Divers had already stored away the double air tanks on the boat, so we only needed to take our personal equipment, like photo and film cameras as well as our water



Rebreather diver inspects torpedos



Penetration dives at *USS Saratoga* reveal everyday artifacts (above) and a dentistry unit (top right)

bottles, which provided us with many litres of drinking water. Our dive gear stayed on board, but if it needed to be rinsed, one could always wash it with drinking water in a container on the pier.

At 08.30 hrs, the boat departed and everyone had time to prepare their equipment during the ride to the dive location. When the first group of divers got into the sea, the decompression station was launched as a safety precaution. Safety first.

In regards to the deep dives with long decompression stops, no concessions are made in safety standards, especially since there is no decompression chamber on the island. All wrecks are located at a distance of 15 to 20 minutes by boat from the pier. All diving depths vary between 155 and 180 feet (45 and 57 meters).

On day two, dives were planned to approximately the same depth, including



a decompression stop between 60 and 90 minutes. This means that the amount of nitrogen accumulating in your blood is extreme. To get rid of the nitrogen a two-minute deco safety stop at 24 meters was scheduled. (Sometimes an extra deco stop of two minutes at 12 meters was added for safety reasons).

Having arrived at the deco station, an 80 percent oxygen deco gas was delivered directly from the boat. With the inhalation of this gas mixture, the body decompresses much faster than normal air, as it contains less nitrogen. Following



Bikini Atoll

All dives were executed with double 12-litre tanks provided with a manifold, and compressed air up to 250 bars. At the end of each dive, we surfaced with approximately 150 bar left in the tanks. The crew took very good care of us, bringing the double sets back on board and securing them at one's given place in the boat.

After all the divers were back on board, the group left the dive site to return directly to the pier to get rest and have lunch. It was necessary to drink lots of water to compensate for dehydration as a consequence of the high outside temperatures and the deep dives.

The next briefing was at 14.00 hrs when the same procedure started again: to the pier, the dive and return at 16.30 hrs. At 19.00 hrs, supper was served. Afterwards, everybody went to bed around 21.30 hrs. During the night, I dreamed that we were attacked by a group of sharks during our deco stop with an hour decompression to go. Lucky enough I woke up. It was only a dream. However, I was again wary of the real existing dangers of attacking sharks.

Being alert and constantly looking around are the critical to survival at the

this method, the decompression times decrease by more than half of the usual time.

Using our Suunto D6 computers, we made a gas switch and immediately noticed a decline of the long decompression times. For safety reasons, the 1/3 rule still leads, as it could be possible for any reason that the buoy could disappear and that oxygen would not be available anymore. It is a standing rule that divers should be able to decompress with the available remaining air from their bottles.

deco station under these circumstances.

USS Saratoga

After our intensive dive training at home, we wanted to get in the water as soon as possible for our first dive on the *USS Saratoga*.

During our in-briefing, we were told that at the moment of the explosion, she was at "battle stations" and that all equipment is still on board.

The *Saratoga* is one of the nicest wrecks, and for a long time, the only diveable aircraft carrier in the world. Dives on the ship are less deep at Bikini. She stands straight up on the sea bottom at depth of 190 feet.

Going down along the buoy line, we could distinguish clearly the bridge and the large flight deck. On our way down, we also

discovered some gray sharks circling around us. We had never seen so many big sharks before; but they are tiny compared to the huge dimensions of the ship. For a second, I imagine how the pilots felt during their landings on to the ship, as we went down along a similar glide path. There was excitement all over, as the visibility was great.

After we visited the flight deck and the hangers with the remains of aircrafts, we continued to the port side of the ship along small anti aircraft guns, doors and openings to the inside of the carrier. Despite our enthusiasm, we had to go up for a deco stop of 30 minutes before we could get back on board the dive boat. We were all convinced that this was one of the greatest wrecks to dive.

Diving *UIJMS Nagato*

The *Nagato* lies up side down on the bottom of the lagoon. We needed more than one dive to discover her. When we reached the afterdeck, we discover the huge propellers. As we swam by, we noticed the enormous dimensions compared to the tiny divers who looked like puppets.

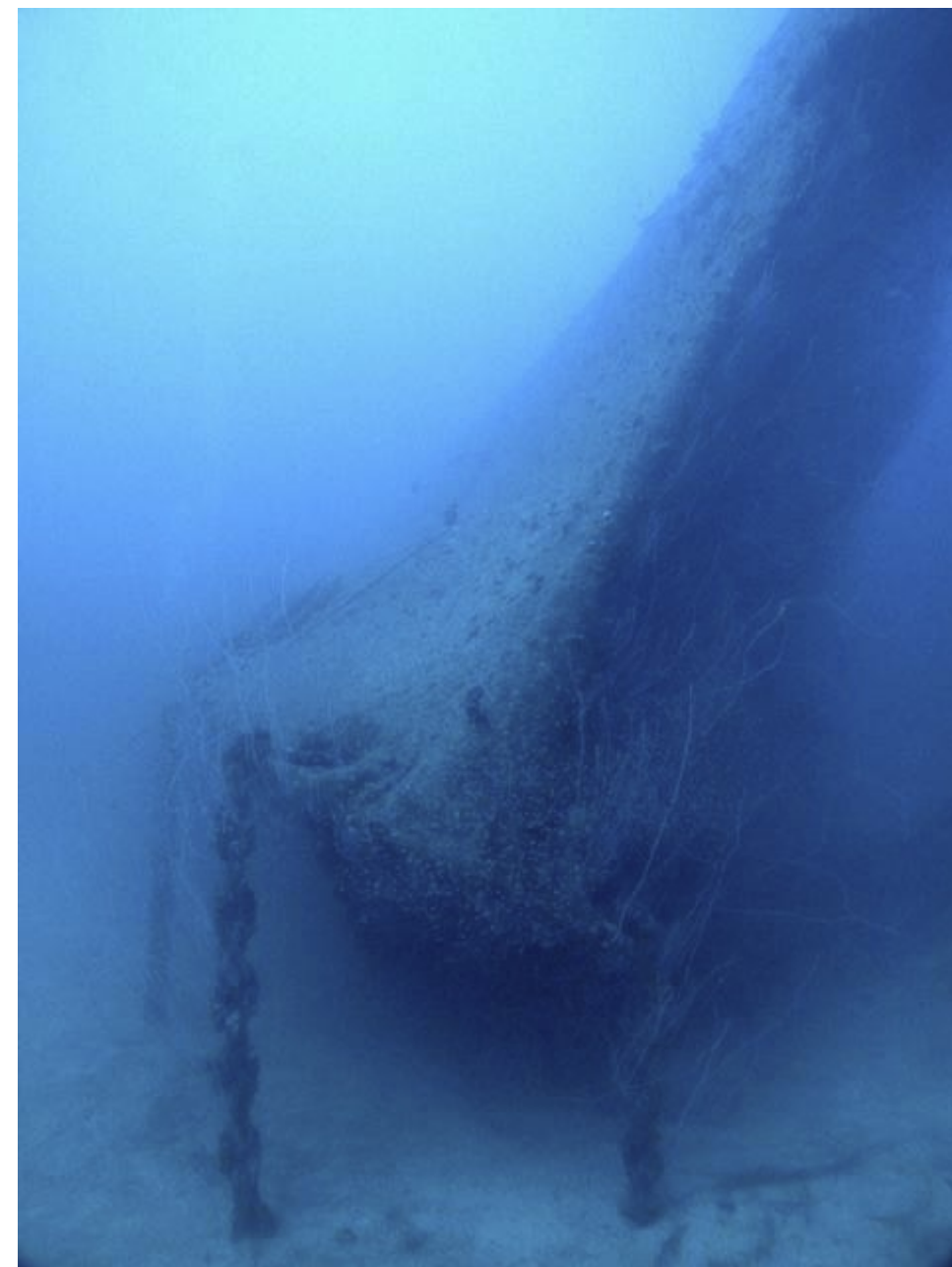
Jim showed us a spot where oil is

leaking from the hull. He turned a glass bottle with oil, and the bunker oil went up to the surface. During all our dives we noticed oil still leaking from the wrecks. At our pre-briefing, we were notified to avoid certain areas of the ship, as aircraft fuel was still leaking. These areas could be recognised by a blurred mist cloud escaping from the hull.

Bikini Atoll



THIS PAGE: Lots of guns and test build-ups



Swimming through these clouds will cause heavy skin irritations. Our Japanese dive colleagues had obviously not understood this warning as they got back on board with heavy irritated red faces. Also our diving suits and wings were contaminated with an oily film, which was difficult to remove.

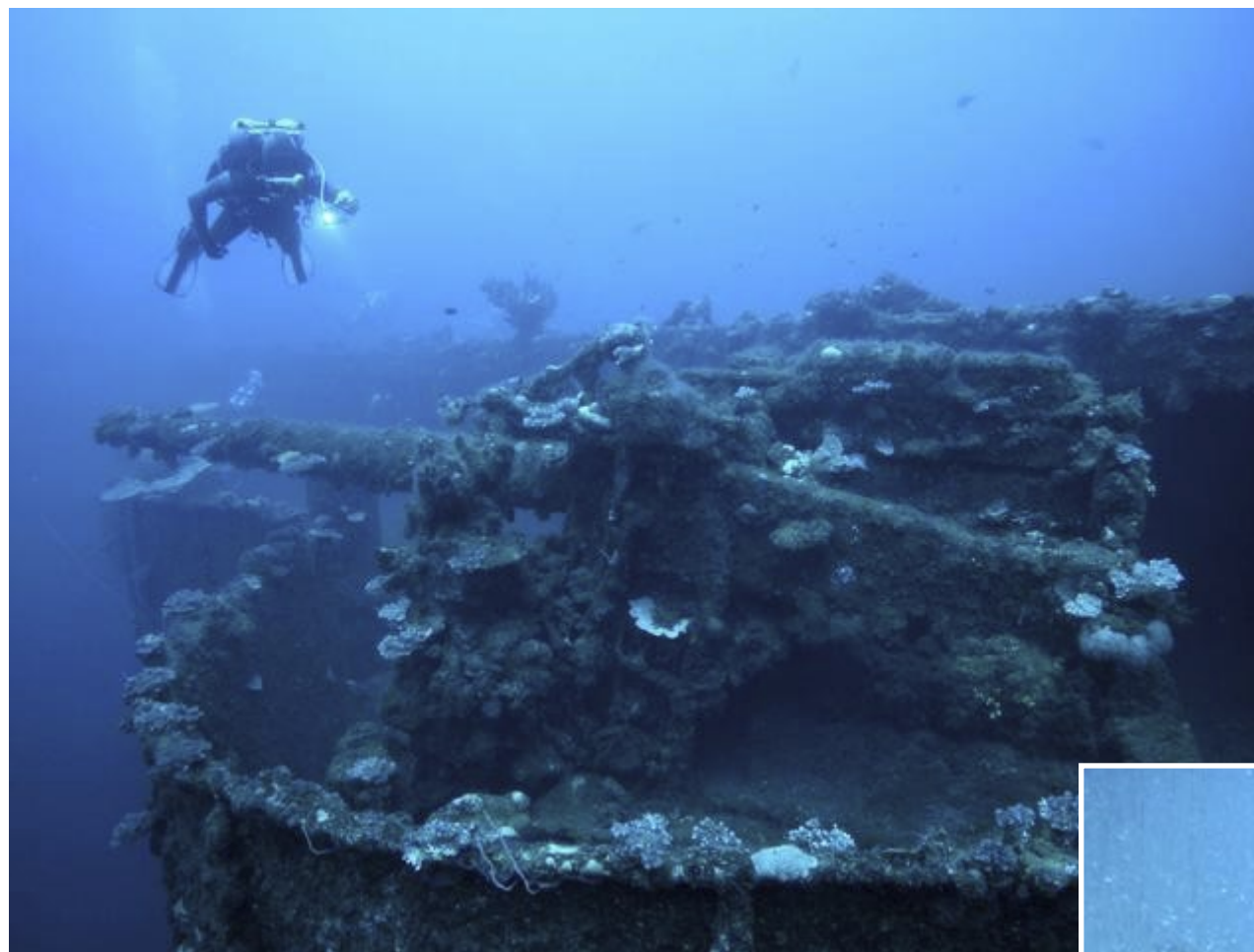
Heavy dives

After a while, the deep dives were taking lots of energy. One's body gets more and more tired after two deep deco dives a day.

Each dive was very exiting. All

the wrecks contain a lot of history, and one can still find all kinds of remains of the past from the moment the ships went down. Imagine that at the moment of the explosion, the ships were anchored in the lagoon at battle stations with all the equipment on board, including grenades, sharp ammunitions and China porcelain.

Penetrating the interior of the wrecks, one must continuously be alert, as there is still oil and aircraft fuel left in the hull. At the end of our week, we were given an exceptional opportunity by being allowed to do



THIS PAGE:
Planes inside the
USS Saratoga
are still at their
places

two penetration dives into the *Saratoga*.

USS Saratoga penetration dives

Having dived on many wrecks and locations in the world, I never experienced such exciting and beautiful dives on compressed air.

The *Saratoga* was located at the shortest distance from the nuclear test explosion point. Consequently, the ship was heavily damaged by the blast and heat of the explosion. Also time had degraded her enormously. The rear deck was blown away and has now almost totally collapsed. The front side of the *Sara*—as she also is called—was still intact.

The four of us entered her,

and we descended via the first elevator shaft beside the bridge, four decks lower. We planned to swim inside the decks and galleries to finally end up at the Captain's hut. Swimming through the gangways, it was of utmost importance not to whirl up the sediment. Regrettably, our air bubbles reached the ceiling and created dust in the water, causing degraded visibility.

Jim was leading us, and we followed him through the many galleries. The passages were so narrow that our dive sets touched the doorways. After we penetrated the wreck for a while, we descended along



a staircase towards the lower decks.

Here, we found a lot of things. Light bulbs were still in their sockets in the ceiling. Cables were hanging around which we had

to take very great care in order not to get entangled. Finally, we ended up in the captain's cabin, where we saw teacups, rifles and other interesting remains of the past. Despite

HIJMS Nagato, the Japanese admiral ship

looked back for a moment and felt more fear than a second ago, as the big shark was swimming just one meter away from my position. Using my camera, I tried to defend myself, but just at that moment, the shark turned away, leaving me to get my respiration back to normal.

Under water, we tried to relax and were eventually able to laugh about the terrifying event that just happened. However, the stress came back as we arrived at the decompression station where we had to stop for an hour, and where we saw the same tiger shark circling again around our position. We were relieved and lucky that the shark



the fact that we were eager to collect souvenirs, we didn't take anything, so as to leave the place untouched for other divers to enjoy these unique historical scenes in the future. Moreover, penalties are very high if you take any souvenirs.

Never in my life have I enjoyed penetration dives like those on the *Saratoga*. All of the team were convinced that these two penetration dives were the most exciting experiences of the week at Bikini.

However, for safety reasons Jim hesitates to take costumers into the *Sara* due to the many existing dangers, such as collapsing walls and ceilings and bad visibility. Without proper training and sufficient wreck dive experience, these penetrations can become very dangerous. Regrettably, the whirled up dust prohibited us from taking any film or photos of our exciting dives. But, we really did see a lot of interesting things during our three dives on the *Saratoga*. We saw grenades, guns, aircraft, anti aircraft machinery, rifles, porcelain, a diving helmet and even a trumpet. The experi-

ence of this wreck continues to feel like a fairytale and the unique experience was a once in a life time event.

Sharks

On each dive in the waters around Bikini, we met two or three sharks. White tip and black tip reef sharks, gray sharks, and once, a tiger shark.

During the ascent from the deck of the *USS Saratoga*, a tiger shark came across our paths; my dive buddy, Peter, tried to attract my attention by signalling with his hand above his head that there was something to be noticed. He also tried to yell underwater, but I didn't understand what he said. However, I finally understood that there was a shark swimming around us, which had to be bigger than normal. Well, as I turned around and looked down in the direction Peter pointed, I saw a big tiger shark coming strait towards me.

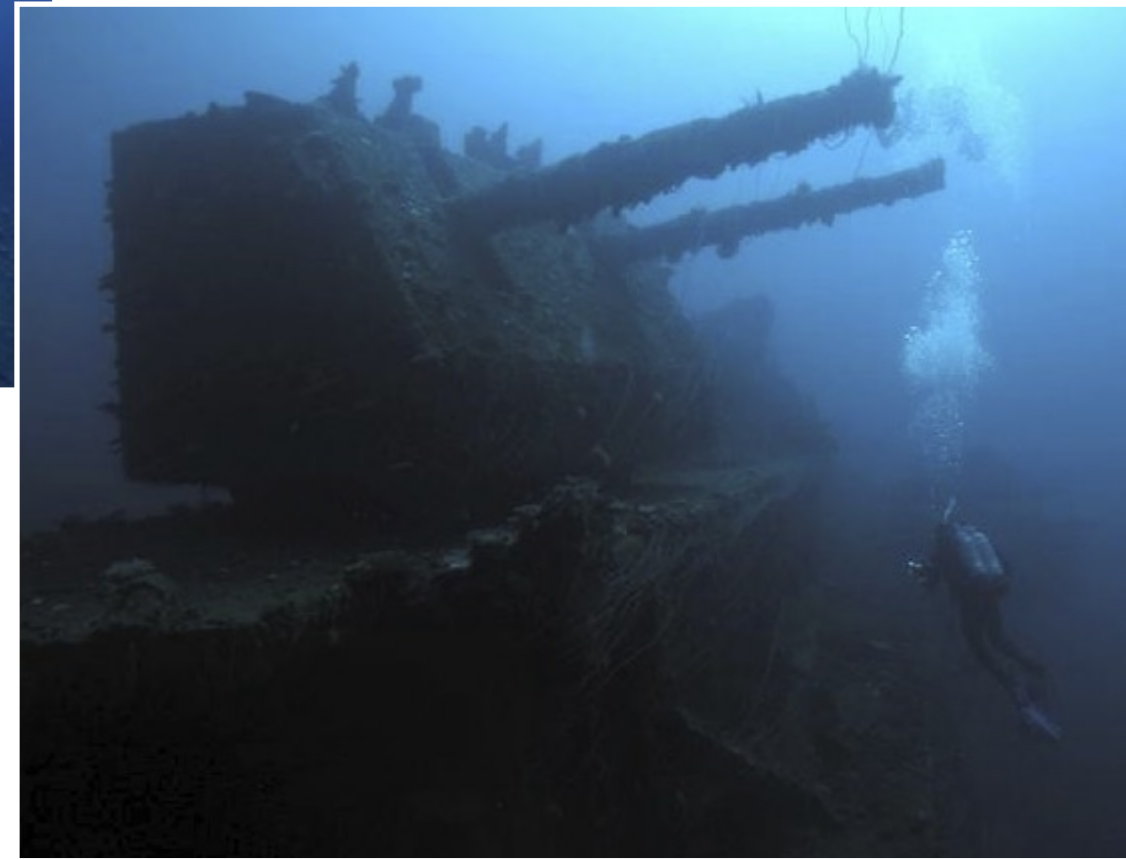
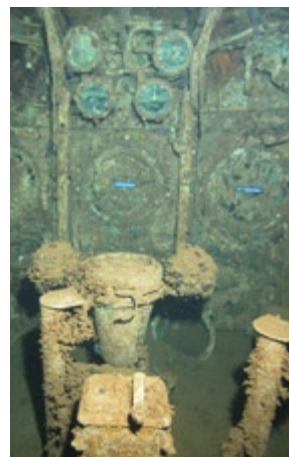
I froze immediately and decided to sprint to the door entrance of the bridge. When I got there, I

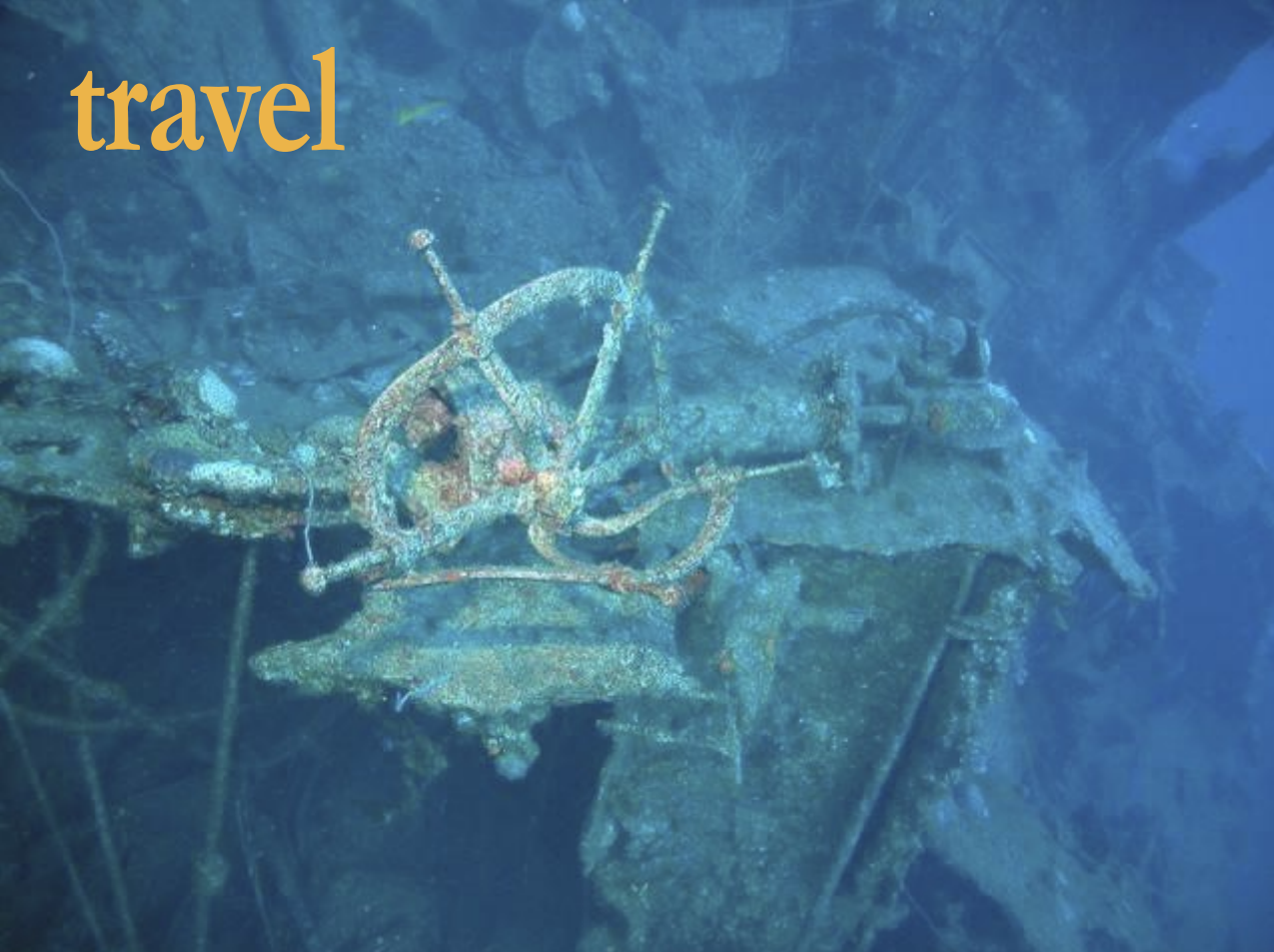
decided that it only wanted to circle around us, sometimes at very short distances, leaving us behind to ponder an unforgettable experience.

Return to civilization

On Tuesday morning we made

our last dive on the bow of the *Saratoga*. She looks gigantic if you stand in front of her on the bottom of the lagoon. To be prepared for the flight back to Majuro on Wednesday, we made an extra long decompression stop, on 80 percent oxygen,





15 minutes longer than was indicated by our computers.

Back ashore, we carefully rinsed our diving gear and put it in the sun to dry. In the afternoon, we were invited to discover the island where Gen Akroyd explained to us the local history including legends and old stories about the former inhabitants.

The island and its original inhabitants know many secrets, which are very well described by Jack Niedenthal, in his book *For the Good of Mankind*.

The story about their reef-god "Worejabato" is one of the legends that impressed me. This reef god appears as a giant reef shark swimming around in the waters of the Bikini lagoon to protect the inhabitants of Bikini against bad influences. The legend says that this shark swims around a small reef at 15 meters distance from our accommodation. That is presumably the reason why we are not able to snorkel in the lagoon after 17.00 hrs as we were told. An incident that may prove this story might be true was experienced by Peter as he was snorkelling by himself one day and suddenly met sharks that came very close. For obvious reasons, Peter decided to leave the water instantaneously.

For the rest of the day, we took our rest and prepared ourselves for our flight back to the Netherlands the next day. However, we were informed that our departure had to be postponed with one day due to a flat tire on the aircraft; the team had now to hub via five other atolls, including a stop to pick up a dead body at the island of Wotje. The corpse, wrapped in linen, had been waiting for transportation for a couple of days and upon pick up was put on top of our diving bags; you can imagine how we felt about that.

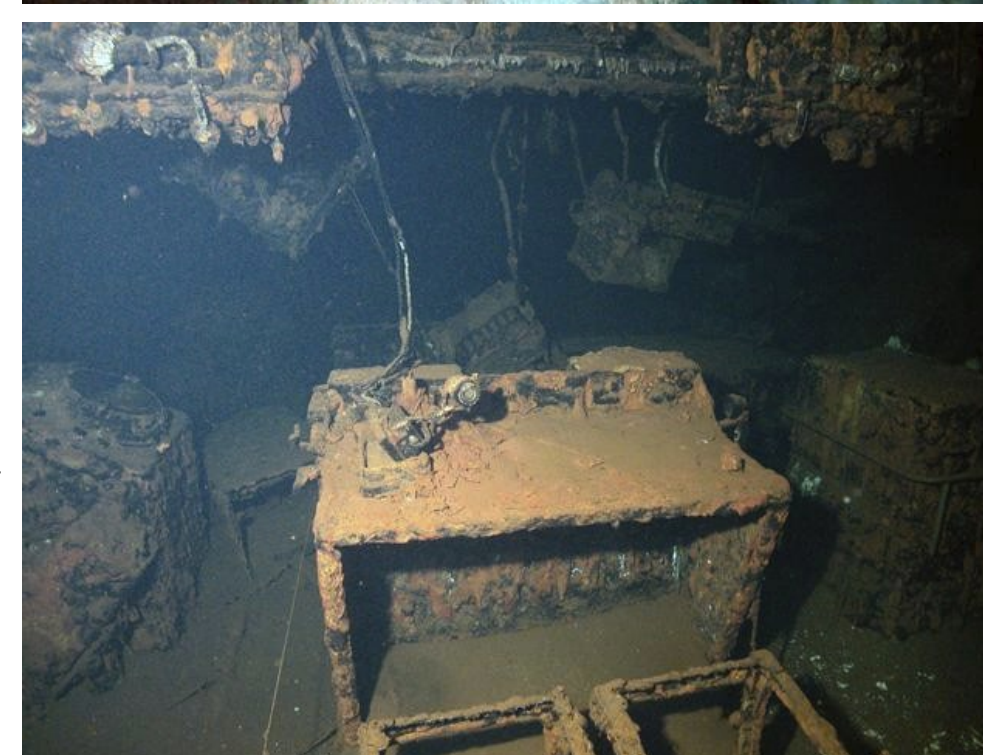
The consequences of this delay was that we missed our connecting flights. After all the expedition needed in total 14 flights to arrive at Bikini and to get back to Schiphol airport. What an adventure, the whole trip was an expedition on its self but worth all the efforts!

Afterthoughts

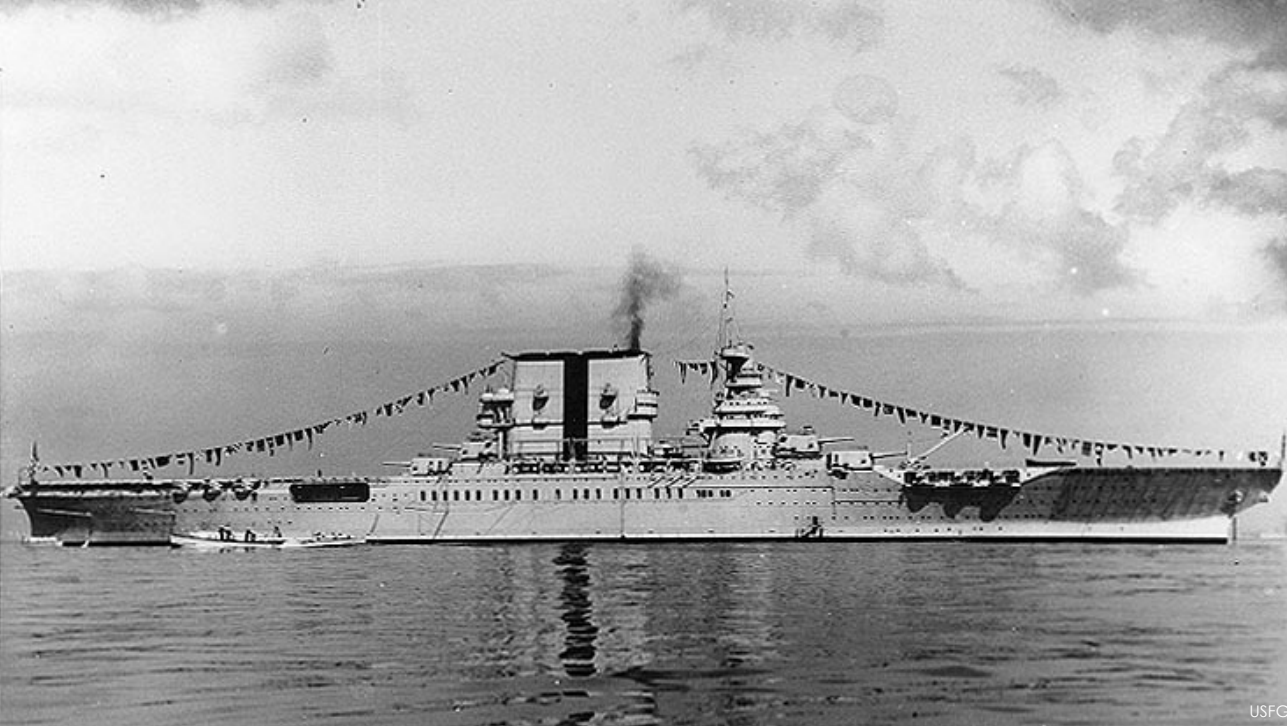
Bikini is world's unique wreck diving paradise, a dream of every wreck and technical diver. Personally, I would like to visit it again as soon as possible, as there is no place in the world to be found where on a small area so many wrecks are resting at a diveable depth, still witnessing recent history of mankind development. ■

The author, Joost-Jan Waanders, was the initiator and expedition leader of this expedition. For more information, visit:

**Technicalexplorers.com
Bikini2008.technicalexplorers.com**



THIS PAGE: The best wreck dive location on Earth



USFC

The wrecks

We literally touched the face of history diving these nuclear wrecks. The history of these amazing wrecks in the Bikini lagoon is vast and contains the most important collection of WWII shipwrecks in the world. In fact, the first and longtime only diveable aircraft carrier lies on the bottom of the Bikini lagoon. During our week at Bikini, we did 12 dives on seven of these wrecks. In fact, there are even more wrecks that are mentioned below. The U.S. aircraft carrier *Saratoga* (the only diveable carrier in the world that has been sunk by an atomic bomb) and the *HIJMS Nagato*, flagship of the Japanese Navy, are the highlights of this site.

USS Saratoga CV3

Commissioned in 1927, it is an American aircraft carrier 880 feet in length and weighs 39,000 tons; it rests in Bikini's lagoon at a depth of 190 feet. Her bridge is easily accessible at 40 feet, her deck at 90 feet, and the hanger for the Helldivers at 125 feet. These Helldivers and bombs are still on display complete with all dials and controls. *Saratoga* had a fuel capacity of 63,200 barrels of fuel oil, 249 barrels of diesel oil, and 132,264 gallons of gasoline. Fuel and ammunition loads during test BAKER were 10 percent of capacity and 67 percent capacity respectively. She was reported sunk by the Japanese seven times during World

War II. She received seven battle stars.

Eight hours after the waves created by the atomic Baker blast rolled over her, *New York Times* correspondent Hanson W. Baldwin wrote this epitaph as he watched the *Saratoga* sink slowly beneath Bikini's lagoon: "There were many who had served her in the observing fleet, and they fought with her through the long hot hours as the sun mounted. Outside the reef ... the observing ships cruised, while the *Sara* slowly died. There were scores who wanted to save her—and perhaps she might have been saved, had there been a crew aboard. But she died a lonely death, with no man upon the decks once teaming with life, with pumps idle and boilers dead. From three o'clock on, she sank fast, her buoyancy gone, as the fleet kept the death watch for a 'fighting lady.' The *Sara* settled—the air souging from her compartments like the breath from exhausted lungs. At 3:45 p.m., the starboard aft corner of her flight deck was awash; then the loud speakers blared: 'The water is up to her island now; the bow is high in the air.' She died like a queen—proudly. The bow slowly reared high; the stern sank deep, and, as if striving for immortality, the *Sara* lifted her white numeral '3' high into the sun before her bow slipped slowly under. Her last minutes were slow and tortured; she fought and would not sink, but slowly the

Bikini Atoll

'3' was engulfed by the reaching waters; the tip of her mast was the last bit of *Sara* seen by man," —unless, of course, you are a diver fortunate enough to be visiting Bikini Atoll! The *USS Saratoga* is the largest dive-able vessel in the world, and the only aircraft carrier available for diving at 880 feet long.

HIJMS Nagato

The Japanese Flagship to the Japanese Navy, she was Admiral Isoroku Yamamoto's floating fortress during Japan's World War II attack on Pearl Harbor and was a treasure to the Japanese forces. The 32,720 ton battleship is at rest upside down in 170 feet of water; her bridge is accessible at 150 feet, the hull and monstrous props at 110 feet. The *Nagato* was built by Kure Naval Dockyard, launched on 9 November 1919, and completed on 25 November 1920. She was reconstructed in 1934-1936 with torpedo bulges, increased elevation for main armament, aircraft crane, etc. After this refit, *Nagato* had ten Kampon

boilers, driving four sets of Kampon turbines developing 82,300 shaft horsepower (shp) for a speed of 25 knots. Her fuel bunkering was now 5,650 tons of oil, giving her a radius of 8,650 nautical miles at 16 knots. Her new dimensions were 725' 9" long at the waterline, 113' 6" beam, 32' 2" draught. Her normal displacement was 39,130 tons, 42,850 tons at full load. She carried a crew of 1,368. In June 1944, she was known to be fitted with radar. By October 1944, her armament consisted of 8 x 16"/45, 18 x 5.5"/50 [guns that were later removed], 8 x 5"/40, and 98 x 25mm AA guns. Her displacement had by now increased to

43,581 tons full load, and as a result, her maximum speed was 24.98 knots. By the end of the war, she had had her main mast and funnel removed for camouflage purposes, as she was holed up in Sagami Bay near Yokosuka. Fuel and ammunition loads during both ABLE and BAKER tests were, respectively, 15 percent and 10 percent of capacity. At 708 feet long, she is upside down in the water and an incredible dive with her four massive screws appearing like an underwater Stonehenge.

USS Arkansas BB-33

A 29,000-ton American battleship that survived two world wars had a fuel capacity of 37,779 barrels of fuel oil, 119 barrels of diesel oil, and 4,000 gallons of gasoline. The *Arkansas* took part in the Presidential Naval Review in the Hudson River, on 14 October 1912 and then carried President William H. Taft to the Panama Canal Zone for an inspection of the unfinished canal. On 22 April 1914, she assisted in the occupation of Veracruz, Mexico. In December of 1918, she formed part of the escort carrying President Woodrow Wilson to France. In

CLOCKWISE FROM LEFT:
USS Saratoga CV3
USS Arkansas BB-33
HIJMS Nagato



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The *USS Lamson DD-367*



the west coast from Hawaii and Japan and shorter passages among South Pacific islands. She sits upright on the bottom and is guarded by a magnificent school of skip jacks; and there is almost always a shark sitting on this ship. The ABLE blast split her open, so she makes for a sensational penetration dive. Fuel and ammunition loads during test ABLE were 95 percent of capacity. The *Carlisle* was sunk by the ABLE blast. She is 426 feet long.

USS Lamson DD-367

The American destroyer *Lamson* received five battle stars for service during World War II. She was used to search for Amelia Earhart in 1937 in the Marshall and

Gilbert Islands. She was deployed from Pearl Harbor on 7 December 1941, in the unsuccessful search for the Japanese Task Force that bombed Pearl Harbor and later served throughout the Pacific until the end of the war. Her fuel capacity was 3,600 barrels, her diesel oil capacity was 110 barrels, and she was at 50 percent capacity for both fuels and ordnance when she was sunk by ABLE. Her hull provides a great example of the power of a nuclear explosion as it is horribly twisted and damaged. At 341 feet long, she is a Bikini divemaster favorite.

USS Apogon SS-308

An American submarine with normal fuel capacity of 54,000 gallons, and an emergency load of 116,000 gallons. She made eight war patrols sinking three

LEFT: The *USS Apogon SS-308*
RIGHT: The *USS Anderson DD-411*

Japanese vessels totaling 7,575 tons. Her first patrol was out of Pearl Harbor in November of 1943. She later patrolled from Majuro to Midway and was part of Operation Galvanic during the invasions of Tarawa and the Gilbert Islands. Working off Formosa, she ran in a wolf-pack known as the "Mickey Finns" that sunk 41,000 tons worth of Japanese vessels toward the end of the war. She received five battle stars and was sunk by BAKER. She now appears perfectly upright as if ready to drive away on the bottom of Bikini's lagoon. Eric Hanauer of Discover Diving commented, "The shadowy silhouette of Apogon's conning tower, completely enveloped by glassy sweepers, is one of the most beautiful sights I've ever seen underwater." She is 312 feet long.

USS Anderson DD-411

An American destroyer that received ten battle stars during World War II, she served as a carrier screen in the Coral Sea, Midway, the Solomons, Guadalcanal and Tarawa. Always on the frontlines, she was with the *Lexington CV-2* and the *Yorktown CV-5* aircraft carriers when they were sunk in battle by the Japanese. She was also with the *USS Wasp* and the *USS Hornet* when they were sunk in WWII. In 1943, in Wotje Atoll in the Marshall Islands, she got hit with a 155mm shell that killed the captain and five officers and wounded another 18 men. She carried 2929 barrels of fuel oil and 168 barrels of diesel oil and was at 95 percent of capacity of both fuel and ordnance when she was sunk by ABLE and is now at rest on her side in Bikini's lagoon. 348 feet long. ■



World War II, the *Arkansas* escorted convoys across the Atlantic. She remained in European waters for the invasion of Normandy where she performed yeoman service at Omaha Beach, the bombardment of Cherbourg and the invasion of southern France. She then moved to the Pacific to participate in action at Iwo Jima and Okinawa. At 562 feet long, the *Arkansas* rests almost completely upside

down in Bikini's lagoon in 170 feet of water. She received four battle stars for her service in World War II and was sunk by BAKER.

USS Carlisle AA-69

A merchant craft named after a county in Kentucky, she had fuel capacity of 9,695 barrels of fuel oil and 375 barrels of diesel oil. She made three voyages to



A 21-kiloton underwater nuclear weapons effects test, known as Operation Crossroads (Event Baker), conducted at Bikini Atoll 1946. Image courtesy of US Defense Threat Reduction Agency

Aftermath

— *at the nuclear playground*

Text by Arnold Weisz

During the period between 1945 and 1958, a total of 67 nuclear tests were conducted on Bikini and Eniwetok Atolls and adjacent regions within the Republic of the Marshall Islands. U.S. nuclear testing on the Marshall Islands inflicted significant damage to property—lands, vegetation, lagoons, and surrounding ecosystems—as well as to people's health.

In Bikini on 24 July 1946, an enormous water column beneath a mushroom cloud left 500,000 tons of radioactive mud in the atoll's lagoon. As a result of the underwater nuclear bomb, "Baker Test", the Bikini atoll was so devastated, that nearly all of the atoll's vegetation was destroyed, and the islands were sufficiently contaminated to render them all uninhabitable until at least 2030. This was just the beginning of an insane atomic arms race that jeopardized many pacific islanders' lives and destroyed the surrounding nature.

Eight years later, the mother of all bombs completely vaporized five of the atoll's northern islands (a total of about 68 acres or 27.5 hectares—four percent of the pre-test lands). The Castle Bravo test on 1 March 1954 was the most powerful nuclear weapon ever tested by the United States.



Bravo was an experimental thermonuclear device with an estimated explosive yield of 15 megatons and led to widespread fallout contamination over the inhabited islands of Rongelap and Utrök Atolls, as well as other atolls to the east of Bikini. The Bravo bomb wreaked havoc with nature, as it raised water temperatures to 55,000 degrees Celsius,

shook islands 200km away and left a crater 2km (1.24 miles) wide and 73m (240 feet) deep.

Waiting to return

Today, while the people of Bikini have yet to resettle their homeland; the island is populated by Bikini Project Department construction workers and some US

Department of Energy staff. There is, however, a large population of Bikinians living elsewhere in the Marshall Islands and overseas who hope to have the ability to return to their homeland someday soon.

Over the past three decades, researchers from the Lawrence Livermore National Laboratory (LLNL) have been evaluating

USS Arkansas (BB-33), a Wyoming-class battleship was the third ship of the United States Navy named in honor of the 25th state

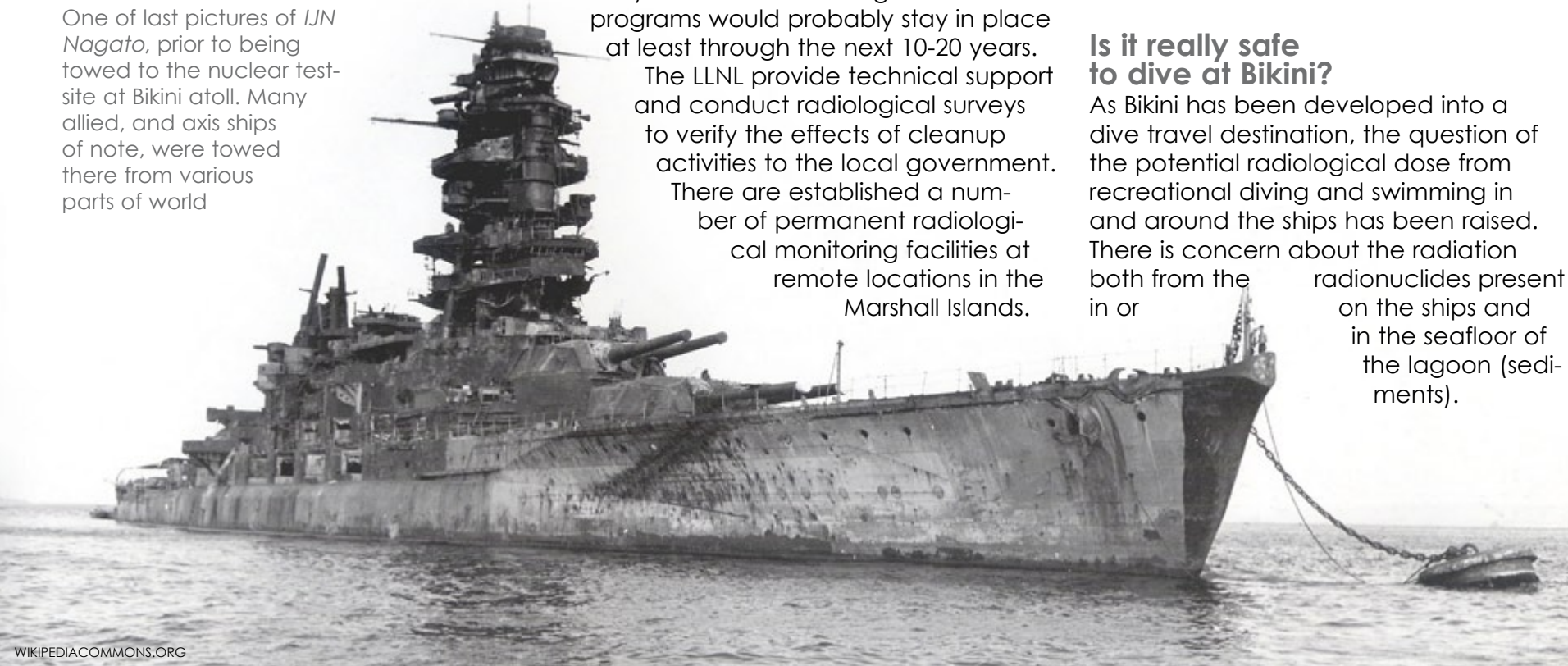




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A gamma spectrometer for determination of external gamma exposure rates in village and housing areas where people spend most of their time.

One of last pictures of *IJN Nagato*, prior to being towed to the nuclear test-site at Bikini atoll. Many allied, and axis ships of note, were towed there from various parts of world



WIKIPEDIACOMMONS.ORG

Aftermath

Cleaning up

The largest contributor to radiation doses from exposure to residual fallout contamination in the Marshall Islands comes from cesium-137. This substance has entered the food chain and is found in, for example, Coconut crabs and locally grown breadfruit, which are important food sources on the islands.

Cesium-137 radiation from plants that grow on the islands is another major contamination source. Another contamination source is plutonium, which is also being tracked through measurement technology in support of the Marshall Islands plutonium urinalysis (bioassay) program.

Researchers from LLNL have worked out a rehabilitation scenario involving treatment of agricultural areas with potassium fertilizer and removal of the top 40cm of soil from the housing and village area. This method would actually expose the future habitants of the contaminated islands to a radiation level well below what is normal from natural radiation sources in, for example, the continental United States.

Is it really safe to dive at Bikini?

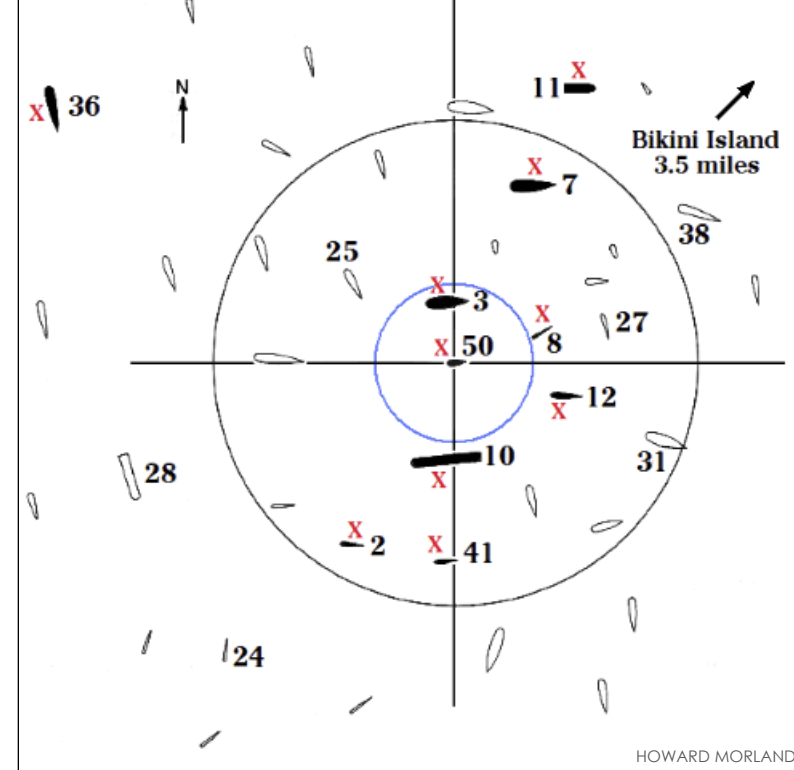
As Bikini has been developed into a dive travel destination, the question of the potential radiological dose from recreational diving and swimming in and around the ships has been raised. There is concern about the radiation both from the radionuclides present on the ships and in the seafloor of the lagoon (sediments).

radiological conditions on affected atolls and using the data to develop dose assessments for resettled and resettling populations. According to scientists at the LLNL, should the Bikinians decide to resettle, then it will probably be necessary to monitor the return of the population to provide ongoing assurances that safety standards are being met. These programs would probably stay in place at least through the next 10-20 years.

The LLNL provide technical support and conduct radiological surveys to verify the effects of cleanup activities to the local government.

There are established a number of permanent radiological monitoring facilities at remote locations in the Marshall Islands.

HOWARD MORLAND

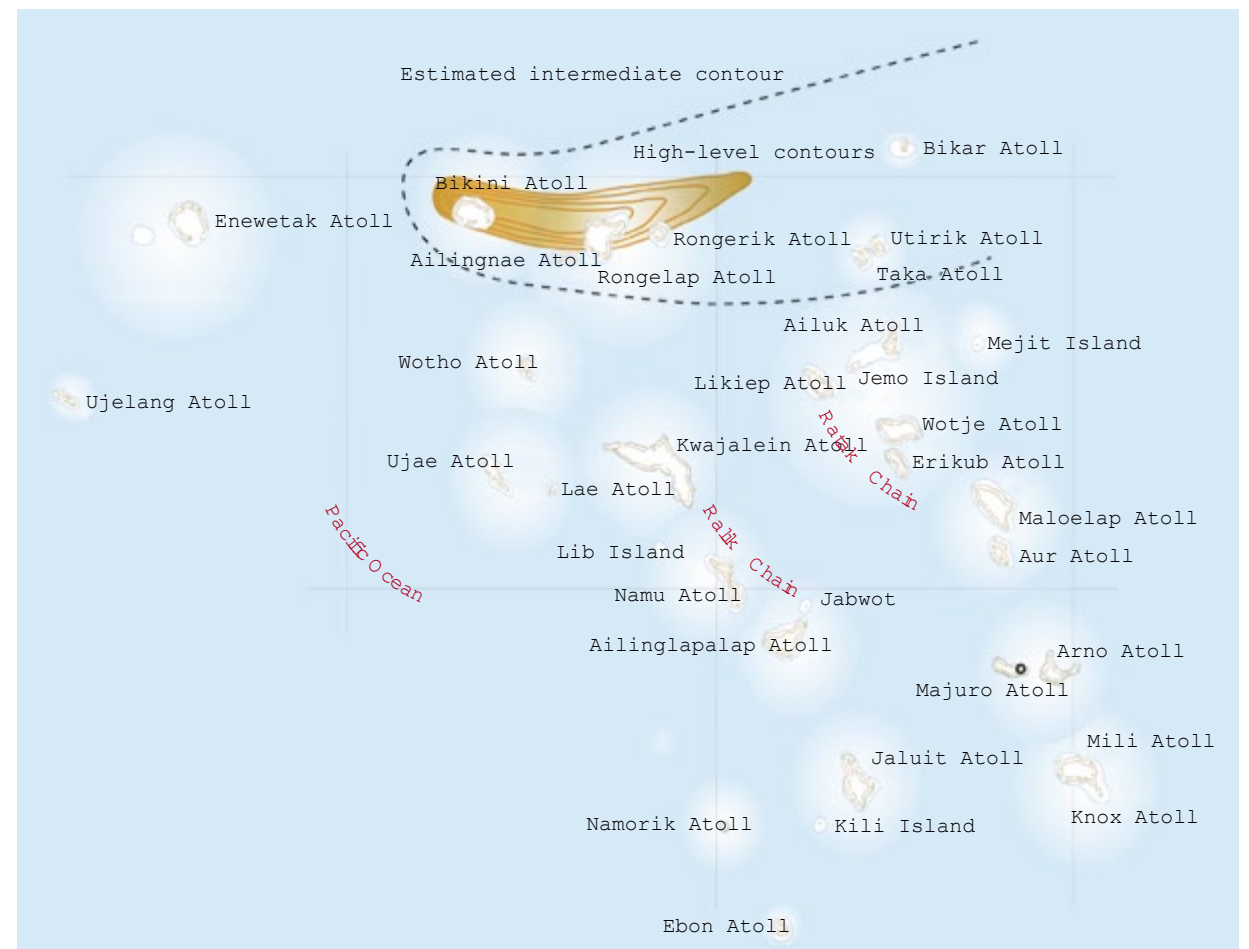


A map of the array of target ships in Bikini lagoon for the Baker shot of Operation Crossroads on 25 July 1946. The ten red X's mark the ten ships that sank. The area of serious ship damage is marked by the black circle, with a radius of 1,000 yards from the point of detonation. The rim of the shallow underwater crater created by the blast, as well as the circumference of the hollow water column that lifted the *Arkansas* is marked by the blue circle, which has a 330-yard radius. Submerged submarines were the *Pilotfish*, (ship #8) at 56 feet, and the *Apogon* (ship #2) at 100 feet

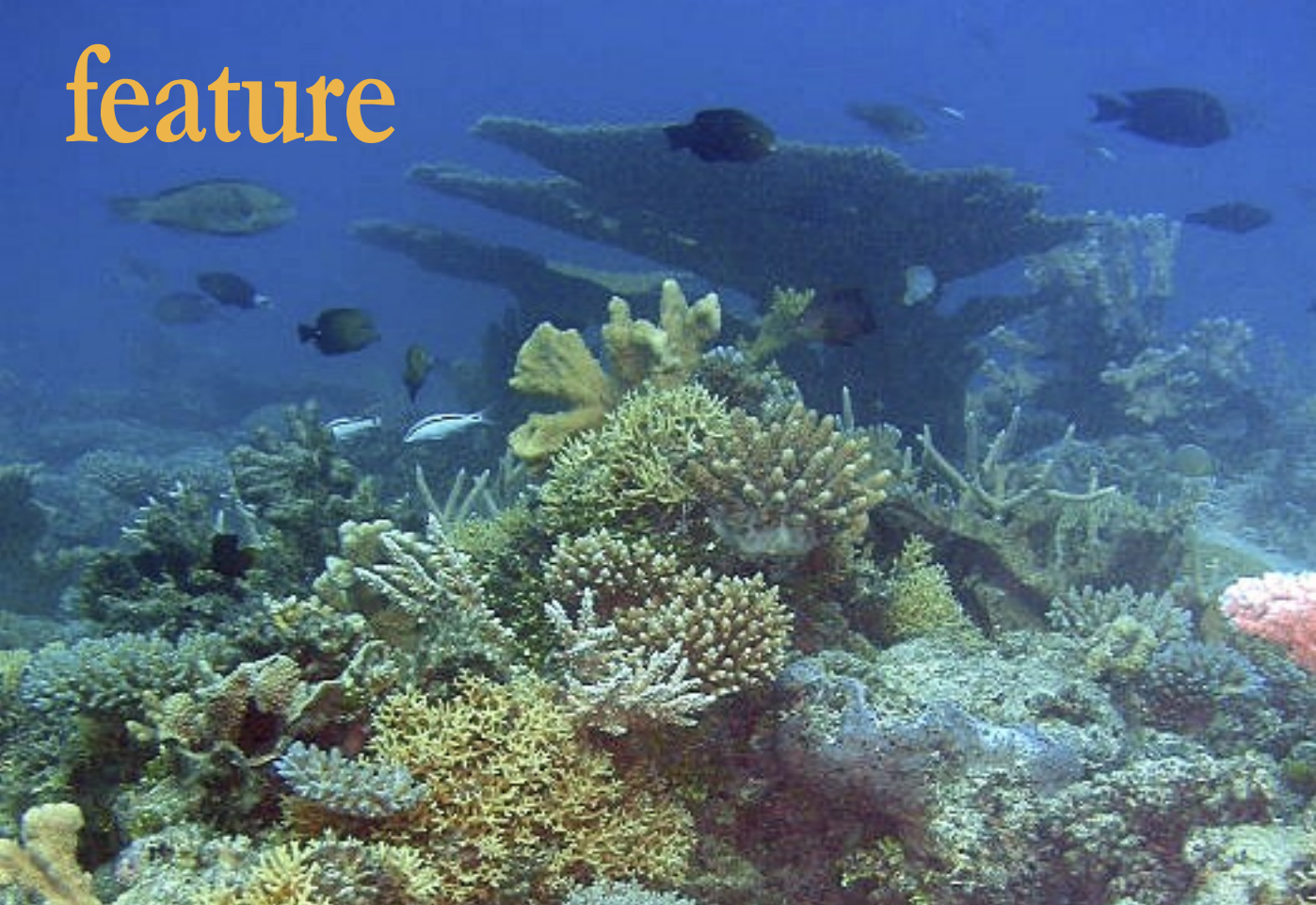
Research shows that the dose from caesium-137, cobalt-60 and bismuth-207 in the sediments on the ships and in the lagoon bottom while swimming near the ships is so low that it is, for all practical purposes, zero. The dose to a person on

land anywhere in the world, for a specific period of time, would be higher than the dose from swimming in the lagoon and diving near the ships for the same period of time.

To give you an additional perspective,



Map of the Marshall Islands



SILVIA PINCA

Lagoonal coral reef habitat at Bikini

the cesium-137 concentration in lagoon sediment is much less than the cesium-137 concentration in surface soil in the United Kingdom and Northern Europe from the Chernobyl accident. The primary potential route of exposure of people from alpha and beta-emitting radionuclides is by inhalation. There is no chance of inhalation of these radionuclides while

diving on the ships or swimming in the lagoon near the ships. It can therefore be concluded that a diving trip to the Bikini Islands is not harmful.

Radiant marine life
Nature has again showed an

Aftermath

astounding ability to recuperate after manmade disasters. Half a century after the last earth shattering atomic blast shook the Pacific atoll of Bikini, the corals are flourishing again.

An investigation concluded in early 2008 by an international team of scientists from Australia, Germany, Italy, Hawaii and the Marshall Islands, has revealed some truly remarkable findings. The expedition examined the diversity and abundance of marine life in the atoll.

One of the most interesting aspects is that the team dived into the vast Bravo Crater left in 1954 by the most powerful American atom bomb ever exploded (15 megatons—a thousand times



SILVIA PINCA



LAWRENCE LIVERMORE NATIONAL LABORATORY

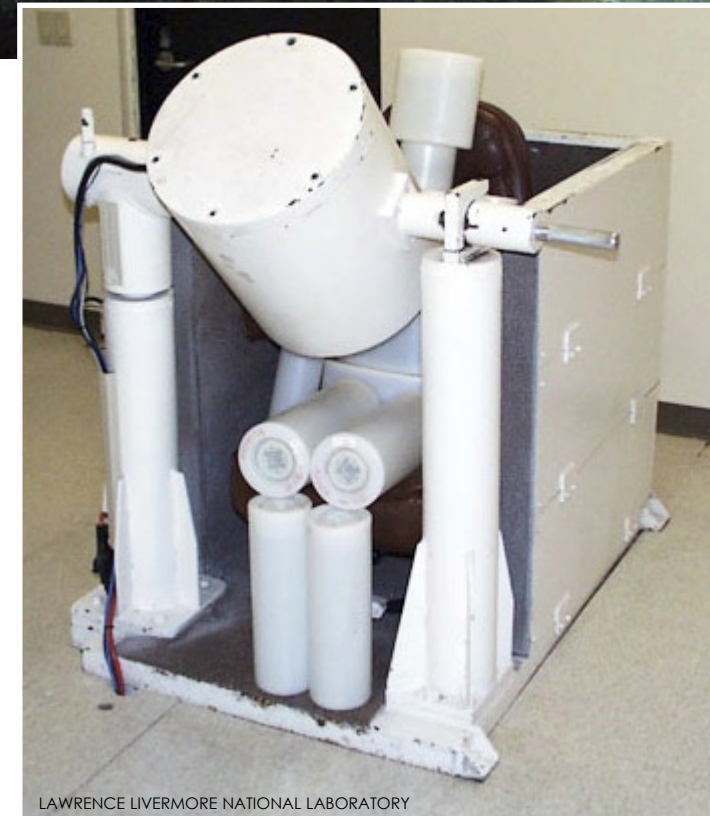
ABOVE: Corals at Enewetak lagoon off Runit Island, Enewetak Atoll, July 2005. RIGHT: A so-called Massic Chair used for whole body counting, measuring the radiation dose delivered by internally deposited radionuclides

more powerful than the Hiroshima bomb).

"I didn't know what to expect—some kind of moonscape perhaps. But it was incredible, huge matrices of branching Porites coral (up to 8 meters high) had established, creating thriving coral reef habitat. Throughout other parts of the lagoon it was awesome to see coral cover as high as 80 percent and large tree-like branching coral formations with trunks 30cm thick. It was fascinating—I've never seen corals growing like trees outside of the Marshall Islands," said Zoe Richards of the ARC Centre of Excellence for Coral Reef Studies and James Cook University, after diving into the crater.

However, more than 50 years later, not everything has returned to the state it was before. At least 28 species of coral previously found in the area has become locally extinct. "The missing corals are

Large Acropora corals resemble trees in the lagoon at Bikini Atoll



LAWRENCE LIVERMORE NATIONAL LABORATORY

fragile lagoonal specialists—slender branching or leafy forms that you only find in the sheltered waters of a lagoon," Richards explained.

For comparison, the scientists also dived on neighboring Rongelap Atoll, where no atomic tests were carried out directly, although the atoll was contaminated by radioactive ash from the Bravo Bomb. The Rongelap Atoll is the second largest atoll in the world with a huge

amount of coral reef diversity and biomass; it lies upstream from Bikini. The scientists have reason to think that these corals are seeding the Bikini corals, helping the reefs to recuperate. ■

SOURCES:
Marshall Islands Dose Assessment and Radioecology Program

Robison W.L. (1990). *The Archeology of the Atomic Bomb*, US National Park Service Publication,

Report UCRL-ID-123374, Lawrence Livermore National Laboratory, Livermore CA 94550.

Robison, W.L., Bogen, K.T., Conrado, C.L., 1997. An updated dose assessment for resettlement options at Bikini Atolla U.S. nuclear test site. *Health Physics* 73(1): 100-114; 1997.

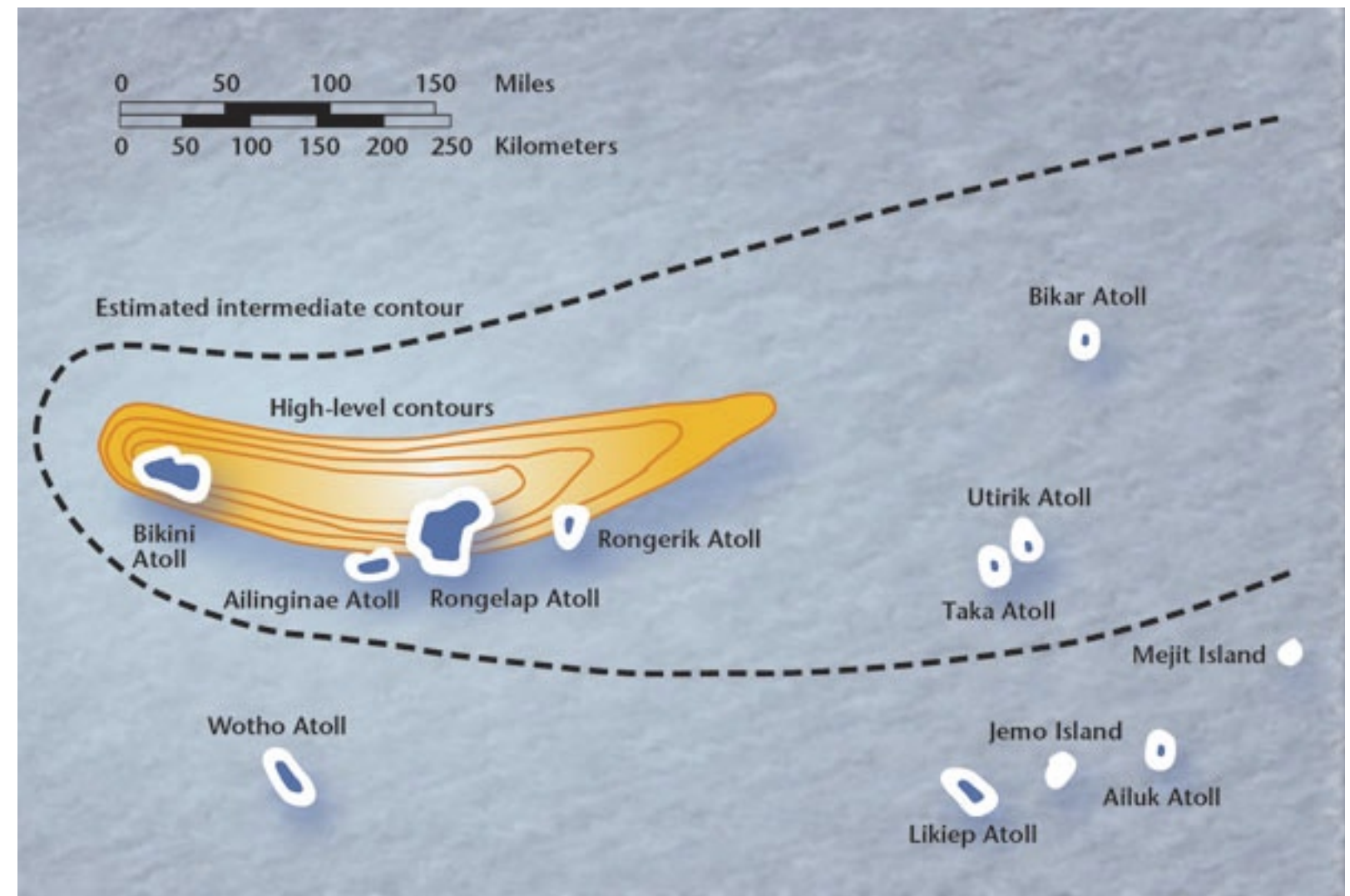
Hamilton and Robison (2006), *The effective and environmental half-life of cesium-137 at former nuclear test sites in the Marshall Islands*, Report UCRL-MI-206535, Lawrence Livermore National Laboratory, Livermore CA 94550.

Bikini on the web:

www.nuclearclaimstribunal.com/tesing.htm
www.ns.iaea.org/appraisals/bikini-atoll.htm
www.bikiniatoll.com

Shipwrecks:

www.nps.gov/history/history/online_books/swcrc/37/chap4.htm



Map of the Republic of Marshall Islands showing the fallout pattern from the Bravo nuclear test conducted on 1 March 1954. Image courtesy of Lawrence Livermore National Library



Woman in two-piece found on the mosaic in Villa del Casale in Piazza Armerina, Sicily, Italy

The Bikini – French fashion that hit the beaches like a bomb

Text by Arnold Weisz

That a minimalistic swim suit creation was named after some “post card pretty” tropical islands in the Pacific is nothing less than what it deserves. On the other hand, the thought behind naming this piece of fashion after these islands is much more sinister.

The bikini, which shocked the world when it appeared on French beaches in 1947, was a Greco-Roman invention. Based

on evidence from Roman mosaics and murals, historians have long believed that the bikini was popular swimming attire for ancient Roman women. In the fourth century, for example, Roman gymnasts wore bandeau tops and bikini bottoms.

However, as archeologists work their way through their discoveries, new insights come to light. Cave excavators have discovered Minoan wall (Greece) paintings from around 1600 B.C. that show a two-piece outfit strikingly similar to the modern-day bikini.

The modern bikini was invented by French engineer Louis Réard in

1946. Strange as it may sound, Louis Réard, the engineer, was actually running his mother's lingerie boutique near Les Folies Bergères in Paris in 1946.

At the time, Réard's main problem was that he didn't quite know what to call his design. Being French, it would of course have to be a name that would stir the masses. So, he searched for something exotic, bold and eye opening.

The clue came from a very remote place, in a rather spectacular fashion. Four days before he was to show the world his new bikini in Paris, the U.S. military provided

him with a name. Réard named his design after Bikini Atoll in the Pacific, the site of the Operation Crossroads nuclear weapon test on 1 July 1946.

On 5 July 1946, he unveiled the bikini at a fashion event at Piscine Molitor, a popular public pool in Paris to this day. Since its unveiling, the bikini has become the favorite swim and beach wear around much of the world, creating its own billion dollar fashion industry. Although the very minimal bikinis worn on Brazilian beaches today have lost some inches of fabric since Réard designed it, his bikini will probably never go out of style. ■

The sun sets in front of our accommodations on one of Bikini Atoll's beautiful beaches

Text and photos by Barb Roy

X-RAY MAG's Barb Roy recently returned from a trip to Bikini Atoll. In contrast to the Bikini report by the expert Dutch expedition, Roy shares her perspectives as a recreational diver and wreck junky on the history and culture of Bikini Atoll.

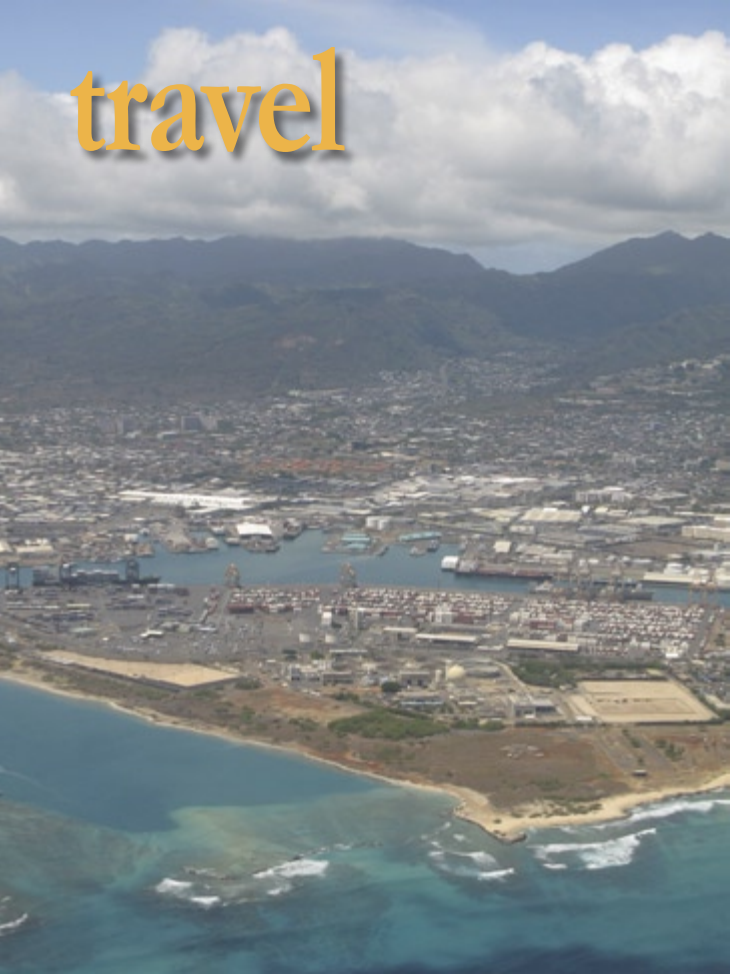
I too would have to agree, the journey to Bikini Atoll as a whole was a memorable experience. Similar to the Dutch expedition, I traveled with a group of technical divers to dive into history and see first hand the destruction of earlier nuclear weapons testing. None in our group claim to be hard core divers, we just enjoy what we do and spend most of our money on deep diving gear, Trimix fills and wreck expeditions. In this group, aside from myself, one is a lawyer, two are engineers at Boeing, one is a carpenter and one owns a dive shop. In one way or another all six of us are wreck junkies, and this far away place seemed to serve as a stimulating caress for our addiction.



*Wreck Junkies
Touching history...*

Journey to Bikini Atoll





Mainly we wanted to get a sense of what the wrecks in Bikini once looked like before they were sent to the bottom of the ocean in 1946, and the *USS Missouri* did just that.

Mess Hall (food preparation and eating area), the Medical facility and Engineering Departments. We were all in awe of the Combat Engagement Center where the

USS Missouri

The vessel is moored next to the *USS Arizona Memorial*, another battleship which was sunk during the Japanese attack on Pearl Harbor in December of 1941. This unforgettable time sparked the United States entry into World War II. Over 1000 sailors and marines lost their lives within the *Arizona* when it went down. But it was the *USS Missouri*, now sitting next to the *Arizona* that hosted the end of WWII when Japan surrendered on 2 September 1945.

The ship's tour included a chance to see where the crew was housed, their



Oahu, Hawaii was our first stopover. Divers traveling this route might want to stay longer in Oahu for diving and other activities like group rowing in an outrigger or a kayak trip to a bird sanctuary



Harpoon Missile System functions were and how they operated, especially the control operations for the 32 armored tomahawk missile launchers. The four 20mm Phalanx CIWS Gatling-style guns and the thick walled hatch into the ships' Steering Room (reinforced to protect navigational operations) were equally impressive.

"The tour of the *USS Missouri* was a real high point for me," said Rob Wilson, a Boeing Aircraft Maintenance Technician, working in the military division, and diver



A WWII Corsair plane ran out of gas just short of the airfield and has become a great dive in Oahu





for over 30 years. "Seeing Pearl Harbor, especially the *Arizona* Memorial, and standing on the *Missouri's* deck where WWII ended when Japan surrendered to General Douglas MacArthur really set the tone for the whole Bikini trip for me."

The *USS Missouri* was the last battleship built by the United States as part of an elite group of fearsome ships constructed during naval warfare. Extensive upgrades were made on several occasions throughout the *Missouri's* colorful deployments, the last being Desert Storm in 1991 where 28 tomahawks were launched against Iraqi forces. Today the "Mighty Mo" serves as a floating museum and memorial in Pearl Harbor open for daily guided and self-guided tours.

USS Bowfin

Another piece of history worthy of a visit while in Pearl Harbor is the *USS Bowfin* (SS-287), a Balao class submarine and a survivor of WWII. In 1942, the *USS Bowfin* was launched, and completed nine war patrols before being decommissioned and opened to the public in 1981 for tours as part of a museum display in the

USS Bowfin Submarine Museum & Park. The sub is 312-feet (95 meters) in length and during its day boasted a speed of 20 knots when at the surface. Waterfront Memorial is also located in the park in honor of the 53 American submarines and over 3,500 submariners lost during WWII.

USS Apogon

Similar to the *Bowfin* is the 312-foot *USS Apogon* (SS-308), another Balao class diesel-electric submarine resting on the ocean floor as part of the Bikini Lagoon wreck dives. I found myself looking at the *Bowfin* imagining what it might be like standing next to the *Apogon* underwater.

Majuro

Before long, we were on our Continental Micronesia air flight to Majuro, the capital of the Republic of the Marshall Islands in Micronesia. The atoll itself covers an area of 3.75 square miles (9.9 km) and is located in the Central Pacific, about 2,200 miles west of Oahu (five-hour flight) and about 2,600 miles east of Tokyo, Japan. U.S. currency is accepted and

Guided Tours of the *Missouri* are offered daily by retired military veterans and volunteers who lend their personal experiences during wartime encounters to share the *Missouri's* legacy. The ship is open daily from 9 AM - 5 PM. Admission is \$8.00us for kids and \$16.00us for adults. www.ussmissouri.com, 1-877-MIGHTYMO. Visitors can drive or take a city bus to the *USS Bowfin* Submarine Museum where they would catch a shuttle bus to the *USS Missouri* or the *USS Arizona* Memorial.

THIS PAGE: Pearl Harbor gives divers a glimpse of Bikini wrecks



Majuro, our second stop in the journey, offers Bikini visitors several dive charter opportunities in warm clear water full of marine residents

Majuro Atoll

our Air Marshall Islands flight leaving for Bikini the next day, Paul Hangartner and I rented sit-on-top dive kayaks and went for a paddle to explore the shoreline within their calm lagoon. Now, Paul works for Boeing delivering new aircraft

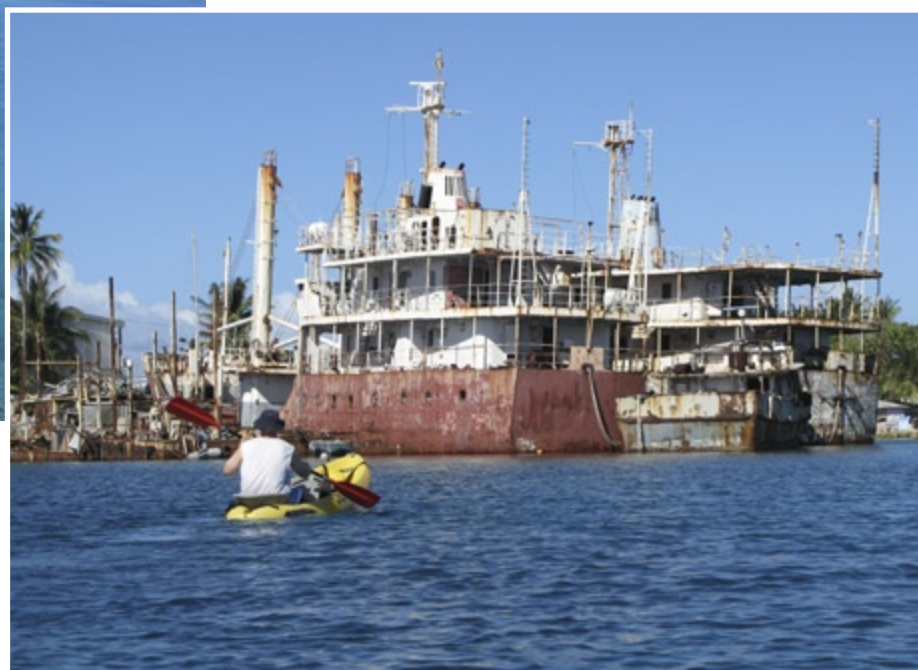
of twisted metal and other debris rotting in such a beautiful place. Coconut palms seemed to line the beach with a few sparse cabins and clothes lines full of laundry in-between. We even came upon several massive cargo ships looking as if they were ready to be hauled away for sinking as artificial reefs.

cies of soft and hard corals.

Some dive sites are as close as the Grumman F6F Hellcat plane resting in 115-foot (35 meters) of water just 1640 feet (500 meters) from our hotel's dock! This is the type of aircraft fighter brought into service by the US government to battle against the Japanese ZERO during WWII. In 1944, rumors have it the Hellcat had been pushed off an aircraft carrier deck. Now in silent solitude, the Hellcat sits with wings folded back in a pre-flight storage position, acting as home to hundreds of fish, sponges, corals and anemones.

A few miles from another nearby dock is a Grumman "Duck", inverted and reported to be in excellent condition! This and so many other great reefs, vertical walls and more wrecks make me want to return someday just to spend a few extra days checking out the turtles, sharks, rays, schools of red snapper and angel

Even though time did not permit dives while in Majuro, I did find several dive operations offering local charters around Majuro and the nearby Arno Atoll on the Internet. Over 20 different dive sites around Majuro were listed, with a booming population of over 1000 species of colorful fish and close to 250 spe-



the United States (US). Marshallese citizens do not need visas to go to the US to live and work, and the same goes for Americans coming to the Marshall Islands," said Niedenthal.

Majuro Atoll was the place we traded Honolulu's busy rush-hour traffic for deserted island roads where simple lifestyles prevailed and friendly

smiles were the norm. Not only does Majuro house the central government and most of the country's businesses, it has become quite the urban scene with several grocery supply stores, gift shops, hotels and a few good restaurants. All of which made our stay at the Marshall Island Resort (100 room hotel) even more enjoyable. Of course, the 82-84F (28C) degree air and water temperature didn't hurt!

To pass the time while we waited for

in their commercial division and is very technically minded, usually figuring out complex problems, even how to handle a kayak paddle. But sometimes his curiosity gets the best of him, this time when his boat floated too close to a group of young boys out for a swim. Within seconds the kids, maybe 6-8 year-olds ambushed him and climbed onboard for a ride! He wasn't sure what to do. It was great fun watching Paul's expressions as the munchkin invasion unfolded.

Once the kids grew tired of Paul, they returned to their swim, and we continued on our journey down the coast. It was sad to see huge heaps of rusted machinery and scores



Marshallese and English are spoken here. The Marshall Islands are made up of 1,225 islands and 29 atolls (islands of coral encircling a lagoon). Bikini Atoll is actually 2.3 square miles (6 km), and made up of 36 islands surrounding a huge lagoon.

According to Jack Niedenthal, Tourism Operations Manager for the Bikini Atoll Local Government, stationed in Majuro, the Marshalls are an independent country with a seat in the UN. "The Marshalls have a 'free association' relationship with




Bikini Atoll



In Bikini the place was clean, food was good and beaches were uncrowded



Video Clips



Check out three underwater video clips from the dive on Majuro Atoll by Barb Roy. Click on the image link to view online >>>

fish found residing on the dive sites around Majuro.

That night we sat around the dinner table in our hotel restaurant and enjoyed a nice bottle of wine with a good meal as we toasted the opportunity to dive upon such forgotten mementos of an arduous time in our history.

With only a 40 pound (18kg) limit on Air Marshall Island's small plane to Bikini, I was in everyone's good graces as I managed to get a waiver for our extra camera and video gear for our documentation work. Mark Theune, the lawyer and the one with the most extra luggage, even gave me some free helpful advice on how to subjugate a speeding ticket back home!

Bikini Atoll

Landing on the tiny atoll proved

exhilarating—kind of like landing on a postage stamp—yet it added to the trip's remote allure in a way.

Shortly thereafter, the group was transported by boat to Bikini and assigned accommodations. After meeting head divemaster, Jim Akroyd and his dive crew, we listened to a brief history about Bikini and 'Operation Crossroads' where two important atomic bomb tests were conducted—Able (above water) on 1 July 1946 and Baker (detonated from a depth of 90 feet/9 meters) on July 26 of the same year.

Jim also explained how the local Bikinian people had to be relocated to another atoll before the tests could take place. This relocation occurred three times before a suitable island was found to sustain enough food to support the popu-

lation. Original residents are still in ongoing negotiations for a suitable solution for their safe return to Bikini.

Unfortunately for observers watching these volatile experiments, little was known at the time about radiation fallout and its devastating after effects. Hundreds were affected with radiation poisoning, and the island of Bikini was almost wiped clean of life. The pressure wave was felt and measured as far away as Alaska! In all, between 1946 and 1954 the US conducted 67 nuclear tests in, above and around Bikini and Enewatak Atolls.

In 1995 Bikini Atoll was deemed safe by scientist from around the world and reopened to the public shortly thereafter. Island water and fruit consumption was the only

concern. In 1996, Jack Niedenthal helped to set up diving on Bikini, and thus dive tourism began through Bikini Atoll Divers.

Nowadays, it's hard to tell anything ever happened. Bikini looked like any tropical South Pacific island—full of palm trees and beautiful beaches surrounded by calm azure colored warm water—except the trees grew in multiple rows of straight lines, and the island was void of tourists. At least we didn't have to worry about getting mugged on our holiday or standing in long ice cream lines.

Diving

Once the dive briefing was over





A closer look at the wrecks revealed a surprising amount of marine life



everyone piled into our ride, an old military-style truck with a canvas covered open-air roof, and headed for the water!

As with the Dutch group, our first dive was on the *USS Saratoga* (CV-3), a Lexington class aircraft carrier, at 880 feet (268 meters) long and 106 feet (32.3 meters) wide. It was on this dive I also earned the respect of the dive crew with my sparse single-tank air consumption and relaxed nature. Actually, I knew that if I wore doubles, I would probably embarrass myself by 'turtling' or not being able to climb back out of the water. Thereafter, I was assigned to an HP 3500psi 119cubic-foot steel tank.

All of our dives were typically between 150 and 180 feet (46-55 meters) deep with long deco times spent after each

dive on their custom hanging deco-station with oxygen enriched air available at 30, 20 and 10 foot stops. As we hung at the station after each dive, one of the crew came around to collect the photographic and video equipment, soon resembling a mechanical lionfish when he was finished. I chose to keep my camera for possible shark shots, especially our friends circling the deco station!

Gen Akroyd, Jim's wife, on occasion shared her I-POD music with me, making deco time more bearable. Watching Paul try to entangle himself around everyone and Mark create bubble rings (like smoke rings), was also very entertaining. Nonetheless, I did enjoy wearing only four pounds of weight with my 5-4-3mm one-piece wetsuit and steel tank.

USS Saratoga

During our week long excursion, we were able to dive on the *Saratoga* several times, including one dive where we followed the anchor chain down the stern to find the TVF Avenger bomber aircraft resting on its anchor gear with the cockpit open. According to Jim, the plane was originally used for training.

Mark, a diver since 1970, was exceptionally thrilled with this dive, too, "I am a history buff, and the opportunity to have a personal connection with the past by being able to touch an artifact of history holds a special thrill for me. That is what has drawn me to wreck diving. For anyone who loves diving and is fascinated by history, few destinations can compete with Bikini Atoll. As is prob-



ABOVE: The conning tower of the *USS Apogon*. Hidden treasures of history can be found all over the wrecks, like the ships' compass (above right) or the gun Jim Akroyd found (inset right)

Bikini Atoll



ably true for most divers visiting Bikini, my favorite dives were those on the historic *USS Saratoga*. For years, the "Sara" was the only aircraft carrier within reach of divers. My most memorable dive on the *Saratoga* occurred the day our group set out to visit a plane resting in the sand at 180 feet just off the stern of the *Sara*. After photographing the plane, we ascended to the flight deck. Ordinarily, divers visiting the plane proceed to the ascent line that was permanently attached to the ship's bridge approximately midship. However, in 2006 the bridge of the *Saratoga* began to lean and become unstable forcing the removal of the ascent line. This left ascent lines at the stern and bow. Our group was one of the few to ever swim the entire length of the *Saratoga's* 880

foot flight deck to reach the ascent line at the bow. As I made that long swim, I recalled the early photographs I had seen showing biplanes landing and Charles Lindbergh strolling along this same storied flight deck. It was a dive that will stay with me forever!"

As we ascended up the side of the ship, Edward Madison, our Bikinian guide, pointed out a huge turtle. He managed to persuade it to stick around long enough for a few photos.

Edward later told us he commonly does 500 to 600 dives on these wrecks each year, and it was he and Fabio Amaral who first started diving on Bikini's wrecks in 1990. "When we have no customers," explains Edward, "I like to explore inside the wrecks. There is a huge rice cooker

inside the *Nagato*. We have found diving helmets and brought them and other things out on the deck for the divers who are not trained to go inside the wrecks.



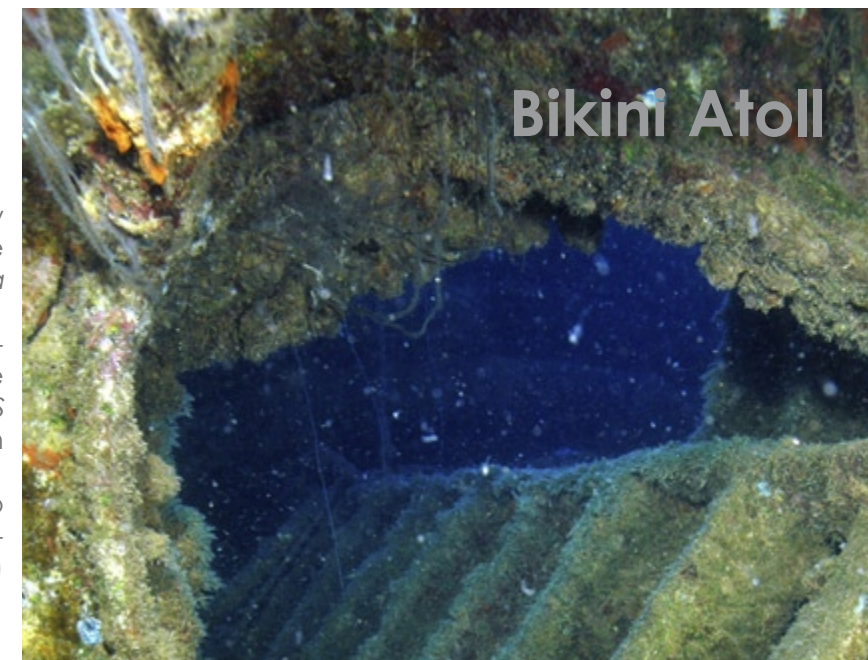
ABOVE: Ron Akeson shoots video of the upside down Nagato.



RIGHT: Narrow passage into the *USS Saratoga*

LEFT: Diver checking out the marine life on the *USS Apagon's* stern

Occasional Deco Station companion (below)



Bikini Atoll



Sometimes there are mantas, sharks, eagle rays and lots of turtles to see, too."

When I found out Edward had a big blue coconut crab as a pet, he agreed to bring it out for us to see and placed it on a coconut tree. This critter is like a wide lethargic Maine lobster, but lives on dry land. Actually, coconut crabs are the largest living arthropods in the world, with two giant claws for climbing trees and crushing coconuts!

Pete Rozen, our Finish Carpenter of the bunch, was wondering how they would taste for dinner. Edward assured us the meat is very good and sweet but the Bikini Government advises visitors not to eat anything growing or living on Bikini.

While walking back to the cabins I could just imagine a great fictional story – about a giant blue coconut crab, affected by Bikini's radiation, getting loose and wreaking havoc in the South Pacific! Perhaps I should stick to travel writing...

Macro magic

After shooting wide angle on most of the wrecks, I decided to use a 50mm macro lens on the upside down hull of the *USS Arkansas* and check out Bikini's smaller scenic wonders. It's really amazing how a photographer's sight changes after switching lenses!

The guys swore I was on another dive when they saw my images of giant anemones and a stunning variety of anemone-fish living amongst their undulating symbiotic hosts. One shot they did drool over were close-up images of the 3-inch fragmentation shells, still in their holding crate. Jim said their green appearance was caused by corrosion on their proximity fuse.

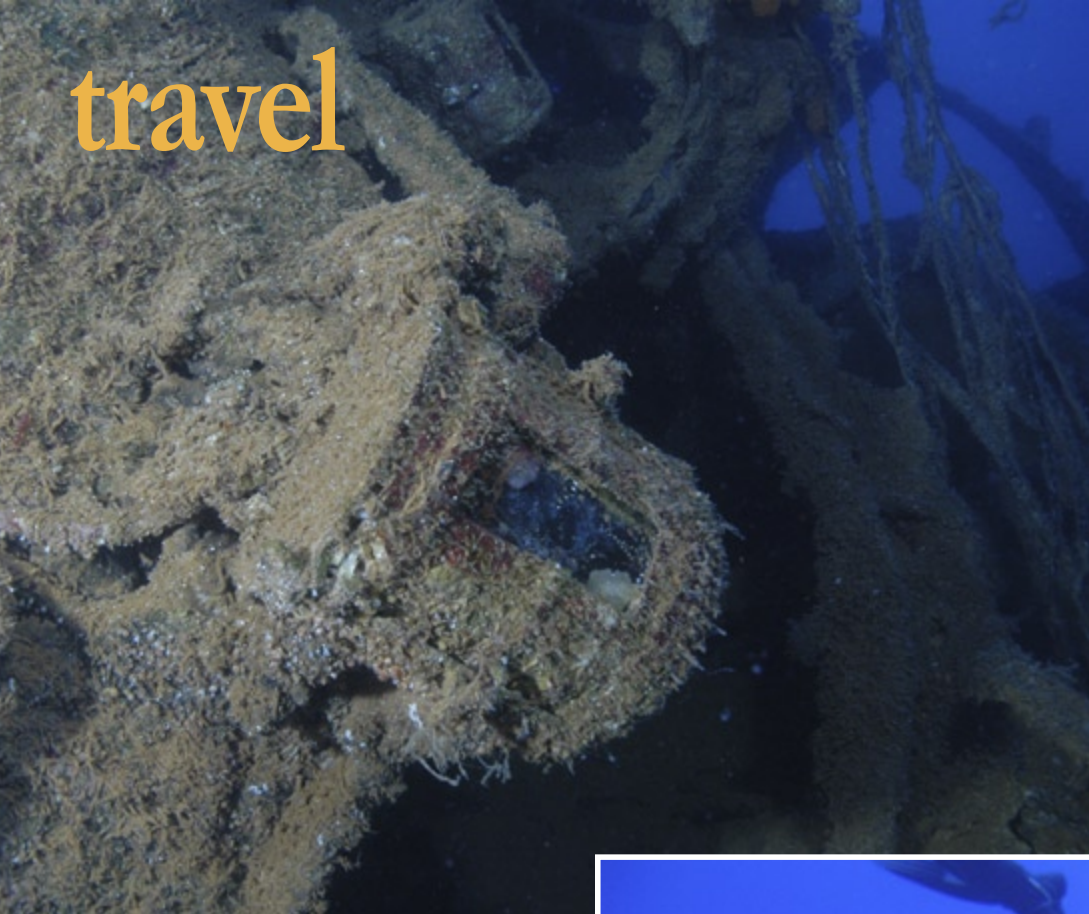
Penetration dives

On our last dives we were divided up and escorted into different areas of the *Saratoga*. I do enjoy entering wrecks,

but chose to explore the off-limits area of the Flight Tower with Edward. Since the unstable structure is expected to topple over anytime, I wanted to have some images for my archives of how the ship originally looked. As hesitant as I was, I must have looked like I was approaching a dinosaur. The *Saratoga's* many years of service both above and below water were taking a toll, yet the multitudes of fish still swarmed around the tall structure without a care.

Once finished, Edward pointed out giant clams on the deck, soft corals clinging to the Blast Gauge Tower (to hold equipment during bomb testing), and tiny fish hiding in and around the forward 5-inch guns.

After the dive however, I did hear from the others about their experiences. Ron Akeson, owner of Adventures Down Under in Bellingham, Washington said: "I looked forward with great excitement to



Silty running light on the Nagato (left), Life on the Saratoga's flight deck

jectiles. After a few more corridors, the barber shop, back through the admiral's quarters, we ended up at CIC again. It was an incredible dive!"

"During my Saratoga tour," comments Pete Rozen, "We entered through the elevator shaft, I believe on the third deck down, to find offices and small working rooms. We saw gas masks telephones, desks stairways. I would say we were about 130 or so deep. There was a



Bikini Atoll

our last dive, a penetration dive on the Saratoga. This was the culmination of our trip, and my favorite dive. Carefully I followed the divemaster down a narrow corridor, turned down another, and ended at the officer's mess. It was as if the explosion never happened. A large coffee pot was still sitting on the counter, and dishes were still in the racks on the wall with a few bottles scattered about. Overhead the incandescent light bulbs were still hanging from their sockets. We backed out and went further down the corridor to the officer's ward room. Here we found bunks where the officers slept and maybe wrote home to tell of their adventures. All too quick it was time to leave. This is a dive I will always remember and just a wetting of my appetite to return again one day."

"I went down the bomb elevator with Paul and made several turns," added Rob Wilson when describing his final dive. "That put us in the Combat Information



Center (CIC) where we found various radios, radar screens and other equipment. From there we moved to Admiral Halsey's cabin and office, then onto the officer's mess. China and other artifacts were all around. After that, we went outside of the ship and swam for a while then back in through a room storing gun pro-

lot of silt, and you had to really be careful not to kick it up down the long narrow hallways with low ceilings."

Bikini diving

The Bikini dive operation recommends visiting divers have at least 50 dives and full wreck and/or cave certification if penetration

is requested. Hydration is very important, but with the desalination of saltwater, electrolytes are removed from the water and must be re-added. Gator Aid is available for sale or divers can bring a mineral additive drink supplement. Diving season is March through November.

Unfortunately a decision was made by the local government to close diving at Bikini Atoll in 2008. "There are currently no immediate plans to re-open Bikini, mostly due to very unreliable air service in the Marshall Islands," said Niedenthal.

"The last word I got was that the 2010 season is highly doubt-

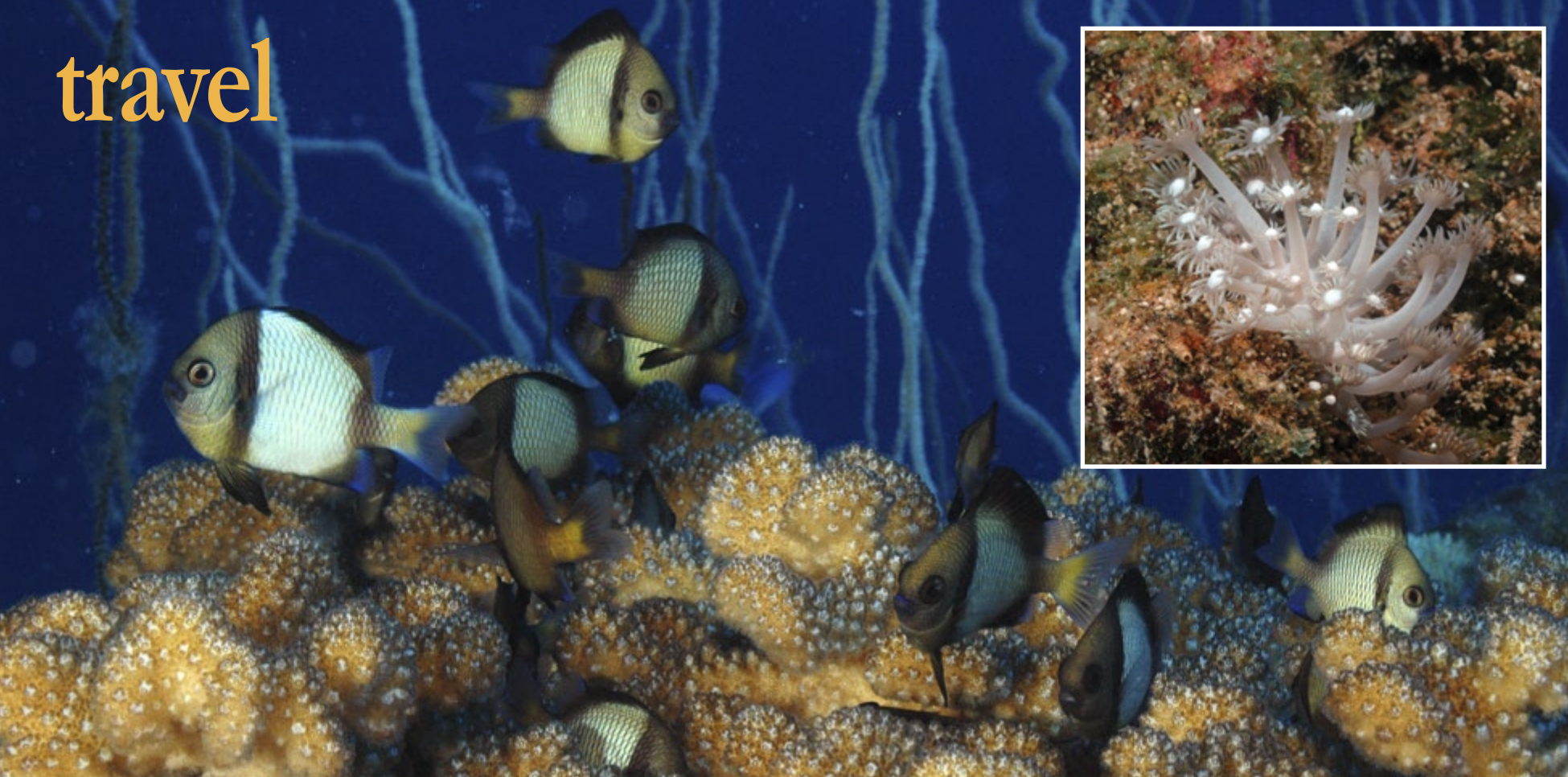


ful due to the economy in the States," added Jim Akroyd, who has worked on Bikini since November of 2003 and met

Gen, his wife while diving on the Saratoga.

Jim also kept track of his dives, "Believe it or not, I actually kept





THIS PAGE: Be sure to take a closer look at Bikini's wrecks for life when visiting. BELOW INSET: Historic artifact, a fan, recovered from the *Saratoga* by an original member of Operation Crossroads

a record of every dive I did on Bikini, and I can tell you that I did 2548 dives in total! 1103 on the *USS Saratoga*, 331 on the *HIJMS Nagato*, 379 on the *USS Lamson*, 133 on the *USS Anderson*, 156 dives on the *USS Arkansas*, 136 dives on the *USS Apogon*, 148 dives on the *USS Carlisle*, 16 dives on the *HIJMS Sakawa*, 28 dives on the *USS Pilotfish*, 19 dives on the *USS Gilliam*, 57 dives at Shark Pass and 42 reef dives."

"I liked the idea of being so far away from everything," commented Pete Rozen, a diver since 1996. "It was cool to be one of the last people to ever be able to dive here. I liked the education about the ships from Jim, the rooms were nice and the food was good. Just the idea of being out there all alone from the rest of the world was great."

Afterthoughts

Even after the trip was over and everyone returned home the Bikini experience lived on. Mark Theune informed me, "When I returned, I received a welcome home call from my good friend Michele

Westmorland. As an accomplished underwater photographer, she was anxious to hear about my Bikini dive experience. She was especially interested in my dives to the *Saratoga*. After describing to her some of the most incredible dives of my life, Michele told me she had a surprise for me. She told me that her dad, Dean Benoy, was in the Navy and was sent to Bikini for Operation Crossroads.

When she told her dad that she had a friend who was diving the Bikini wrecks, he told her about how the sailors working Operation Crossroads were given the opportunity to take small souvenirs from the ships before the ships were sent to the bottom.

He told Michele that he retrieved a wall fan from the *Saratoga* and still had it in storage. Mr. Benoy asked Michele to give the fan to me, knowing that I would take good care of it and give it a good home. The next time Michele came for a visit, she presented the fan to me along with a copy of a certificate her father received commemorating his service

in Operation Crossroads. My fan from the *USS Saratoga* is a relic of history I will always treasure. Thanks Mr. Benoy."

Many divers have just always wanted to go or wanted to feel the significance of seeing such historical monuments of our time, but I believe Rob Wilson expresses it best when he says, "It's one thing to read about history, but to actually reach out and touch it makes it so much more real."



Bikini Atoll



Dive British Columbia's Emerald Paradise

For more information on diving in British Columbia, Canada:
www.diveindustrybc.com



Dive Industry Association of British Columbia



silver



www.seacam.com

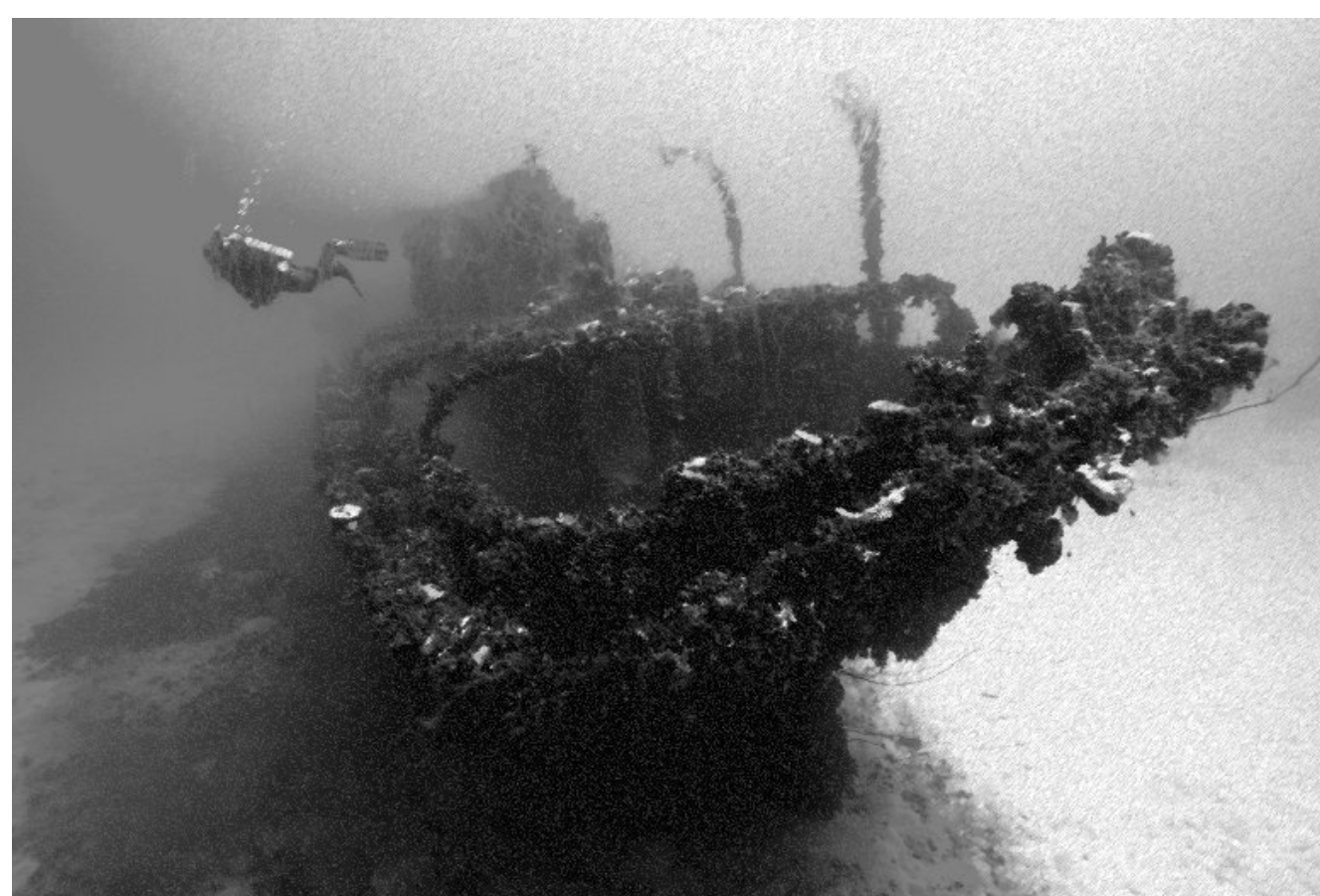




Kwajalein

Text and photos
by Thorsten Repp

Wrecks of the Pacific



THIS PAGE: Eerie scenes from some of the sixteen wrecks of Japanese cargo ships that can be found off the Kwajalein Atoll

PREVIOUS PAGE: Diver checks out the great propellor of the *Prinz Eugen* wreck. Just one of the blades is the size of a diver

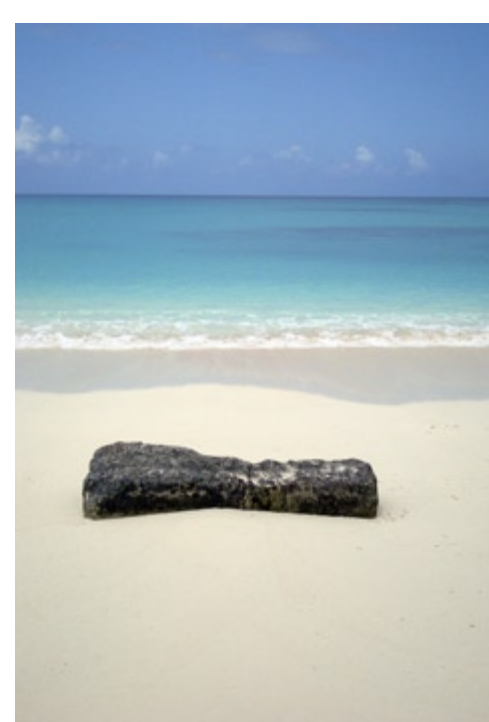


Almost invisible for wreck divers all over the world one of the biggest wreck dive spots in the South Pacific can be found among the Kwajalein Atoll in the Marshall Islands.

It was January 1943 when the heavy battle of Kwajalein took place during World War II on what was the outer ring of the Japanese force in the South Pacific at that time. The runways on the Atoll have been destroyed within a few days by the US troops and the following air raid sealed the fate of several big Japanese cargo ships which have been bombed to the seabed of the lagoon. Sixteen of these ships can be dived today. Overgrown by pale green organisms these big Japanese freighters form in the twilight of the depths the ghost fleet of the Kwajalein Atoll, one of the biggest World War II shipwreck graveyards in the South Pacific.

Several US aircraft wrecks are scattered around and many can be found on the northern tip of the atoll, Roi Namur. Right beside the





CLOCKWISE: Diver investigates remains of artillery and cargo on the *Prinz Eugen* wreck; Scenes from the white sandy beaches of Kwajalein Atoll; Diver peers into open deck chambers of the *Prinz Eugen* wreck

main Island rests a victim of “Operations Crossroads”, the nuclear bomb test series in the Bikini atoll 1946. It is the German cruiser *Prinz Eugen*, the biggest and most magnificent wreck in Kwajalein.

Prinz Eugen has become known for the fight alongside one of the famous battleships during World War II, the *Bismarck*, especially for its role in sinking the British *HMS Hood*. In 1946, the *Prinz Eugen* was brought to Kwajalein after the atomic bomb test series. Due to bad damage, the vessel leaked just before the crew reached the safe harbor of Kwajalein Island. The big ship filled with water, rolled to its starboard side and sunk upside down.

Today, the wreck rests in 20 to 40 meters of shallow water. The stern is partly out of the water and exposed to the continuous waves and sharp blowing wind from the sea, which can get very rough from time to time. One of the big copper props has been detached and relocated to Kiel in Germany where the ship was built in 1936.

Into the blue — diving the *Prinz Eugen*

Just a few meters below the surface, the massive body of the wreck is outlined in the shallow water. Only the stern with the huge propellers can be seen of the 213 meter long ship before the visibility lets the rest of the shipwreck vanish in blurry shades of blue.

A single blade of the propeller is as big as a diver. Behind it is the giant and intact hull. A swim between the stern and the sandy bottom leads to the top side of the ship where the smooth current from the ocean side can be felt.

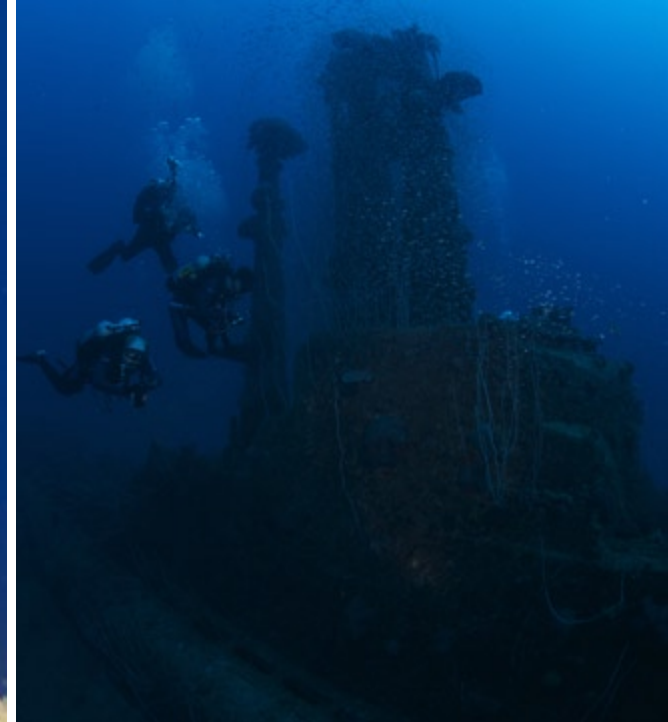
While moving deeper, a stroll alongside the vessel shows massive 8-inch battery guns. The canons are buried half in the sand.

The superstructure has collapsed due to the heavy weight of the ship itself. Everywhere, bigger parts of the ship are scattered in the sand. A huge obscure spherical object, the gun director sits right beside the ship. Torpedoes are sitting in their tubes, still as if ready to be shot.

Several doorways can be used to enter





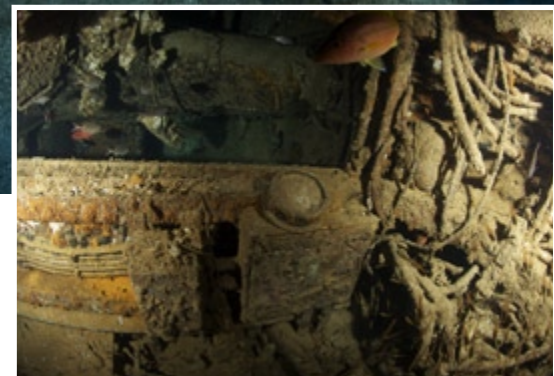


THIS PAGE: Gear wheels, relics and artifacts from the interior of the *Prinz Eugen* shipwreck. ABOVE: Divers swim past the rising towers of the wreck. PREVIOUS PAGE: A diver hovers over the wreck of the *Prinz Eugen*—divers find some torpedos still sit in their tubes

in years ago. Several sections of the wreck can be explored: galleys, storage rooms, bathrooms, generators, different types of shelves—more and more relics appear in the light of the torch. The officers rooms have chairs, tables and beds.

Everything is buried under several inches of rust. The long time under saltwater has had its impact. It's not unlikely to have to abort a penetration dive due to the fact that a ceiling of a deck has collapsed and bits and pieces prevent one from moving ahead.

Not far away from the *Prinz Eugen* are numerous Japanese freighters resting not much deeper than 60 meters in the lagoon. Some of them are sitting upright, some on their sides, and others upside down. The *AKIBASAN Maru*, *ASAKAZE Maru*, and *TATEYAMA Maru*, just to name a few, sunk very close to each other. These cargo ships are fairly intact but have been cannibalized over the years. Therefore, the smaller parts are gone, but bigger items, like ammunition, shells and spare props, can still be found on and inside the wrecks. Gauges are still mounted in the engine



the inside of the wreck. A dive into these openings leads through rusty red alleys. These old walls

move slowly and statically back and forth driven by the current. It is a strange

ghostly scene.

Navigation demands concentration due to the fact that the wreck is lying upside down. Beds are mounted to the "ceiling". Divers can penetrate deeper into the wreck while moving along white ropes that were brought





THIS PAGE: Scenes from the Japanese ship wrecks easily identified by their small ladders on the bow typical for their day



Divers check out relics and artillery shells left over from days gone by



PREVIOUS PAGE: Divers explore cannons on the decks of some of the wrecks of the Japanese built ships, some cannons are still pointing upwards towards would-be attackers



rooms. The huge cargo holds are almost completely empty.

Barracudas circle the wrecks frequently. Corals and sponges cover the wrecks, and swarms of smaller fishes often pass by. These wrecks lurk in the gloomy water, and the greenish color from the growth covering them makes them look like ghost ships.

The coral encrusted masts are interesting objects to observe during the ascent and descent. The anchor windlass and the canons, with their small ladders on the bow, are typical for the days when these ships were manufactured and make it easy to identify a ship as Japanese built.

Some canons are still pointing upwards towards the surface where the attackers were coming from. A number of these cannons are dismantled but some are fairly complete.

Inside, the ship's big gearwheels and iron plates are piled on top of each other. The huge engines ringed with the cat walks and small ladders are

usually easy to access.

Occasionally, a mast lays across the big openings of the cargo holes. The strange looking airscoops nearby the superstructure remind one of big tubas. There is so much historic material in the water that it is hard to decide what to explore next.





THIS PAGE: Scenes from downed planes, discarded US aircraft submerged in the waters around Kwajalein including B-52 bombers and transport aircraft, even remnants of a military truck can be found

Downed planes

Leaving the main bay and traveling up north to Roi Namur one can find many discarded US aircrafts that have been dumped in the water here; B-25 bombers, C-46 transport aircrafts and F-4 Corsairs can be found only a few meters below the surface.

Colorful fishes circle the aluminum bodies of the wrecks, which are resting on white sand surrounded by nice corals and

sponges. From a certain angle the sunlight is reflected by the lines of rivets. Some planes are still in good shape while others have been completely dismantled.

A truck right beside an upright C-46 on white sand makes a strange scene of an artificial underwater airfield.

A variety of interesting wrecks can be found in the waters of Kwajalein, but unfortunately, the atoll is a military off limits area; therefore, basically no tourism exists, and only one abandoned hotel is located on the island. It is truly a challenge to get there, but it's worth all the effort as soon as the first wreck comes into view. ■

fact file



Marshall Islands



SOURCES: YANN SAINT YVES, MICHAEL AW, US CIA WORLD FACT BOOK, SCUBADOC.COM

History After almost four decades under US administration as the easternmost part of the UN Trust Territory of the Pacific Islands, the Marshall Islands attained independence in 1986 under a Compact of Free Association. Compensation claims continue as a result of US nuclear testing on some of the atolls between 1947 and 1962. The Marshall Islands hosts the US Army Kwajalein Atoll (USAKA) Reagan Missile Test Site, a key installation in the US missile defense network. Government: constitutional government in free association with the US; the Compact of Free Association entered into force 21 October

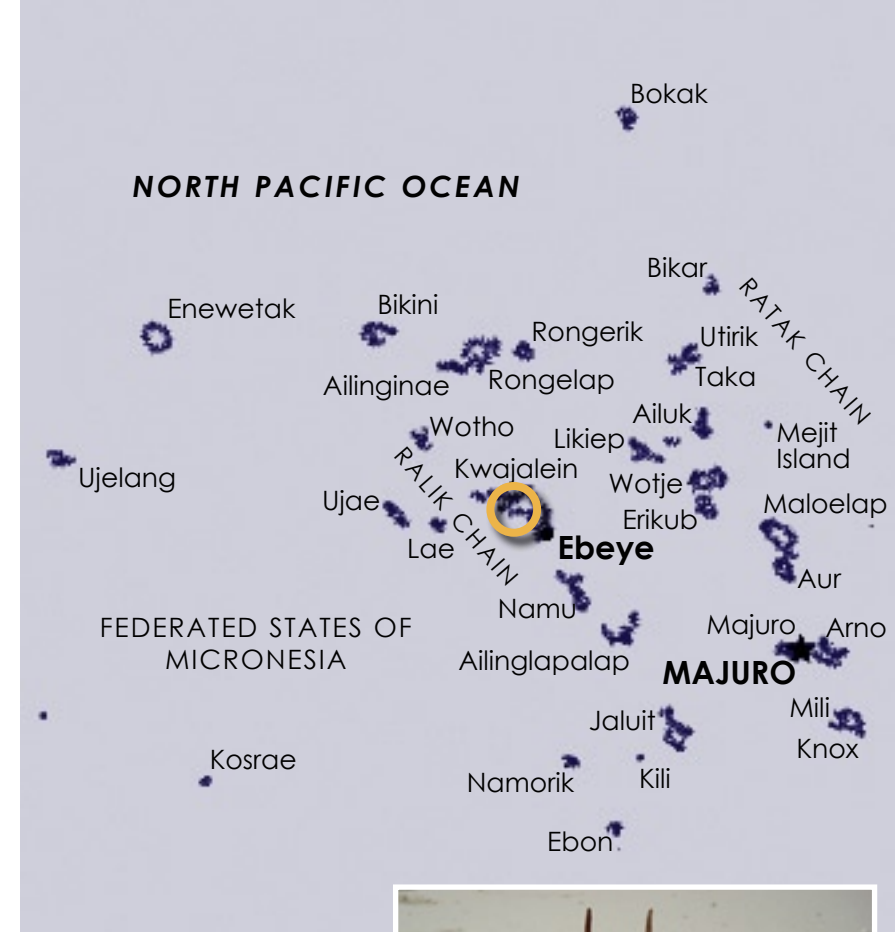
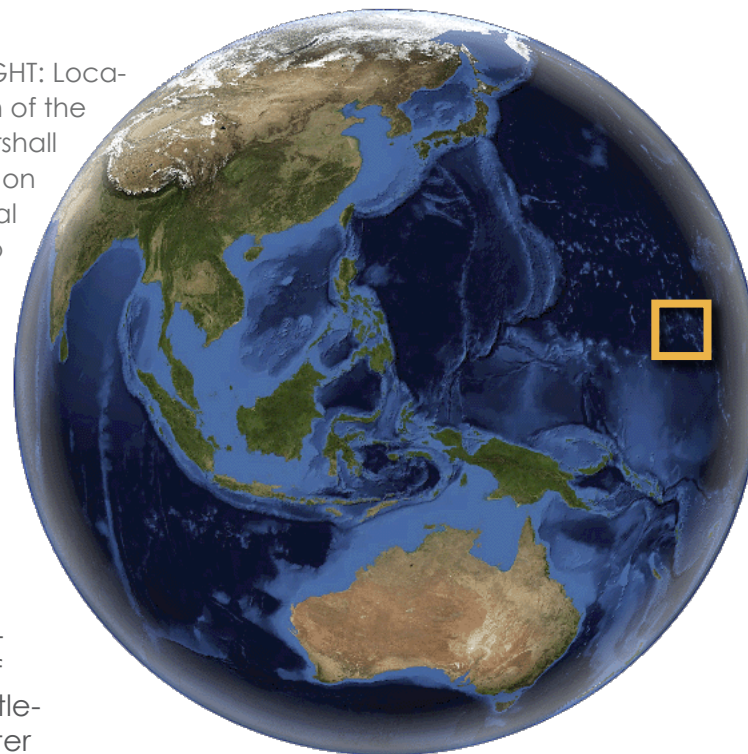
1986 and the Amended Compact entered into force in May 2004. Capital: Majuro.

Geography Oceania, two archipelagic island chains of 29 atolls, each made up of many small islets, and five single islands in the North Pacific Ocean, about half way between Hawaii and Australia. Coastline: 370.4 km. Terrain: low coral limestone and sand islands. Lowest point: Pacific Ocean 0 m. Highest point: unnamed location on Likiep 10 m. Note: the islands of Bikini and Enewetak are former US nuclear test sites; Kwajalein atoll, famous as a World War II battleground,

surrounds the world's largest lagoon and is used as a US missile test range; the island city of Ebeye is the second largest settlement in the Marshall Islands, after the capital of Majuro, and one of the most densely populated locations in the Pacific

Economy US Government assistance is the mainstay of this tiny island economy. The Marshall Islands received more than \$1 billion in aid from the US from 1986-2002. Agricultural production, primarily subsistence, is concentrated on small farms; the most important commercial crops are coconuts and breadfruit. Small-scale industry is limited to handicrafts, tuna processing, and copra. The tourist industry, now a small source of foreign exchange employing less than 10% of the labor force, remains the best hope for future added income. The islands have few natural resources, and imports far exceed exports. Under the terms of the Amended Compact of Free Association, the US will provide millions of dollars per year to the Marshall Islands (RMI) through 2023, at which time a Trust Fund made up of US and RMI contributions will begin perpetual annual payouts. Government downsizing, drought, a drop in construction, the decline in tourism, and less

RIGHT: Location of the Marshall Islands on global map
FAR RIGHT: Location of Kwajalein Atoll on map of Marshall Islands



income from the renewal of fishing vessel licenses have held GDP growth to an average of 1% over the past decade. Agriculture: coconuts, tomatoes, melons, taro, breadfruit, fruits; pigs, chickens. Industry: copra, tuna processing, tourism, craft items (from seashells, wood, and pearls).

Climate tropical; hot and humid; wet season May to November; islands border typhoon belt. Natural hazards: infrequent typhoons.

Environmental issues inadequate supplies of potable water; pollution of Majuro lagoon from household waste and discharges from fishing vessels. Agreements: party to: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Hazardous Wastes, Law of the Sea, Ozone Layer Protection, Ship Pollution, Wetlands, Whaling.

Currency 20.5 Maldivian rupies (MVR)= 1€ (2008), but many resorts show prices in US dollars and in Euro.

Population 63,174 (July 2008 est.) Ethnic groups: Marshallese 92.1%, mixed Marshallese 5.9%, other 2% (2006). Religions: Protestant 54.8%, Assembly of God 25.8%, Roman Catholic 8.4%, Bukot nan Jesus 2.8%, Mormon 2.1%, other Christian 3.6%, other 1%, none 1.5% (1999 census). Internet users: 2,200 (2006)

Language Marshallese (official) 98.2%, other languages 1.8% (1999 census) note: English (official), widely spoken as a second language.

Links Marshall Islands Visitors Authority www.visitmarshallislands.com

Embassy of the Marshall Islands www.rmiembassyus.org



White beaches of Kwajalein Atoll

Some of the local wildlife



Yoga & Diving

Perfect Harmony

Text by Cindy Ross
GirlDiver.com

A place without distraction, a place without time. The place one can find solace and retreat from a busied world above, where the problems of your day seem to meld with the water and are left at the shoreline.

Our ability to dive comfortably is directly related to our core strength, balance, focus and determination. To improve our abilities in the water, we were told "the only way to get in shape for diving, is to dive". However, many in the dive community are now exploring the benefits of the ancient practice of yoga, through training both the body and the mind for better fitness in our sport.

When we dive, we are in our elemental nature, and it's incredibly easy to forget how powerful those elements are. When you're moving in the surge or current, you become one with the water, relaxing and allowing the water to use its strength to move you along. It's our respect for the

waters force which allows us to freely move within its realm.

Scuba is often seen as simply a sport, and yoga as mere exercise. But both are truly ways of living that allow the practitioners a more complete and full life, through venturing into another place. With scuba we are able to fully appreciate the primordial force of the ocean. Yoga practice heightens your awareness of what you are experiencing in your body, so the awareness of your place in the underwater environment becomes clearer. The stillness of yoga allows you to let go and be more focused on simply "being" in the water.

Diving is known to be good exercise, however, not perfect, as it is not completely symmetrical. Diving concentrates on the legs and shoulders and leaves other areas untouched, so to pair it with a form of exercise that puts emphasis on stretching and core strength ensures complete activity for your entire body.

"Yoga can help female scuba divers keep their neck and shoul-

der girdle aligned and flexible since this is typically a weaker area in women," said Arielle Thomas Newman of Yoga By the Sea Vacations in Playa del Carmen, Mexico.

Because yoga includes stretching throughout, the flexibility in every part of your body is improved. This helps you move with more freedom, balance and comfort, which becomes obvious both in walking to the shore with heavy equipment and moving effortlessly beneath the waves.

As in scuba diving, proper breathing patterns are important in yoga. You reach maximum performance in any endeavor when your lungs are intaking the proper amount of oxygen combined with the proper positioning of the body. Yoga benefits, such as easing tension on the back and shoulders area of the body, will give you the strength and posture that can increase your form in the water as you master buoyancy like never before.

"If divers practice no other yoga besides controlled, rhythmic

breathing, they are doing themselves a tremendous favor by learning how to use breath as a tool to stay calm and collected underwater. The number one rule in diving is keep breathing and breath is the key component to a physical yoga practice. There's a very symbiotic relationship there," says Kimberlee Stedl, author of *Dive Yoga*, the first book printed on the subject.

"For women, I would say that the strengthening poses in yoga are most beneficial to build muscular strength and endurance, and that the breathing and visualization techniques are useful to maintain focus and control while diving," she said.

Beginning divers often find their buoyancy skills difficult when comparing them to the buoyancy of scuba pros. However, with a little more practice, you can gain more knowledge about reaching your body's equilibrium but this may take time. Some may learn to dive competently in only a few days but some may take several weeks or months with a very long



learning curve. With the help of yoga, meditation and breathing exercises can make you become a more patient student diver. The extended patience that you gain from practicing yoga can also be helpful while waiting for those safety stops and long surface intervals.

Kimberlee came into scuba as a yoga instructor already, so didn't have a chance to personally see the effect "before and after" yoga had on her diving. Her husband, Todd, however, was a diver first, yoga participant second.

Todd noticed three main areas where yoga positively influenced his diving. He achieved better breath control and breath pace underwater by becoming

more stabilized in breathing. He found using just subtle contractions in the core region (namely the obliques) he was able to right himself and maneuver easily resulting in better neutral buoyancy. The serenity of underwater was also more noticeable. Todd noticed the difference in his diving within a few weeks of beginning his own regular yoga practice.

The time we spend beneath the surface allows us to remember where we came from, our intrinsic connection with water. Yoga practice allows us to strengthen our mind, body and spirit so our moments in the our water world are more vibrant and surreal. ■

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POINT & CLICK
ON BOLD LINKS

Equipment *epic*



Edited by
Arnold Weisz



Scubapro Seawing Nova

This fin offers a so-called clean water blade geometry for optimal propulsion, variable pivot control ribs, ergonomic foot pocket with extended heel plate, heavy duty marine grade bungee strap system, durable monoprene construction. Scubapro also issues this product with a limited lifetime warranty including the strap. It is available in these sizes: S/6-8, M/8-10, L/9-12, XL/11-13. Black is the only color. www.scubapro.com



Scoot along

The Aqua Ranger offers speed and performance with an aggressive new look in a portable and affordable recreational underwater propulsion unit. The Aqua Ranger is rated to go 30ft (10m) deep and has a top speed of up to 2mph (3.2km/h), which allows for cruising below the surface at a nice pace. The Aqua Ranger is suitable for kids eight and up and adults in the ocean, lakes and swimming pools. It is strategically positioned between the already available Seascooter™ Dolphin and the Seascooter™ PRO. www.seadooseascooter.com



Diverite EXP wings

The EXP line of wings from Florida-based Diverite allows divers to improve their dive technique with custom options on each wing. All EXP wings are donut-style. They include one multi-functional design that allows for smooth transition from singles to double tanks. Two of the new wings sport a unique bladder that can be adapted to become a dual bladder wing and three of the wings include tie-down options to change the amount of lift depending on the planned dive. www.diverite.com

OC1

The Oceanic OC1 is a titanium-housed all-in-one dive computer featuring a precision digital compass, digital watch, wireless Buddy Pressure Check and a wealth of other features. The dot matrix display, which comes with SmartGlo backlighting, provides superior readability and intuitive user interface. Switch between up to three independent wireless transmitters, tracking three Nitrox mixes or a buddy's tank pressure. www.oceanicworldwide.com



iPouch

Neither water nor sand or hand covered in suntan lotion at the beach will now endanger the life of your personal cell phone.

Handy & Safe pouches are absolutely waterproof. Should your boat capsize, your phone will swim on the surface, ready for that life saving call. www.ewa-marine.de



equipment



Reflecting

The Custom Divers Seeker is a traditional D-SMB that contains a conductive material shaped to receive and send back radar signals

"It can be quite a scary thought (when you are sitting beneath a Delayed Surface Marker Buoy decompressing) wondering if the boat has seen you, or if you are adrift on your lonesome," explained Alex Vassallo, Custom Divers CEO. "I wanted to be assured that the boat had seen my D-SMB, so the solution was to make it radar detectable. It sounds simple, but the Seeker took over three years of research, development and testing until we were truly satisfied that we had a full patent pending product that will revolutionise diver safety."

www.customdivers.com



SeacSub 2000 SWS

Chosen by law enforcement and specialized groups, the quintessence of the SEAC line continues to be improved upon, remaining the jacket preferred by the demanding divers and professionals thanks to its numerous technical characteristics, its buoyancy force, and its distribution of volumes. www.seacsub.com



SLX 800t Technical Dive Light

Nocturnal Lights has released the SLX 800t Technical Dive light. The SLX 800t produces 800 lumens, and it has an eight-hour burn time. The new SLX has an internally adjustable diffuser that allows you to switch from spot to flood in seconds, and you can mix and match each diffuser to get your preferred beam pattern. Its double o-ring design and sliding switch make it nearly impossible to flood according to Nocturnal Lights. SLX 800t also doubles as a focus light and video light.

www.nocturnallights.com



Seasoft TX3 Dry suit

This is a 3mm Superstretch™ dry suit that is designed for all temperatures. For temperatures ranging between 65 and 80°F (18 and 27°C) the suit requires no undergarment. It comes with heat reflecting silver neck and wrist seals. For water temperatures of 50 to 65°F (10 to 18°C), you will need undergarment or layers to stay comfortable. With a lightweight Ti Zip zipper from

Germany.

www.seasoftscuba.com



turtle tales



Edited by
Peter Symes

Leatherback Expedition

— *a report from S.O.L.O.*

Text and photos
by Rufus Isaacs





PREVIOUS PAGE: Almost hatched
LEFT: Baby leatherback; Foraging
leatherback off Oregon, US (inset);
Leatherback Rock (bottom)

Leatherback butchered
for its skin (right);
Leatherback came
ashore to die (lower right)

boat.
Enroute to the Leatherback nesting beaches, divers have an opportunity to see some WWII planes, ships and ammunition in waters of 70 feet or less. Snorkelers and beach explorers have other neat experiences available to them as non-divers. Time at the Leatherback beaches takes about two days and one night in order to gain a meaningful experience with

The locals
I had been curious for some time as to how accurate the Papuan men are with their bows and arrows, as the bows are bent bamboo, the bow string is of bamboo, and the arrows are often crooked with no feathers or a notch to fit the bow string. I challenged the village men to shoot at a 3 x 5 inch target placed at 15 meters (about 45 feet). ALL hit that small target.



S.O.L.O. 2008 Expeditions
a terrific success —Papua Barat,
Indonesia, 20 March 2009

Save Our Leatherbacks Operation (SOLO) completed its fourth year of expeditions to the Leatherback turtle nesting beaches located in very remote Papua Barat, Indonesia. Each summer between May and October, between two and four expeditions are conducted for the direct benefit of both scuba divers and others who are keen to see, film and touch this living dinosaur from the past.

The Leatherback sea turtle is in its exact form as it existed about 150 million years ago. When the ice age froze out the huge

creatures, this Leatherback went into the sea and survived. An Expedition participant has a very rare opportunity to actually interact with an existing real life dinosaur from the Jurassic period while they still exist.

Humanity's increasing and wanton destruction of our seas is causing a spiral into extinction of this, the largest sea turtle and reptile on Earth.

In 2008, as in past years, we held two expeditions of 14 people each between July 14 and August 6. Each sortie lasted 11 days and 10 nights. The expeditions go first to the Leatherback nesting beaches to the East of Sorong, the port of embarkation on a quality live aboard



these giant Leatherback females as they come from the sea in the dark of night to nest. Males never appear unless injured.

Day periods at the beach include an opportunity to interact with residents of two remote villages where our research staffs reside and witnessing of an almost forgotten "Leatherback Calling Ceremony" by villagers in tribal costume, complete with bamboo bows and arrows to call the Leatherback females to the beach that night (so far, works every time).

(except me) The village chief drilled the center of the target. WHEW! Don't get THESE Papuans angry!

The nights on this 18 km long beach are the most exciting part of the three-phase trip. We go to the beach after a fine dinner on the boat, at about 9 p.m. All dress well to protect from being gnawed on by the always present "No See Em's", but at times even a 100 percent bath in Deet does not repel them.

We go ashore at Leatherback Rock, usually in calm surf, to be met by the villagers who become our guides in search of the Leatherbacks. Their eyes see a lot more than ours, and they have local knowledge of the



Leatherback habits. We have them equipped with hand held radios.

We all make a comfortable sand dune seat or bed and marvel at the stars, which are so bright in the no pollution air, we can almost grab one. Last trip, I counted 25 shooting stars and one decaying satellite on a burn back into our atmosphere.

After a brief wait, hooded lights begin to flash up and down the beach as our native staff locates a

female crawling from the sea to find the spot where she was hatched to dig her nest and lay clutches of up to 100 eggs.

We scramble to the location in small groups so as not to 'spook' the Leatherback and wait to approach her until she is digging the nest hole and begins to drop her eggs.

The process requires from 1 to 1.5 hours, so there is plenty of time for photos and examining the

Text and photos
by Larry McKenna





CLOCKWISE: Adult female leatherback; Dropping her eggs; McKenna with locals in traditional dress; Turtle calling ceremony; Equatorial sunrise; Tony Raja's leatherback

entire hatching event. Many sit beside her and stroke the soft, velvet-like skin that protects her massive rib cage and lungs and marvel at the huge size of this Leatherback.

The Leatherback has been instrumented to dive lower than 3,000 feet in search of giant jellyfish. This is the only sea turtle that does not have a shell.

As many times I have seen this process, I never fail to get "goose bumps" at the

experience. Eggs laid, sand repacked over the four-foot deep nest, she, with lots of effort, climbs out of the wide and deep hole she made and makes her way back into the sea. When a Leatherback comes to nest, she often returns in the same season to nest between four and five times, which can mean that one Leatherback can lay up to 500 eggs in a season.

Once the Leatherbacks begin to

emerge from the sea, the time can speed by quickly with the intensity of running up and down the beach, filming, watching, etc. So, a glance at a watch surprises most when dawn is near. A Pacific sunrise on a remote beach can be a vision never to forget.

We return to the boat, shower and get cleaned up, have breakfast and return to the beach after sunrise to participate in actual nest research with the Papuan staff. On some trips, the research is also accomplished at night. We examine the nests that have hatched to determine how many eggs hatched and did not. Often, we locate and release babies that are caught deep in the sand and would not live unless brought to the surface.

Helping the species

Our motivation is to stop the extinction spiral. To place more hatchlings into the sea is a prime directive of our foundation. Our staffs have this purpose to accomplish each day and night as they locate and mark egg nests. Our ongoing results this year come from doing exactly that and more (relocating nests from global warming areas of egg destruction). The apparent results of the 2008 nesting data is cause for proclaiming a terrific success.

Success

We are achieving one of our foundation objectives by increasing the numbers of babies put out to the sea to live, to

grow and return to nest at a later time. In one nest at night, expeditioners assisted 16 hatchlings to the surf, which would not have lived without human intervention. During the following morning, nest researchers were able to locate and release more trapped babies. All who participated remain excited. So far, in this season, our staff have located and released over 600 hatchlings from deep in nests (this effort has NOT been accomplished or catalogued previously on these very remote beaches).

Our relocated nests are producing approximately an 85 percent success rate of eggs that hatch, which would have otherwise drowned or cooked deep in the nests. At season close (end October), we anticipate a summary of very encouraging results. Yessss, we ARE excited! Our volunteer science panel of PhD Marine Biologists is reviewing the data for a later release to the public.

At mid-morning, we board the ship and head west into the Raja Ampat Islands to dive out the remaining days of the expedition. We extended the venue of the dives to include Kawe and Waya, both West of the Ampats and on the Equator. Diving in this pristine region is perhaps the last great dive location left. In 2007 and 2008, the majority of dive and travel magazines and *National Geographic* have featured this area because of clear waters and amazing concentrations of marine life.



We continue to offer these expeditions in 2009. A cash deposit of US\$500 is required to reserve a bed before April 30. A few beds remain on both trips, but they will be filled quickly. Information on the 2009 expeditions can be requested by e-mail at: saveourleatherbacks@earthlink.net. If you want a combined experience of a life time, join us. Only about 300 have sat beside this living Jurassic era dinosaur in this very remote location. ■

LEATHERBACK FACTS

- Type: Reptile
- Genus species: *Dermochelys coriacea*
- Primary diet: Jellyfish
- Average life span: 45 years (est.)
- Size: Up to 7 feet (2 meters)
- Weight: Up to 2,000 pounds (900k)
- Fact: The largest leatherback ever found was 8.5 feet-long (2.6 meters) and weighed 2,020 pounds (916k).
- Protection status: Endangered
- Size relative to a 6-ft (2-m) man



Make a difference

Join the adventure and become an active part of the research team. Travel to exotic, seldom seen locations. Depending on when you decided to make the trip, you'll watch rare, nearly extinct, turtles lay eggs or watch the eggs hatch and the babies travel to the ocean.

Dive the legendary Raja Ampat islands aboard a large, comfortable, fully-equipped ship—a classic Indonesian Phinisi design with all the amenities a diver would hope for and more! The *MVS Raja Ampat* is the only premier liveaboard in Indonesian waters.

The expeditions can accommodate up to 12 divers per trip in six air-conditioned cabins with in-suite toilets and hot showers.

The boat has a very comfortable salon and is fully equipped with camera tables and multiple electric outlets.

Healthy buffet meals are served, and you will be hosted by excellent, experienced

divers and dive guides.

Dive clubs and dive groups can reserve a trip for their group and dive all together—12 people per trip.

- Trip 1: Jul 14 – 24 is sold out
- Trip 2: Jul 28 – Aug 7
- Trip 3: Aug 11 – 21

All trips are hosted by Larry McKenna, PhD, SOLO's founder who has made multiple trips to this area and is very familiar with the beaches, the dive spots and the locals. He is an accomplished author, photographer, filmmaker and diver. Assisting him will be SOLO volunteers who have also been to the beaches.

Best of the best of the best

Larry promises that divers will dive the "Best of the very Best" among the islands of Raja Ampat—now including Kawe,

straddling the equator!

The cost per person is US\$2,750* (maximum of 12 people per trip) and includes all boat costs except tips. This is a deep discount by the boat owners who are supporting the cause. A standard trip would cost over \$3,600.

International and local airfare is not included. These low expedition prices are only available through SOLO.

Expedition reservations are secured by a \$500 deposit on or before May 2009. Further details will be sent to those who reserve a

Leatherback pewter pin — one of the many gift items that can be purchased in SOLO's web-shot. All proceeds go to the cause



space. Tax exemption for US citizens

*Because you are participating in the work of this 501(c)(3) tax exempt Foundation, all expedition fees, airfare, hotels, and meals are 100 percent tax deductible. ■

Join Kurt Amsler

Don't miss out on a unique opportunity to travel with one of the very best underwater photographers on the planet. Kurt Amsler will join the third trip during which he will lead a special "On The Beach with Papuans" visit. The trip will be from August 10 or 12 for four days. The experience includes a truly unique "Tenting Experience" with the Leatherback Turtles and a walk in virgin jungles. Maximum group size is eight people. ■



Meet Indonesia's Youngest Leatherback Turtle Volunteer

Meet Justin Howard. He is an 11th grader at Ipeka International Christian School in west Jakarta, Indonesia's sprawling capital city.

Justin contacted SOLO over one year ago by surfing on his computer and found SOLO'S website. Frequently since then, Justin has peppered the staff with all manner of questions concerning the extinction crisis facing the Leatherback turtles. He has attempted to engage classmates in the information sharing and in extolling them to join him in spreading the awareness of the situation here in his own nation. He will succeed as time pushes forward. Justin has the firm support in his activities from a super keen family.

He is 16 and about to begin his senior year of high school. Justin's education at university will be in marine biology where he will join in global efforts to save our oceans. Justin can be e-mailed at: pandaren_73@hotmail.com ■

Join a 2009 expedition



KURT AMSLER

Scientists from WHOI and the U.S. Navy have found out that the skulls and shells of sea turtles have an amazing and unexpected resistance to underwater shock waves. With added research, that resistance could have human applications in the form of improved body armor design, said Darlene Ketten, a WHOI biologist.

The experiment first began more than five years ago in a test pond in Maryland, where the Navy gauged the safety of ship hulls by setting off explosions near test vessels. They tried to clear the area of marine mammals and sea turtles prior to detonation, but needed to determine how far the animals had to be from the blast to remain safe.

The skulls of the turtles include a broad shelf of bone that may reflect shock waves away from the brain. She likened it to the helmets worn by some World War I soldiers with a flange in back.

Ketten said sea turtles resemble and move like "underwater tanks," and she noted the extra protection around the skull might be nature's strategy to compensate for the fact that sea turtles can't contract their head into a shell like land turtles. ■

Turtle skulls are shock-resistant

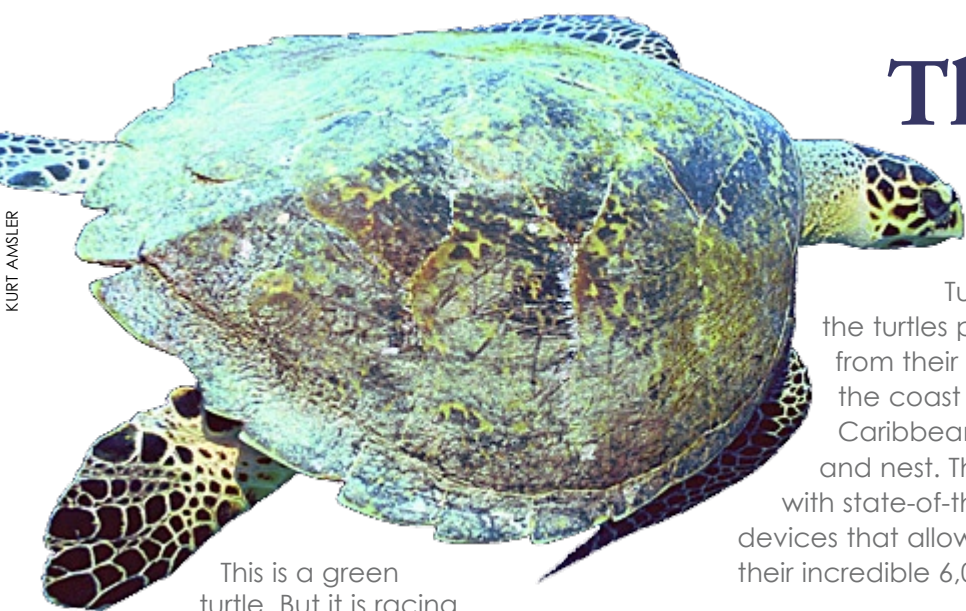
What started out as an experiment to protect sea turtles during underwater explosions may end up saving the lives of soldiers on land, scientists from Woods Hole Oceanographic Institution (WHOI) find.



DARLENE KETTEN, WOODS HOLE OCEANOGRAPHIC INSTITUTION COMPUTERIZED SCANNING AND IMAGING FACILITY

SOURCE: WOODS HOLE OCEANOGRAPHIC INSTITUTION

A three-dimensional reconstruction from CT scans of a Kemp's Ridley turtle



KURT AMSLER

This is a green turtle. But it is racing

The Great Turtle Race

Eleven leatherback sea turtles have set out on the Great Turtle Race, in which the turtles paddle 3,700 miles from their feeding grounds off the coast of Nova Scotia to the Caribbean—where they breed and nest. The turtles are tagged with state-of-the-art satellite tracking devices that allow researchers to follow their incredible 6,000-kilometer journey.

The data collected from the turtles during the migration will help scientists in their own race to save this endangered species from threats such as coastal development, fishery bycatch and egg harvesting.

Which turtle will reach the finish line first? Which will dive the deepest or go the farthest afield? Will they all make it to the end? Follow the turtles as they race across the Atlantic on **National Geographic's website** ■

GET CLOSER

WETPIXEL EXPEDITIONS 2009

BAHAMAS EXPEDITIONS

- Feb 07-14, 2009 Tiger Sharks and Great Hammerheads
- May 05-13, 2009 Oceanic White Tip Sharks
- May 16-24, 2009 Oceanic White Tip Sharks
- Jul 13-20, 2009 Sharks and Dolphins

More information: <http://wetpixel.com/links/bahamas>

OTHER EXPEDITIONS

- Mar 07-Mar 22, 2009 Sorong, Halmahera, Ambon, Indonesia
- Mar 25-Apr 09, 2009 Ambon and the Banda Sea, Indonesia
- Nov 24-Dec 06, 2009 Eastern Fields, Papua New Guinea
- Dec 08-Dec 19, 2009 Eastern Fields, Papua New Guinea

Contact Wetpixel for details: <http://wetpixel.com/contact>



Odyssey Marine

— Interview with Marine Archaeologist
Neil Cunningham Dobson

Text by Millis Keegan
Photos courtesy of
Odyssey Marine

Millis Keegan interviews Odyssey Marine Exploration's Principal Marine Archaeologist Neil Cunningham Dobson — April 2009

MK: What do you do? I ran into some confusion trying to set this interview up, so lets take a closer look at what you are trying to do. Obviously you are not treasure hunters, so what are you doing? What is your main reason to be out on the oceans, if it is not to find and salvage treasures?

NCD: I am the Principal Marine Archaeologist for Odyssey Marine Exploration. Odyssey has given me a unique opportunity. No other company or academic institution has the equipment and time to conduct archaeology the way Odyssey has the ability to do.

Odyssey is the world-leader in deep-ocean shipwreck exploration. We differentiate ourselves from salvage companies and treasure hunters because we conduct "best practice" archaeology on all the sites we work on. The term "treasure hunter" is negative within the deep-ocean world because it typically refers to a group or person who tears apart a shipwreck with no regard for the historic value, information or artifacts a shipwreck has to offer. They are simply interested in just getting to the treasure.

Conversely, salvage is the recovery of shipwrecks for money, and salvagers do not write reports or publish their findings, and given that we do do that, calling us salvagers would not be correct either.

Odyssey's business model is simple: there are billions of dollars worth of cargo and priceless artifacts lying on the ocean floor and the technology exists to locate and recover these treasures. We have the capabilities to conduct commercial marine archaeology where good business and sound archaeology can co-exist.

One common misconception people have about Odyssey is that we sell everything we recover, and this is not true. Artifacts that we recover that are deemed culturally or historically significant, are kept in Odyssey's permanent collection for study, education, and research by museums, cultural institutions or other qualified academics.

On most shipwrecks, there is cargo that we classify as "trade goods" and, these are items found in large repetitive quantities... a good example would be coins. After undergoing conservation and thorough documentation, these duplicate items will be offered to private collectors. Our decision to sell artifacts is made using criteria similar to those used by museums when they de-accession artifacts or collections.



ABOVE: The *Odyssey Explorer*. INSET RIGHT: Neil Cunningham Dobson

We also share the artifacts, treasures and knowledge we recover with a broader audience by displaying them at museums and interactive exhibits, and producing books, DVDs and television features. The adventure and excitement in our field motivates young students to get interested in archaeology, and we support that interest by creating educational curricula.

And finally, we produce high quality archaeological reports to share our findings with the archaeological community and the general public.

MK: Do you search for wrecks that do not carry significant valuables, and if so,

what are the reasons for that?

NCD: There are certain criteria that shipwrecks must meet to become one of our targets, and one of those is that the ship must have documented proof of carrying highly valuable cargo. However, in our exploration of the oceans, we do come across interesting and significant shipwrecks that do not carry high value cargo. For example, we have discovered a few amphora wrecks, submarines, aircraft and so on. Whist the cargo has no real monetary value, we may conduct



an archaeological investigation that can include a photomosaic.

It is a possibility that we will return and recover artifacts from some these sites at some point in order to share the

historical knowledge that can be gained from these wrecks. Discovery Channel's Treasure Quest series did a great job to showcase some of the historically significant wrecks that we came across and investigated but did not excavate during our last search season.





ROV Zeus

logical interests should be salvaged by museum curator rather than commercial businesses and so on. How do you handle that?

NCD: To our knowledge, there aren't any museum curators that salvage shipwrecks. The word "curator" itself comes from the Latin word curatus, which means "care." A curator is someone who is responsible for a collection and some of their duties can include researching the history of the artifacts in the collection and

publishing information about the collection. Odyssey has a Curator of Collections, Ellen Gerth, on staff because this is an integral step in the archaeology process. You can see some of her publications here: www.shipwreck.net/featuresarticles.php. Apart from that, Odyssey is proud to have the world's best marine archaeologists and conservator working for Odyssey.

A lot of the criticism about what we do stems from misconceptions about our operations by people

who have never been on board our ships during an expedition nor have taken the opportunity to visit our conservation lab or our museum exhibits.

The fact is that deep-ocean shipwreck exploration and archaeological excavation is an expensive endeavor, and operations can cost more than US\$35,000 per day. The equipment and technology used costs millions of dollars in acquisition and maintenance costs. Governments and academic insti-

MK: How did you get started? What was your motivation?
 NCD: Well, my career has been a bit unconventional. I started out at age 17 when I joined the British Merchant Navy where I was a deck officer. I then went to the oil industry and spent 11 years working on oil rigs in the North Sea as a ballast control room operator and barge engineer. After that, I worked as a marine survival instructor/examiner. I was one of the UK's first freefall lifeboat instructors. During my leave from oil rigs, I took up sport diving, became an instructor and ran a UK dive club. So really, diving wrecks sparked of my interest to combine history and my maritime career.

Through my work, I gained

commercial diving qualifications, joined the Nautical Archaeology Society and became a tutor. I was approached by Dr Colin Martin of St Andrews University to join him in the investigation and excavation of a 1653 Cromwellian warship lost off Duart Castle on the Isle of Mull, West Coast of Scotland. I spent five years on this project. Later, I pursued a master's degree at St. Andrews University and began my career as a marine archaeologist.

My marine background along with my archaeology put me in a unique position. I have spent 30 years in the marine industry; I have worked on all sorts of vessels, rigs and sailing ships. I decided that deep water was the area I wanted to work on and

the challenge to see if a robot could do archaeology. I gained commercial Remotely Operated Vehicle (ROV) qualifications and eventually came to Odyssey.

My motivation is to bring marine history and archaeology to the general public. I am privileged to be one of the first people to discover a shipwreck since it was lost and to handle and study the artifacts from it. I get to tell the story of the ship and its crew and bring them alive. I am passionate about sharing my knowledge with the world gaining me the nickname "The People's Arch".

MK: Being a salvage company, you meet a lot of harsh opinions about what you do. Opinions about how shipwrecks of archeo-



A 42-pound bronze cannon from the wreck of the HMS Victory being hoisted onto the deck of the Odyssey Explorer



Artifacts recovered from the 1622 "Tortugas" shipwreck site
BELOW CENTER: Ceramic cargo from the "Blue China" wreck at a depth of nearly 1,200 feet

factors. It is fast becoming a race against time, and it is really crucial at this juncture to address this issue.

MK: What is your biggest achievement?

NCD: This is a hard one. Being a father to my two sons, Luthais and Harris, is my personal biggest achievement. Professionally, the moment of the discovery of *HMS Victory* ranks as one of the

years later in 2003 with the *SS Republic*. Our second major discovery came three years later in 2007 when we discovered the "Black Swan" deep-ocean site, which is believed to constitute the largest collection of coins excavated from the deep ocean to date. The next year, 2008, we discovered *HMS Victory*.

I think what you can see is a trend; we're getting better and more efficient in our ability to research and follow



ABOVE: Gold bars recovered from the 1622 "Tortugas" shipwreck site

tutions can't afford to fund archaeologically-sensitive shipwreck exploration on the scale we're doing it.

As a publicly traded company, we are funded through private investors. With our business model, we can also generate revenue through the sale of duplicate artifacts, also known as "trade goods" (i.e. artifacts or coins found in large duplicate quantities). This is a new model for shipwreck exploration companies, and we are fortunate to see that a lot forward-thinking academics and archaeologists are starting to be interested and supportive of what we are doing.

Personally, I do not get bothered by what other people say about us. I am a qualified, experienced marine archaeologist and have seen more shipwrecks than most marine archaeologists. I do my archaeology to the best of my profession. I am privileged to be a part of

the Odyssey team that includes the top shipwreck project managers, conservators, researchers, scientists and other shipwreck specialists.

MK: What is the challenge in seeking for lost ships and their cargos?

NCD: There are many challenges from the efficient use of resources to safety and security aspects. One of the biggest ones is finding an interesting wreck that you have no identity for and using all my skills to try and solve the mystery. I see my work as underwater CSI because a shipwreck is like that of a crime scene; I have a pile of clues and have to try and work out the last moments of the ship and the crew.

One of the major threats to shipwrecks at this time is the extensive damage through trawl nets and other manmade

greatest moments in my career. But with my passion for marine archaeology, all of the shipwreck projects I have taken part in are exciting and fascinating.

MK: How has your company evolved over the years?

NCD: Odyssey was founded in 1994 and made its first major recovery almost ten

through to the discovery of wreck sites. We're solidifying our position as the world leader in shipwreck exploration with our proven track record.

MK: You have been up against some legal palaver, did that affect the passion for what you are doing? How do you cope? I imagine with all the effort and the money invested in the search, it must

be pretty frustrating when something like that happens?

NCD: The legal issues do not affect my passion. It is frustrating at times, not just for me, but obviously for our company. But being pioneers in our industry also comes with pioneering a whole new legislature and regulations. We are setting historical and legal precedents and helping to write and clarify maritime law. It does not deter us, instead I think it has made us a stronger team as we bond together to support our company, goals and mission.

MK: Is there a competition out there, and if so how do you handle it?

NCD: There are other shipwreck explorers (or in many cases salvage companies or treasure hunters), but we are the only ones with the technology and knowledge necessary to successfully conduct operations in the deep-ocean. We are pioneers in the field of deep-water shipwreck archaeology.



COLLECTIONS OF THE NATIONAL MARITIME MUSEUM

Loss of HMS Victory, 4 Oct 1744; 18th c. painting by Peter Monamy, England

standards as those employed in terrestrial and shallow water sites. The significant difference, however, is the requirement for specialized equipment. The Remotely Operated Vehicle (ROV) is the eyes, hands and tool box for the archaeologist.

More information about the technology Odyssey utilizes can be found here: www.shipwreck.net/ourapproach.php.

MK: Your latest disclosed discovery, HMS Victory, is more than just another find, you quite possibly will be able to solve a long time mystery, and might even exonerate the admiral, if I understood it correctly, those kind of achievements must be gratifying. Can you tell us a bit about that?

NCD: As a matter of fact, we have already done all of these things—solved the long-time mystery of the location of Balchin's *Victory*, thereby exonerating the Admiral and the lighthouse keeper. Discovering the *Victory* was very gratifying for me personally. She was the mightiest vessel of her time and her final resting place has eluded explorers and historians for centuries. We found her over 100km from where people have concentrated their search.

With our discovery, we can tell the story of the people who lost their lives and correct the historical record on how she was lost. It was a long-held belief that she wrecked off the Casquets, when in fact, our research seems to point more to the fact that she went down due to a violent storm far from there. This is particularly

important because initially people theorized that poor navigation was the reason for her demise and placed blame on Sir John Balchin, his crew and the lighthouse keeper.

The cannon assemblage is just a wonderful window into the military weaponry of the day. So far, we have recovered two cannon—a 12-pounder bearing the Royal crest of George II and a 42-pounder bearing the Royal crest of George I—this is also the only known example of a 42-pounder cannon on dry

land. These cannon were the key pieces of evidence in identifying the shipwreck as Balchin's *Victory*. I look forward to the challenge of recovering them all some day.

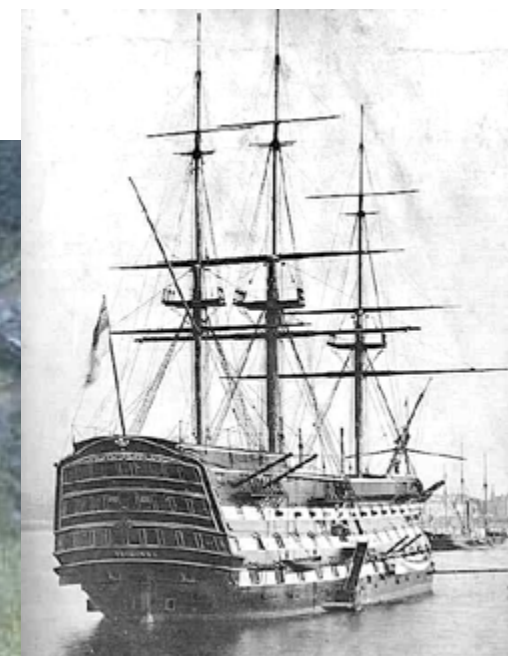
MK: Where do you guys see yourselves ten years from now?

NCD: We believe Odyssey will continue being the leaders in the field of deep-water exploration and archaeology. Certainly, technology will continue to evolve, and there will be advances that we could only now dream about,

which will become a reality. The ocean is deemed the 'last uncharted frontier', and it is also a very real possibility that we will have been able to map the entire ocean floor by then. ■

For more information, visit: www.shipwreck.net

HMS Victory, a first-rate Royal Navy warship wrecked in the English Channel, 1744



Bronze cannon protruding from the seabed at the wreck site of *HMS Victory*, bears the royal crest of King George I (inset)



Portrait of Admiral Sir John Balchin, commander of *HMS Victory* during her last voyage in October 1744

MK: Are you worried about piracy?

NCD: As we have learned from the news in recent weeks, pirates can be a very real threat, but the commercial marine industry has mechanisms to deal with piracy, and our crew is well-equipped and well-trained.

MK: What technology are you using for your search?

NCD: Conducting archaeology in deep water requires the same

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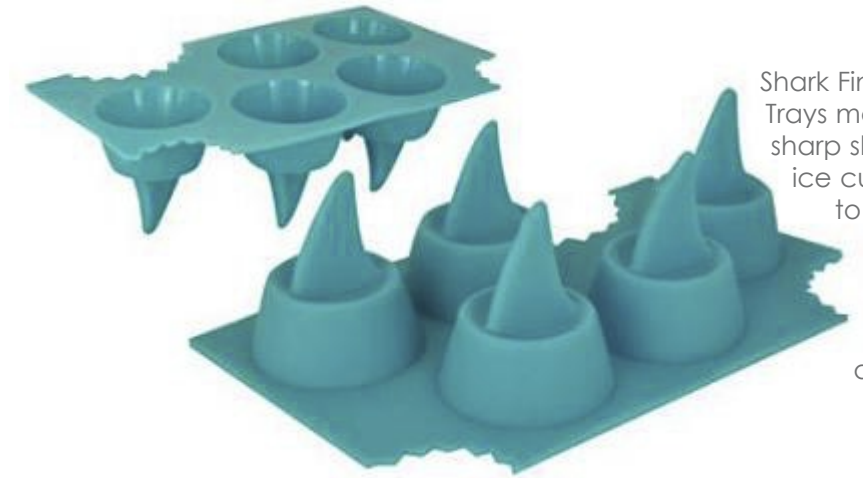


Edited by
G & P Symes
& Catherine GS Lim

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Funky Gifts

for Folks with Fins...



Shark Fin Ice Trays make sharp shark fin ice cubes to float around in your next cool drink



Shark Fin Ice Cubes

Creep out your dive buddies with these shark fin ice cubes floating in their next cool drink topside. These ominous ice fins are made with — what else? — a shark fin ice tray (top right). Price: GB£5.99 www.play.com



Shark Fin Salt Shakers

SHARK SHAKER is a salt shaker inspired by the form of the shark's dorsal fin. The designer, Amin Vahidian of Iran says that the shaker creates an illusion of a shark prowling under your table perhaps reminding us that using too much salt on our food is dangerous for our health. www.dot4design.com



Magic Turtle Bowl

This aquatic acrobat swims around in its watery home all day long. A constant turtle companion friend to accompany you on lazy afternoons at home, or long days at the office. No clean-up required. Bowl contains multi-coloured beads and simulated rock base. Battery-operated. www.fascinations.com

Sharky Tea Infuser

Designed by Pablo Matteoda from Argentina, this nifty gadget won third place in this year's Beyond Silver international design competition. In the designer's own words, "INFUSION means to extract certain properties from a soluble ingredient such as tea leaves, herbs or fruit by soaking in liquid (water) until it gets saturated. So, we can say that an infuser is in charge of making this happen. This is a ludic point of view about the color given off from the phenomenon, which makes more interesting the waiting on the whole process." www.designboom.com





Jellyfish Lamp

December Diamonds of North Carolina, USA, makes unique handmade ornaments and lamps in marine themes such as this jelly fish light pink and blue 16" lamp. Available at Laraine's online swim and resort shop. Price: US\$ \$59.99 laraines.com



Dancing Desktop Jellies

Thanks to a gently circulating current, the three jellyfish floating around in this desktop tank "swim" through shafts of colored light streaming from six bright LEDs, which let you set the mood. You have a choice of settings: lights blending softly from one color to the next, or holding steady on one particular color. Let the gentle dance of the jellies relax your nerves. www.thinkgeek.com

Octopus Ring

This authentic handmade sterling silver ring is designed from a real octopus tentacle that has been drilled, carved, shaped and cast in silver. It's unique from all angles and versatile. with a good sense of weight to it. Great as a gift for both guys and gals. The finish is light oxidation with some added texture. The inside is finished with a near mirror finish for contrast. It is also available in dark oxidation and bright finish. Sizes 4 - 7 available for US\$160. Matching sterling silver earrings also available. www.etsy.com



Jellyfish Chandelier

This large amber inverted hanging jellyfish chandelier was designed by Joel Bloomberg. Since the early 1980s, Bloomberg has created a wide range of functional sculptural works—objects that expand the vocabulary of art glass and use materials in new and unexpected ways. Each handmade piece involves a combination of blown forms, coldworking, polishing and Bloomberg's own lamination process. Throughout the day the colors of the piece can change with the intensity and direction of light. Available in more colors upon request. Crystal-fox.com



SmartLab Shark Model

Sharks were patrolling the seas long before the dinosaurs roamed the planet! Let the kids see inside the sharks with this SmartLab model. They can snap together the pieces of the shark model from the inside out including fins, gills, muscles, and denticles and teeth Comes with instruction manual. Designed for ages 8 and up. www.discoverthis.com

Robotic Bull Shark

This remote controlled robotic Bull Shark moves just like the real thing. It can smoothly maneuver up, down, left, right, and even backwards through water, in depths up to nine feet (3m). With a maximum distance of 40 feet from its handheld remote unit you can swim with the robotic shark since the remot is

also submersible. One-hour charging gives the unit a 15-minute run time 9-volt battery required. Great for ages 8 and up. According to the manufacturer, the item meets all U.S. Federal toy safety standards. On sale for US\$59.95 (was \$99.95). www.hammacher.com





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Edited by
Peter Symes



A school of cobia accompany a 30-foot whale shark at a petroleum platform in the northern Gulf of Mexico. Photo by Fred Anderson

— News from the University of Southern Mississippi Gulf Coast Research Laboratory

Participate in Scientific Research: Report Whale Shark Sightings in the Northern Gulf of Mexico

Scientists at the University of Southern Mississippi's Gulf Coast Research Laboratory in Ocean Springs, USA, are seeking help in gathering information about whale sharks, the world's largest fish species.

If you have ever been offshore and encountered a 30-foot shark, it was most likely a whale shark. The whale shark, *Rhincodon typus*, was once thought to be a rare species in the northern Gulf of Mexico.

The research of University of Southern Mississippi scientists at the Gulf Coast Research Laboratory, however, is showing otherwise. Large groups of whale sharks, some in excess of 100 individuals, have been reported in the northern Gulf near the Mississippi River Delta and the DeSoto Canyon.

Individuals who frequent offshore areas

of the northern Gulf and make the special effort to report their whale shark encounters are critical to GCRL studies on whale shark occurrence and distribution in the Gulf region. If you observe a whale shark in the northern Gulf of Mexico, please join us in learning more about these elusive sharks by reporting the encounter.

These sharks are easily distinguishable by their large size, broad head and a checkerboard pattern of white spots. The spot pattern of these sharks is unique to each animal, much like our thumbprint; a photograph of the left side, behind the gills, can be used to track an animal's movement worldwide. Whale sharks are often observed at or near the surface of the water feeding on plankton, small fish, squid or fish eggs. Whale sharks commonly associate with big game fish, such as yellowfin, blackfin and skipjack tunas, tripletail, dolphin and cobia.

Little is known about the biology of whale sharks, and much of what is known has been discovered only in the last two decades. There are reports of whale sharks as long as 50 feet and weighing more than 100,000 pounds. There is some evidence that whale sharks could be almost 25 years old and 30 feet long before they reach adulthood. Pregnant females carry up to 300 embryos, and the young are only about two feet long at birth. Presumably they grow more rapidly than other shark species.

Whale sharks are highly migratory, and reports show that they make transoceanic migrations in relatively short periods of time. They can also dive to depths of a mile or more. Their migratory behavior and deep-ocean habitat adds another layer of difficulty to studying whale sharks



Now you can support whale shark research by reporting your sightings online...

A 28-foot whale shark swims next to a sport fishing boat in the northern Gulf of Mexico. Photo by Gulf Coast Research Laboratory

beyond the expected challenges of offshore research related to logistical constraints, monetary limitations and weather conditions.

Gulf Coast Research Laboratory biologists are extremely grateful to all who report their sighting information and help spread the word about the Online Sightings Survey.

For more information about whale sharks, see the new whale shark website at www.usm.edu/gcrl/whaleshark.

To report a sighting:

Please complete the survey at www.usm.edu/gcrl/whaleshark.

Please include the following:

- Time and duration of encounter (sighting)
- Location (GPS coordinates)
- Approximate number and size of individuals
- Observed behavior
- Associated species
- If available, photographs of sharks observed

Reports can also be made by email, mail, phone, or fax to:

Dr Eric Hoffmayer
703 East Beach
Ocean Springs, MS 39564 USA
Tel: (228) 872-4257
Fax: (228) 872-4214
eric.hoffmayer@usm.edu ■

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In Australia, scientists estimate there are just 500 to 1,000 grey nurse sharks left

Can artificial womb save grey nurse shark?

Grey nurse shark embryos have a tendency to eat each other in the womb. For millions of years, this grisly reproductive system has worked just fine and made sure that only the strongest survived. A pregnant grey nurse shark can carry up to 40 embryos in each of its two wombs. When they get large enough, they turn on each other, eating their womb-mates, until only one pup is left in each uterus. Under normal conditions, this would create a stable shark population that rarely shrinks or grows.

Now, grey nurse sharks are dying faster than they can breed, the victims of drift nets and other commercial by-catch. In

Australia, scientists estimate there are just 500 to 1,000 grey nurse sharks left, down from several thousand in the 1980's.

Artificial uteruses

But Nick Otway of the New South Wales Department of Primary Industries has an idea to boost that population—removing the young before they get to the cannibalistic stage and raising them in artificial uteruses.

For the last three years, he's researched building an artificial womb that would keep grey nurse pups from eating each other. There, they would receive a steady food supply, so they would not need to

eat each other, and they would be released nine to 12 months later. It's not an easy process as the artificial wombs would need to mimic the environment inside the mother sharks, such as composition of fluids, bacteria, food composition and temperature, as

“If we can raise about 40 pups a year, it will start bringing up the grey nurse population.”

well as how these factors change through the course of the pregnancy. The scientists also need to master surgical techniques to remove the embryos from the mother and place them into the sterile artificial uteruses. ■

Sexual discrimination behind decline in sharks

Sexual segregation of sharks in the open ocean could be a major contributor to population declines a team of European marine scientists says.

The researchers say their study found a “striking” level of sexual segregation among the mako shark (*Isurus oxyrinchus*), in the South Pacific Ocean. The scientists used data collected from a commercial Spanish longline fishing vessel targeting swordfish in the southeast Pacific Ocean. A total of 264 male and 132 female mako sharks were captured as bycatch with males occurring predominantly in the western area of the survey region and females dominating in the east.

Sexual segregation

Based on length measurement 84 percent of the males were considered to be adult compared with 13 percent of females. The researchers say this indi-

cates size, as well as sexual, segregation.

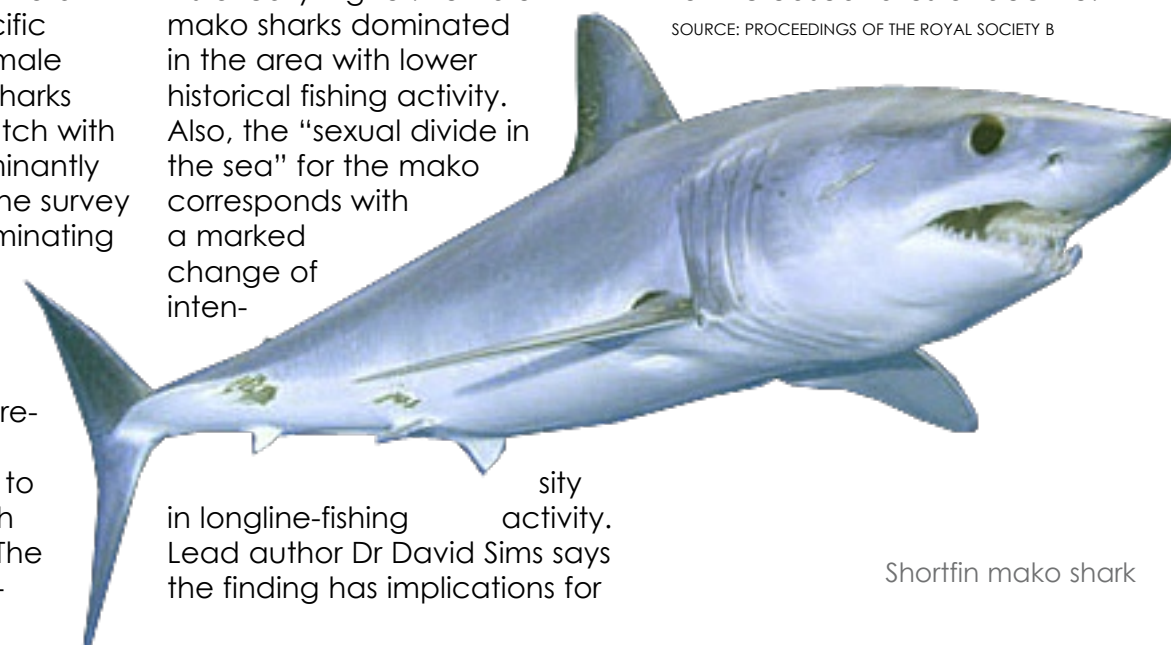
Males dominate in highly fished areas

Males were predominant in the area where longline fishing was historically higher. Female mako sharks dominated in the area with lower historical fishing activity. Also, the “sexual divide in the sea” for the mako corresponds with a marked change of inten-

assessing fisheries effects on shark populations.

“If high fishing activity occurs in key areas where, for example, the majority of a population aggregate for feeding or mating opportunities there is a potential for increased rates of decline.” ■

SOURCE: PROCEEDINGS OF THE ROYAL SOCIETY B



Shortfin mako shark

ANDY MURCH

On the origins of the Great White

From which line of species did the modern great white shark evolve?

For the last 150 years, some paleontologists have concluded that the great white shark, *Carcharodon carcharias*, is a smaller relative of the line that produced *Carcharodon megalodon*, the largest carnivorous fish known.

Other paleontologists disa-

greed, arguing that the great white shark evolved instead from the broad-toothed mako shark. The second group contends megalodon, which grew to a length of 60 feet, should have its genus name switched to *Carcharocles* to reflect its different ancestry.

The verdict

The study in the March 12 issue of the *Journal of Vertebrate Paleontology* falls squarely into the mako camp. It concludes megalodon and modern white sharks are much more distantly related than paleontologists initially believed. ■





technical
matters

Technical Diving : Why?

Practice makes perfect; basic skills in technical diving can make it seem like one is learning to dive all over again, albeit better with more streamlined trim

Text by Fredrik Isakson
Photos by Alex Dawson

To develop your diving without becoming an instructor —

Technical diving gives you the opportunity to develop your diving without becoming an instructor. But the diving becomes more difficult, and the technology is not what you are used to. Do you have what it takes to move on? Is technical diving for you? After you read this article, you'll know a little more, and maybe you will be willing to take the next step in diving. Perhaps technical diving is something for you?

For many, technical diving feels like something very strange. Most divers have taken their certificates during a trip to a warm country, and often it stops there. But some go further and take their first stumbling steps into more advanced diving. They start diving in their home country. Maybe they decide to educate themselves further. A few of them decide to evolve even further in diving. They take the next step and perhaps even a course with rescue exercises, a course

where they will learn more about the physics around the diving. A few press on and decide to become a "divemaster". They see it as an opportunity to work with diving abroad or as a way to get to learn a bit more. To become an instructor would then have been the traditional way, the only way to go on in one's diving career.

In recent years, a new path has opened up for those who do not want to become an instructor and yet want to

develop with his or her diving; that path is technical diving.

Tougher requirements

If you selects this route, it opens up a window of opportunity to learn more advanced techniques, albeit a little harder and deeper than most can handle. So far, there are few who choose this path, yet a small but steady stream of divers have begun to become interested. More and more divers are learning to

dive with mixed gases and decompression. Technical diving makes it possible to get to places that ordinary holiday divers do not even dream of.

"Personally, I think that most divers seem to get a new start when they begin a course in technical diving. It provides them with new skills to practice, and they will practice a lot on things that they previously only learned the basics of," said Stefan Hogeborn, a NAUI instructor in Sweden and my instructor in technical

diving.

Today, there are a number of organizations that provide courses in technical diving. They all have one thing in common in that they teach a different approach to diving.

"Now, we leave the diving that fits all, and hence, the techniques taught at recreational courses. Now, rules apply all the time, and one must follow them; instead of one teammate, you now have two," said Hogeborn.





It's a good idea to get used to using twin tanks before you start a technical diving course

During deco stops at the end of a technical dive, divers switch to 100 percent oxygen

'intro to tech' type course. It's an orientation course for technical diving," said Hogeborn. Most educational organizations have one.

Solid course

People starting with technical diving will probably have to learn to dive all over again. Everything is different, and yet, the same. Technical Diver, a NAUI course, includes 12 practice dives and a larger number of theory lessons. Technical Diver combines smaller classes into one larger course. It is a solid start to learning more about technical diving.

If the instructor awards you with your certification, which is not a given, the instructor believes that your skill set in diving makes it possible for you to start doing technical dives. It does not mean that you are a complete technical diver—a mistake young tough boys often make.

"After the course, you're still a beginner, but with more skills than before. It is after your education that the real training begins," said Hogeborn.

For me, the course gave me an opportunity for a new start in diving, new equipment, new gear and a different attitude to the "team"—your diving buddies. Suddenly, there are lots of new things to practice and new things to see, previously impossible to reach.

What is this?

The first few days, I just sucked in information. I kept my distance and studied my fellow students in the course; I was, after all, there to describe technical diving as a reporter as well. But slowly, I was sucked into actually learning, because it was so fun.

The team—my fellow students—consisted of Frida Drakling, Janne Henriksson and me. We were to become the team,

or three group, of which a technical dive team consists.

It became quite clear to me that, even before the course, the other two students had been training on the principles and procedures that we were supposed to learn. In the beginning, it was to my disadvantage since I hadn't been practicing them at all; everything was totally new for me. But as the days passed, I caught up more and more.

Some things were easy for me to understand, others—mostly practical stuff—took a little bit more time to understand. But we complemented one another well and learned from each other. It was something we would benefit from over the days to come.

The course was structured in modules, skills in the water were mixed with theoretical lessons. In order to have time for our normal lives, we concentrated on our lessons in the evenings and on weekends. It would take us a few weeks before we had had time to do all the exercises and learn the theory.

A lot of theory

The first lectures of the course were mostly theoretical. Hogeborn told and showed us how to configure our equipment and what kind of equipment we had to use to be able to do the dives we were about to learn to do. It became clear to me that we were now leaving common recreational diving and moving into diving with higher complexity. What one brings under water was now on a large degree about redundancy.

This was also fun—much more fun than I first thought. I had always believed that technical divers were a little too interested in technology, that they had a tendency to talk a lot and mostly tinker with



their gear, and that they found little or no pleasure from diving for its own sake. But I have found out that this is not so.

Most of the technical divers I meet nowadays have a more pragmatic approach to their diving than I first thought. Things are used, or sit where they sit, because they have a purpose, and there is always a proper reason for everything these divers bring under the surface; if there's no reason for bringing it, they leave it behind.

Tinkering with your diving gear

The organization and care of a diver's equipment is the foundation for good trim and correct technique. Hogeborn shows us how to adjust and correct our backplates and webbing, bottles and steel twinning bands. Each step leads to the next, and after a while, you wonder why you didn't set up your diving gear

Come prepared

I was offered an opportunity to test out what technical diving could be for me, but I was extremely hesitant and refused at first, thinking that technical diving wasn't for me. But after some persuasion, I decided to take the chance to see what it was.

I had never used twin bottles and hadn't learned the techniques used for them. It was time to become a beginner again.

"I think that anyone who wants to try out technical diving should dive with twin bottles for a while before taking the next step. A short cut could be to enroll in an





A diver on the team, or three group, which is used in technical diving, prepares for an exercise to practice new skills

A tip: buy a pair of dry gloves with five fingers before the course. These three-finger gloves can pose a problem in drills handling and tying air tanks

because when you are back above water, you can ask questions, be corrected and rapidly be shown the right way to do it.

Later, when we tried it in the water, the techniques were there, not perfect but reasonably good. Reverse kicks were simply not easy, but I was beginning to get it right (several weeks later).

We went through the usual frog kicks, modified frog kicks, flutter kicks, reverse kicks and helicopter turns in both directions with one or two legs. It turned out to be a lesson that I think most divers, even those who don't intend to become technical divers, could benefit from. For me, it felt like basic skills that I really wondered why I and other divers did not go through in basic training.

Time to get wet

The first day of diving. It felt

good to soon be getting into the water, but before we did, we had to practice our S- and V-drills dry. S-drill stands for Safety drill, and V-drill stands for Valve drill. This is something we would do before every dive, during and after the course, from now on.

An S-drill simulates a situation where one diver runs out of gas and must receive gas from the other diver. The drill teaches us how to act in a situation like that. In a V-drill, you close and open all three valves on the cylinder package while sequentially switching the regulator so that you always have air.

It was much harder than one would think. I had obvious problems, and it took

a while before I succeeded. I felt like I was put together in the wrong way to implement a "valve drill."

It's not only a problem in reaching the valves but also a balance problem. If you only concentrate on the Valve drill, you will slip and lose your trim, probably even float up and down in the beginning. It is a good exercise that makes you manage multiple operations simultaneously. I have gotten accustomed to always practicing these operations to get them to flow like running water. But I still have to work a bit to reach the valves.

To see yourself on film

The exercise was to swim along a line that the instructor had tied off on the bottom. We were now supposed to show the fin techniques we had practiced on land. This first dive also gave the instructor, and us, an opportunity to study how our trim was with, for us, new equipment.

This was the first time I swam with a decompression bottle under my arm.

The instructor showed us how it was done, and then it was our turn. Every move we did was filmed, and when we got back to the classroom our techniques were analyzed.

The camera was merciless; all errors could

be clearly seen, and while we viewed it, comments on our technique rained down on us, sometimes to big laughs. It was clearly visible when someone did something good, and it was equally clear when someone did something bad. Having a video camera in a training situation was a very good idea, as it turned out.

To have the right gloves

On the next practice dive, we brought our decompression bottles, but did not use them. We brought them to practice

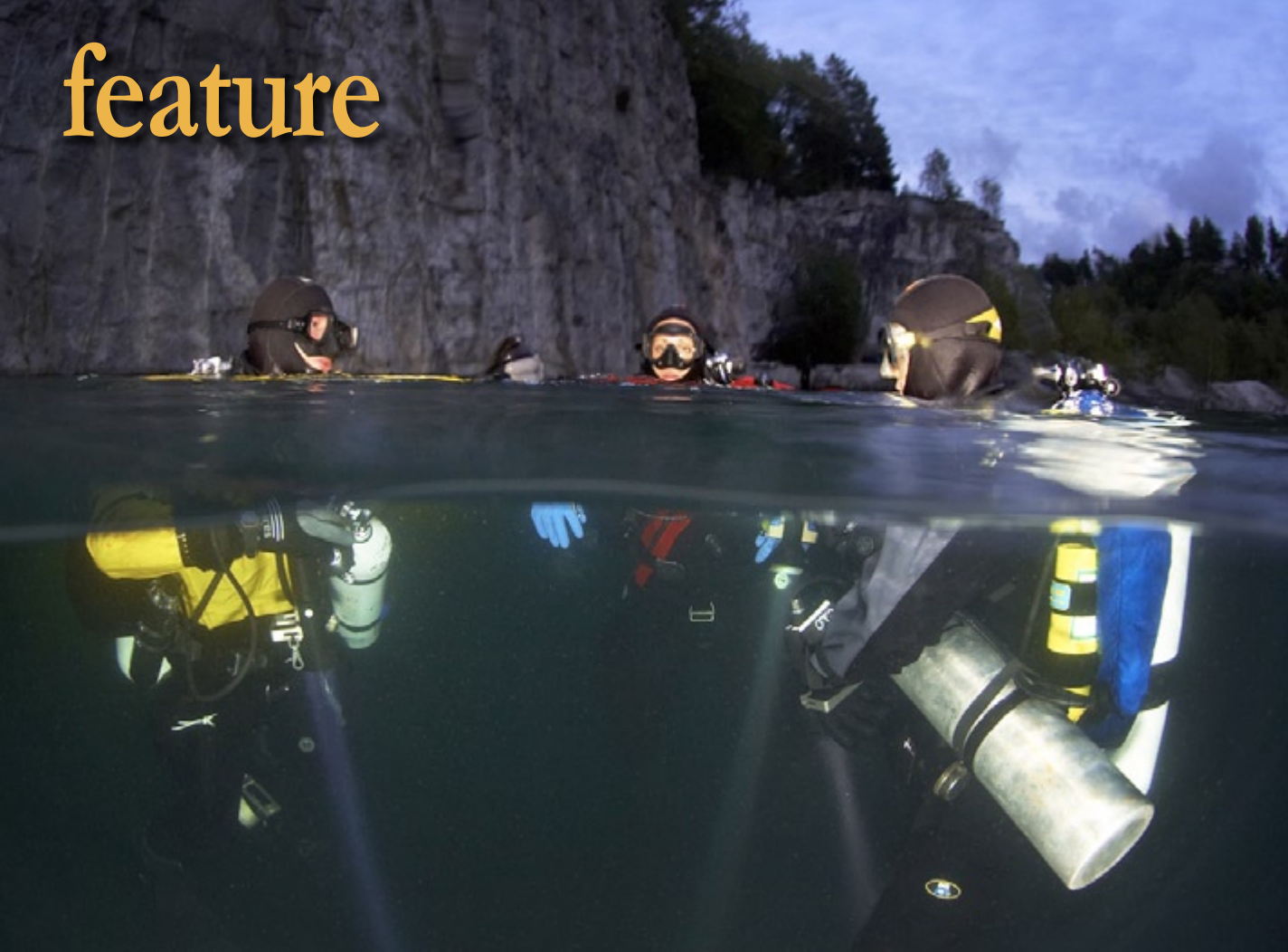
Technical diving is about being able to solve most problems you can think of and then some. You must solve the problems without panicking or the need to surface. To surface is not the solution when diving technically.



removing and attaching them to our harness. We practiced the procedure to leave the bottles at a tie off on the line. That sounds kind of easy, but each new operation is a new difficulty to sort out.

I, myself, just couldn't handle it and didn't, for the life of me, understand why. I tried and tried and just got more and

more pissed off because it seemed much less difficult for my team mates, Frida and Janne. What was I doing wrong, and what were they doing right? It took a while before I realized that it had something to do with the gloves I had on. To do it properly required more fingers than I had available in my three-finger gloves.



Divers meet at the descent line to talk through their dive before commencing the technical dive

the rescue course or equivalent.

What happens if things go wrong? What symptoms are there with different types of gas poisoning? It's good to learn again, and it gives you a fresh look at old skills.

Line handling

A good environment for scenario exercises is one that can be altered to your needs. We did them in an old sand take, the Husby pit. It was perfect because if you put a fin or a hand in the bottom you lose visibility in seconds. But before we got into the water, it was time for a dry exercise in line handling.

After yet another review of line signs and how to follow and interpret the line, we covered our eyes while Hogeborn, together with his assistant, drew a path in the forest. The team's task was to orient the line without seeing anything. It was fun, difficult and instructive.

A tip: buy a pair of dry gloves with five fingers before the course. It's probably possible with three finger gloves, but oh so much simpler if you have five fingers to work with.

Task loading

This course was designed to teach you how to solve problems. New problems keep on coming up, and you must come up with the solutions. When you have solved the first problem, there is always another. Slowly the instructor's demands on you increase. It's called "task loading"—the problem load is ever increasing.

Technical diving is about being able to solve most problems you can think of and then some. You must solve the problems without panicking or the need to surface. To surface is not the solution when diving technically. You have left the type of diving where you can make a direct ascent to the surface. A technical diver must be able to solve the problems on the spot, in an orderly fashion and with the help of

your team mates.

The team is a unit, helping is a given if something is wrong for any of the divers in the team. If you can solve the problem, do, if not, support for your team member when he or she tries to solve the problem.

Physics and gas laws

The subsequent days, we carefully learned about physics and gas laws and how to calculate END, MOD, SCR, best mix, oxygen exposure, and more. The abbreviations stand for a lot of things you should know if you want to dive technical dives. Instead of telling you how to calculate stuff like this in this article, you should take a course. With an instructor, you will learn all the calculations that you need to do to a technical dive safely.

Today, there is software that calculates all these values for you, but you should know how to do it without the programs, said Hogeborn.

Much of what we learned during this course, we recognized from exercises that we had done in previous courses such as

Zero visibility

The bottom of Husby pit was highly mobile and impaired visibility quickly—a perfect place for our scenario exercises. The exercise was to deploy line, unload decompression bottles, or keep them on, swim out over the bottom and tie off the line at proper places.

It all sounded pretty simple and straight forward. It's just that at this point our instructor turned out to be the devil. Suddenly, regulators were free flowing, lights stopped working, valves were turned off, the masks disappeared, and with silt outs, the visibility turned to zero; quickly, we had to start communicating through body contact.

Troubleshooting

The task loading exercise is constructed to teach the team how to handle any difficulties and problems. They should also learn to prioritize between what needs to be solved first and what can wait. The instructor's task is to keep the problems at



Divers practice new skills at Husby pit where visibility can quickly disappear due to silt



a manageable but challenging level and bring the whole team to work together to solve the problems.

During the course, you learn that things will happen. Your readiness for unexpected events increases, and the ability to solve problems when they arise gets better and better. The stress threshold is shifted to increasingly difficult problems. Most can be solved if you take it easy.

Each diving day began and ended with theory and a briefing of the dives of the day. All exercises were filmed, and my shortcomings often became painfully clear.

The launch of decompression

We developed as divers more and more over the following days. Our instructor decided it was time to start practicing ascents with decompression.

The difficulties in ascents with decompression are keeping the depth and time, performing the gas changes, and keeping an eye on your team mates. It is more difficult than you might think and requires a lot of exercise.

A fact of technical diving is that you learn a lot of stuff that you will keep training on for a long time—hence, all the technical

During the course, you learn that things will happen. Your readiness for unexpected events increases, and the ability to solve problems when they arise gets better and better.

divers located and paddling in Björkvik (a beginner's dive site in Sweden with a maximum depth of 15 meters) and other "easy" dive sites. They practice routines over and over again. In a crisis situation, the routines must work.

You practice over and over again so that there can be no doubt. In a real situation, it just has to work, said Hogeborn.

20 minutes at 45 meters depth

Our first steep dive was at a depth of 45 meters with a bottom time of 20 minutes. It started to get dark when we swam out into the lime quarry in Vagnhärad. Darkness settled and became dense. We did our V-trills and S-Drills—safety and valve exercises that you always do before a dive.

We swam over to the descent line, talked through our dive plan and began our dive, a journey into the darkness. Temperatures dropped as we descended. We landed on the bottom in an orderly fashion. Once down, we tied off our line, which we would follow in the dark and

murky water to start the dive.

As the one responsible for checking our dive time, I watched the dive from a time perspective and tried to plan the dive so we would return to the ascent line in time for our ascent. Everything worked fine except that I got a bad cramp in one leg and had to call the attention of the other team members.

We solved the problem and continued the dive. After ten minutes, we swung around and returned to the ascent line. The lights shined like laser beams in the dense darkness — it was pretty cool.

THIS PAGE: Divers form a small trident star around the ascent line as they begin their journey to the surface

Trident star

When we returned to the ascent line, we formed a small trident star around the ascent line and began our journey to the surface. The instructor was hovering outside our view, but he was there all the time. We were all a little worried about whether he would try to give us some new tasks to solve, but he didn't.

All of us had responsibilities; mine was to check the ascent rate and clock our stops. Our deep stops ended up being a little longer than I planned, but things were going well, and when we reached six meters, we switched over to our decompression gas, 100 percent oxygen, and made our remaining stops.

Star Light

When we broke the surface, stellar light shined from above. As we paddled towards the place where we would climb up, I looked up to the heavens and the stars and thought about life. It's fun and exciting and sometimes rewarding.

The next few days, we did some similar dives, tried different roles in the team and had the opportunity to test different gas mixes to see how helium affected us. My personal experience was that the difference between a gas mixture with high helium content and a mix with low or no helium content, is very large. Helium strengthens and improves your awareness substantially or rather, the absence of nitrogen does. Suddenly, the dive is totally clear to you and you remember more.

A new beginning

Those of you who have been diving for a while will find that technical diving gives you a chance to re-ignite your diving passion, and that it gives you new knowledge. All of a sudden, there is a possibility to dive where you previously didn't have the knowledge or technology to go. You will become a better diver. I can also promise that if you haven't previously suffered from the idea that you are never fully developed as a diver, you will suffer that prospect now. So go ahead and practice. ■





Books & DVDs

Edited by Catherine GS Lim

POINT & CLICK
ON BOLD LINKS



Summer of the Sharks DVD

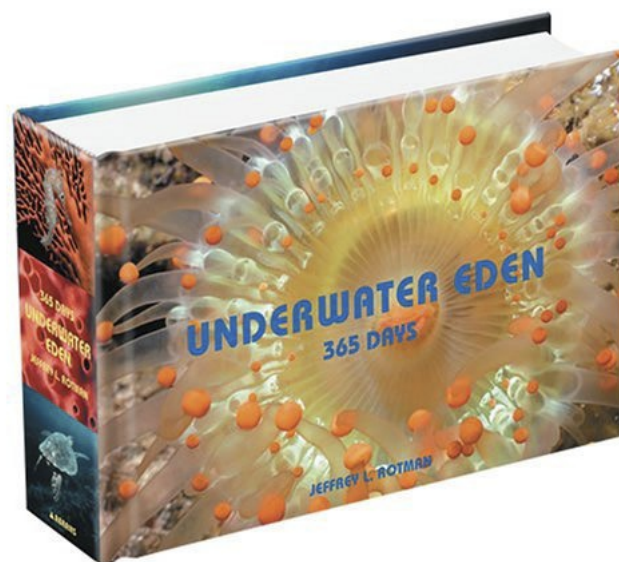
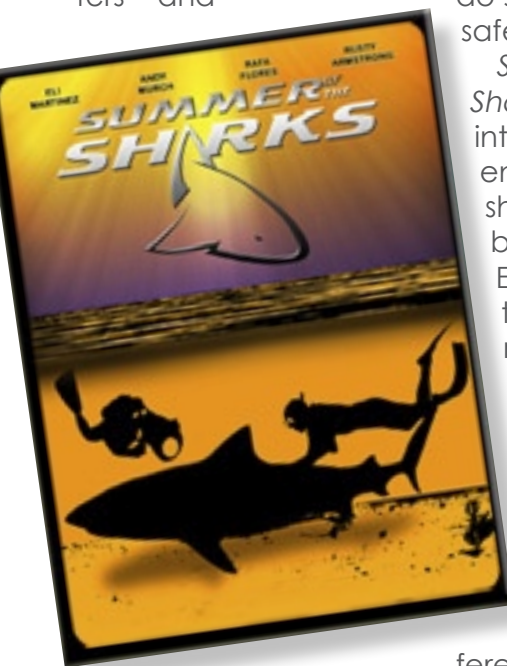
Imagine diving into the ocean in the hope of swimming alongside sharks. While most folks swim the other way when they see the flash of the sleek torpedo-shaped creature, professional shark divers actually seek out such encounters – and

do so without the safety of a cage.

Summer of the Sharks offers a peek into the experiences of four shark divers (led by Shark Divers' Eli Martinez) as they get on the road to pursue their passion. Although essentially a road trip, expect rough seas, aggressive sharks and much intimate footage of different shark species.

The documentary celebrates the beauty of sharks, and the ultimate experience of swimming with them in the open ocean. Perfect for shark lovers at all levels. Contains some coverage of shark hunting.

LENGTH: About 75 minutes
DATE: 2008
DIRECTOR: Rusty Armstrong
PRODUCER: Eli Martinez



Underwater Eden: 365 Days

If you want to create the next big thing in science fiction, perhaps this book is a handy tool in your arsenal. With photos comprising literally half the book (on all the right-hand pages), it is an intriguing glimpse into the fascinating (sometimes bizarre) creatures of the underwater world.

A pufferfish that resembles a lemon, a goosefish that looks like an ancient Mars Rover that had been stepped on, a creepy-looking scallop with its many beady eyes, a sand tiger shark with what looks like a bad nose job — just some of the characters you can spend a lazy afternoon with. There are also close-up photos, offering new perspectives to familiar animals.

Accompanying every photo is some commentary about the photo, often giving information about the photographed animal. Such bite-size snippets of knowledge are non-technical, and allow the reader a deeper insight into the lives of the animal. Although the book is entitled *Underwater Eden 365 Days*, I am sure that many readers would continue to savour the photos in this book way beyond 365 days.

AUTHOR: Jeffrey L Rotman
PUBLISHER: Harry N. Abrams, Inc.
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HARDBACK: 744 pages
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ISBN-13: 978-0810993112

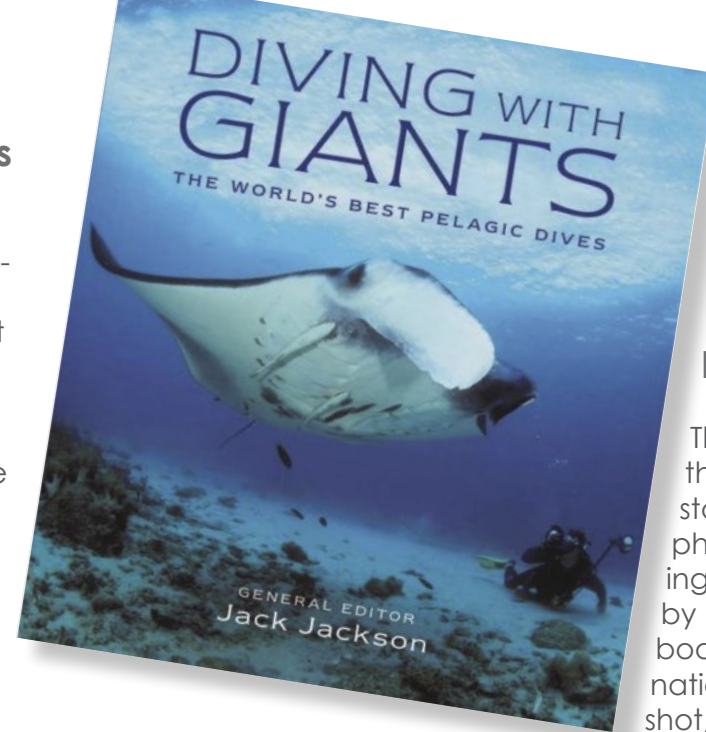
Diving with Giants

There is a certain thrill when you swim alongside animals larger than you. There is that moment when the thrill turns to wonder as you discover the gentle nature of these massive creatures. Indeed, many a diver have been left in awe in the middle of a dive when confronted with these gentle giants.

Diving with Giants is yet another book that showcases the best diving destinations, but this time, it is targeted at divers keen on swimming with the world's pelagic marine animals – the sharks, dolphins, whales, barracudas, manta rays, etc. Destinations listed in the contents page are the Caribbean and Atlantic, the Red Sea and Indian Ocean, Indo-Pacific, and the Greater Pacific.

The book contains a balanced mix of text and photos, so that even non-divers can experience this ultimate adventure. Chapters have been penned by a panel of experienced divers, but written such that beginner divers (or even non-divers) would find it engaging and informative. Although many photos in the book tend to be rather bluish, chances you might find yourself reaching for the phone to call your travel agent as you flip through the pages.

EDITOR: Jack Jackson
PUBLISHER: New Holland Publishers Ltd.
PAPERBACK: 160 pages
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Master Guide for Underwater Digital Photography

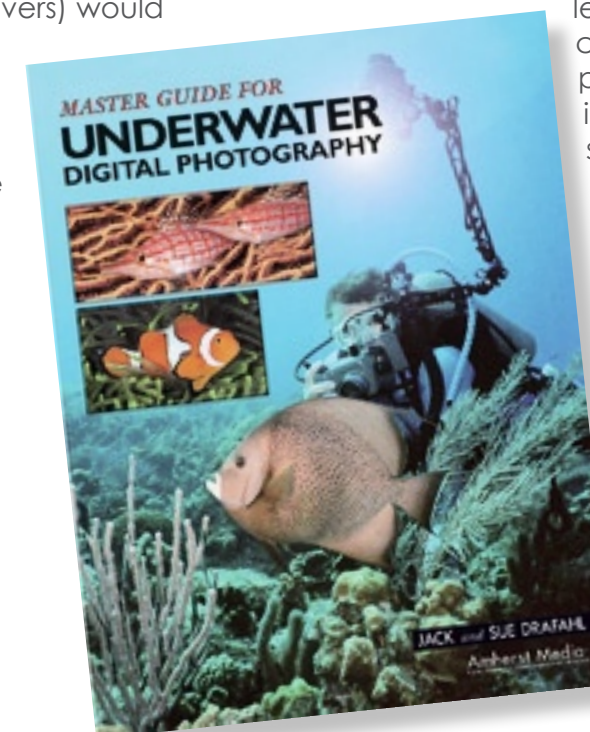
This book contains everything you would need to get started in underwater digital photography, short of providing you with a camera. Written by Jack and Sue Drafaht, this book is filled with clear explanations of how to get a good shot, applicable to underwater photographers at all levels.

Right from the cover photo (which depicts every underwater photographer's dream of getting up close and personal with his subject), readers are taken on a comprehensive course in taking good underwater photos.

However, rather than plunging immediately into the topic, the book starts by pointing out how the underwater environment affects photography, as well as the different aspects about film and digital cameras. A logical and necessary starting point!

The contents of the book run the gamut of available light, flash, close-up and super-macro photography. There is also information about backscatter, photo composition and obtaining good exposure. Then, with all this knowledge under your weight belt, it's time to take the plunge and dive in with camera in hand!

AUTHORS: Jack and Sue Drafaht
PAPERBACK: 128pages,
250 full-colour photos
ISBN: 1-58428-166-9



Edited by Kurt Amsler
Peter Symes and
Scott Bennett



Illumination

Text and photos by
Kurt Amsler. Translation
by Arnold Weisz

Nice subject matter and good visibility is a prerequisite for a great image. But just as important is correct lighting.

For underwater photographers, who are not only taking photos during night dives or in caves, there are two different light sources available. The first is natural light (sunlight during the day), and second, artificial light (strobe/flash light).

Daylight is a constant light source that influences the film or the CCD-sensor in a digital camera as long as the shutter is open. This creates a photographic rule; the longer the shutter remains open with the same aperture, the brighter the image will be. Another aspect in daylight photography is the speed of the subject. To catch the image of a rapid swimming pilot whale, you should not go below 1/250 second. If you do, your image will be blurred.

Strobes, on the other hand, release their flash in a fraction of a second and are always faster than the shutter. Hence, fast mov-

ing subjects are no problem for strobes, as the light emitted will "freeze" the subject in the image.

Exposure techniques

The most ideal subjects are sea mammals that swim near the surface. The best way to catch images of these animals is by snorkeling—in this way, a strobe is redundant. Additionally, images captured without a strobe are clearer than with one.

Even in the clearest water, you will always find particles that will reflect the strobe light. Also in wreck and landscape photography, you can often skip the strobe if the distances to the subject are

not too great. Images don't get more expressive (color rich) under water, because the



red color disappears already at three meters distance anyway.

CLOCKWISE FROM FAR LEFT: Giant tube sponges on Cozumel's Columbias Reef; wreck propeller; scorpionfish

Image techniques for under water daylight images are no different from those used above the surface. But ideally, an underwater photographer should only

work with two kinds of exposure techniques: manual or shutter priority. These are the only ways which allow you to adjust the shutter speed according to the movement of the subject.



photo & video



CLOCKWISE FROM LEFT: Stingray at the Maldives; Lionfish hovers over a reef; Whale shark eyes diver in Mozambique

In manual mode uses the built-in light sensor in the camera to measure the light intensity towards the subject and sets the correct shutter speed. Working in the automatic shutter mode, the camera will take care of these settings for you. Just keep in mind the following: if the subject doesn't fill at least 60 percent of the frame, the bright exposure values from the water will carry more weight than the subject, and the camera will adjust to this. In that case, your subject—for example, a whale shark—will appear very dark. To correct for the lack of light, modern cameras have an exposure control button that you can set on 1/3 or 2/3 Positive, and the camera will slightly over expose, so the whale shark will get a better exposure.

The strobes are always faster than the subject and the camera. It is therefore impossible to reduce the amount of light by adjusting the shutter speed. To counteract this, you have to use the aperture.

Which aperture setting to choose together with each specific strobe you can often find on a table, which usually comes along with the strobe.

The main point here is the distance between the subject and camera. For those who only shoot with strobes, don't worry too much about the ambient light. This is the case foremost when taking macro or close-up images. For these kinds of images, the ambient light doesn't really matter, as the aperture is too small anyway to allow much light to hit your film or CCD-sensor. Flash-only images, where the viewer has no idea if the image was taken during day or night, are used for close-up or macro subjects.

Mixed light

As soon as you want to include more of the surrounding area or blue water, you need to take into consideration the natural light. The trick here is to mix both the strobe light and the natural light.

The strobe should illuminate the foreground of the image, and the natural light, the background. This means that you have to set the correct aperture and shutter speed on each occasion.

For example, we are taking an image of a fish and want to incorporate a saturated blue color in the background. If one uses only natural light in the image, most probably the fish will appear blurry, and the background will shine in a radiant blue because of the longer shutter speed.

If we are only using the strobe, the fish will be well illuminated, but the background will appear dark and dull. To get this kind of image perfect, you need to mix the strobe light and the natural light.

So, what's the trick? Use the aperture for the strobe and the shutter speed for the natural light. To get

a clue on the correct aperture, you can read off the table, which usually is found on the strobe. For the background, you need to trust the camera exposure meter. Use this in-built function to measure the background light—not directly

behind the subject, but about 30 degrees above. This way, you will obtain a slightly darker background because the camera will give you a little faster shutter speed and the background will receive less light.



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photo & video

The correct mix

For example, the camera exposure meter shows aperture 8 (which we need for the strobe), and the shutter speed is set for 1/30. With these settings the shutter is still open after the strobe has gone off, allowing for more natural light, making the background blue. To achieve the perfect mix, you need to practice. A good tip here is to train your eyes to measure the natural light, at different depths, at different times of the day and within a different range of visibility. Keep this in mind during any dive, and you will learn "to read the light". This will make you able to choose, without hesitation, the correct settings for mixed light images.

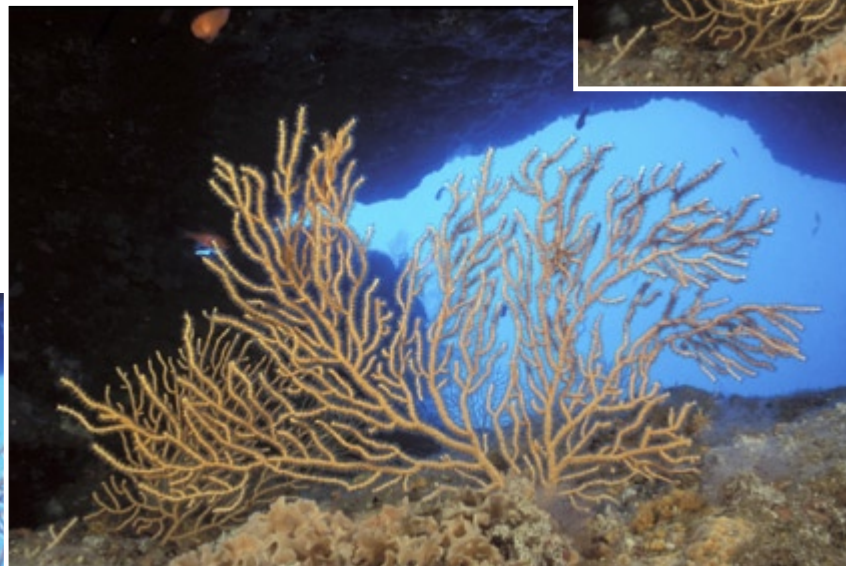
Practical tips for illumination

- Working with images in natural light



only, you have to adjust your shutter speed to match the movement of the motive.

- When taking images near the surface or in shallow water, a strobe is unnecessary. Often you may need to swim fast, and then the strobe will only slow you down.
- For natural light images, it is easier



Fan coral exposure series (top to bottom):
f8 125 seconds;
f8 60 seconds;
f8 30 seconds;
f8 15 seconds



to work with the automatic aperture. As you preset your shutter speed, the camera takes care of the aperture. You save time, and it allows you to concentrate on the subject.

- The built in exposure meter is of great help to under water photographers—specially for mixed light exposures. On the other hand, you need to have

a good comprehension of how to work with the exposure meter. Study the manual and train both on land and under water. This will help you to easily find the correct settings.

- Using strobes, there is only one rule: flash combined with aperture. As the flash-light from the strobe is always faster than the shutter speed, the only way to influence the image is by aperture.

- The exposure tables that usually come with strobes do

Illumination

not always reflect reality under water. You should always take some images with different settings of a subject exactly one meter away, and use the correct illuminated image as the foundation for your continuous work. With every change of distance by half a meter (away from the subject), you have to open the aperture by one step, or close the aperture, if you get closer to the subject. This way you can make your own table, which is adjusted to your equipment.

- Flash-only photography only makes sense when used in macro or close-up photography. For any other kind of images, in for example wide angle, you need to consider the natural/ambient light. The rules

that apply are: use flash for the foreground controlled by aperture, and get the saturated blue background by correct shutter speed.

- The background on mixed light images should always be darker than the foreground, to get a good contrast. Never measure the light directly on the subject, but about 30 degrees above (towards the surface). ■

For more information about underwater photography, Kurt Amsler and his photo workshops, visit: www.photosub.com

DivePhotoGuide.com

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photo & video



SeaLife DC1000

The newest addition to the SeaLife line debuts the Easy Set-up mode — a graphic on-screen guide that takes the guess work out of setting up the camera for great pictures on land or underwater. A 10 mega pixel CCD, powerful a 25X zoom (Optical: 5X and Digital: 5X) and four new specially designed underwater modes makes this versatile yet powerful entry-level camera a safe bet for a first underwater camera.

sealife-cameras.com

Aquatica HD WAVE

Aquatica has been providing discerning underwater photographers with high quality underwater photographic systems for over 25 years. Now they have added video housings to their range. Built with the same high quality solid aluminum construction as their digital SLR housings, no compromise was taken to create the New "HD WAVE" Video Housing for the current Sony HDR-SR11/12 and the NEW Sony HDR-XR500V/520V HD camcorders. www.aquatica.ca



Sea & Sea DX-2G

Based on the highly successful DX-1G, SEA&SEA has applied its state-of-the-art technology to develop the housing design, paying special attention to even finer and more detailed controls. The DX-2G comes equipped with 12.1 mega pixels and a large, high definition 2.7-inch LCD monitor with 460,000 pixels. Vivid and bright display that lets you see even the finest details in the picture down the 55m / 80ft the housing is rated at. Capable of RAW image photography the newly-developed image engine and enlarged buffer memory allow you to take up to 5 continuous shots in RAW mode. www.seaandsea.com



Subal 5D Mark II

The CD5MII aluminium housing for the Canon EOS 5D Mark II is Subal's newest development for the DSLR cameras. Special attention has been given to the position of the front and rear main dials and the lever for the display illumination. There is a lever in the rear housing that allows one to activate the AF-On OR the AE/FE Lock button. Generous shading of the LCD-monitor provides a dazzle-free view to the brilliant image of the camera monitor and works well with the HD-video function of this camera. The housing can be delivered with the magnifying Viewfinder Optic GS 180 or the magnifying 360° rotatable Viewfinder Optic WS45.

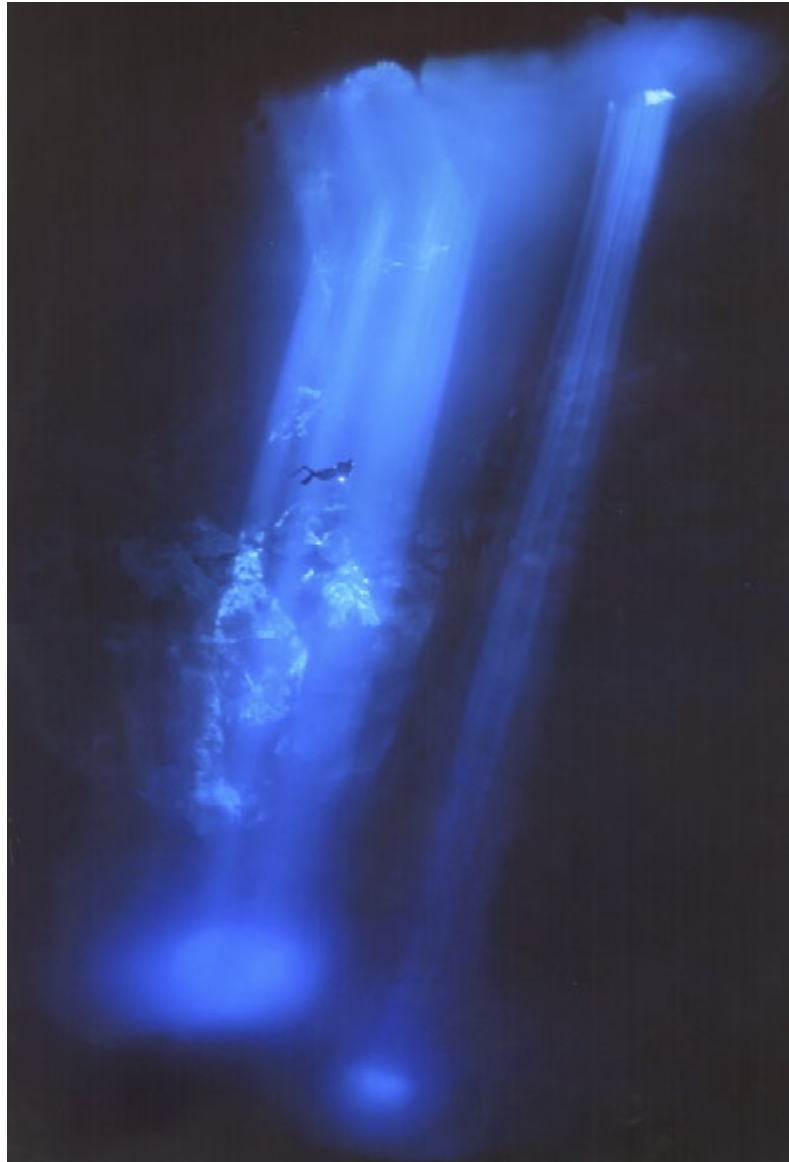
www.subal.com

Seacam 5D Mark II

Seacam shouldn't need any introduction. The trademark aluminium lightweight housing is precision-cast, double hardened and hard anodized. Black fibre coating inside. Port system has screw thread and bayonet. Plane port, macro port, manual focus macro port, dome port, wide port, fisheye port and superdome of high-grade optical glass, precisely ground, most finely polished and optical coating upon request. www.seacam.com



Winners of the Golden Dolphin Competition 2009



1st Place
Man and
Underwater
World:
Anatoliy
Beloshchin

GRAND PRIX
and 1st Place
Underwater
Inhabitants:
Alexandr
Safonov



1st Place
Black & White
Photography:
Marina
Kochetova



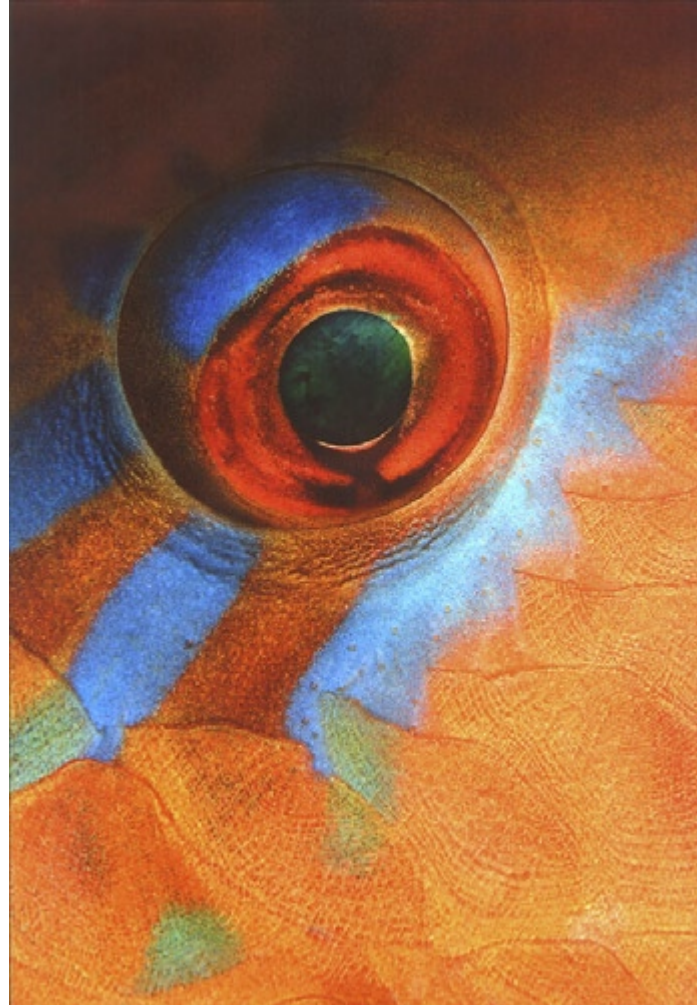
1st Place, Freshwater:
Mikhail Vedekhin

Our
motive:
Your
passion



www.subal.com





1st Place
Macro:
Andrey Narchuk



1st Place
Wide Angle:
Silvia Boccato



2nd Place, Underwater Inhabitants:
Alexandr Marinichev



2nd Place
Freshwater:
Viora Alessio

ISSUE #3
MEGAMERICAN

ALEX KIRK BRIDE: AMERICAN WATERS | CONTESTS: DEEP BIODIVERSITY & OUR WORLD-UNDERWATER | CONSERVATION: CALIFORNIA'S GREENS

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2nd Place
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World:
Anatoliy
Beloshchin



2nd Place
Wide Angle:
Olga Kamenskaya



2nd Place
Macro:
Andrey
Nekrasov



2nd Place
Black & White
Photography:
Giordano Cipriani

For more information and a full listing of 2009 results, see: www.goldendolphin.ru



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- Underwater Naturalist Course with Underwater Pioneer Neville Coleman
- Underwater Photography Clinics with Mathieu Meur from Singapore
- Underwater Film Festival
- BBQs, dinners, and Underwater Party

Contact festival organisers: Tim & Wandy Hochgrebe
Ph 02 6680 9134 info@underwaterfestival.com.au

underwaterfestival.com.au



Amazon

Our 23 day adventure started with an amazing soccer match in Sao Paulo and then into the wilderness of the Pantanal and to the Amazon. Long days in the sun, mosquitos, noisy nights with loud animal voices, thunder, rain and no cell phone, internet, or computers.

Adventure

Text and photos
by Amos Nachoum
Translated by Valentin Dosiere

Amos Nachoum Photography
Noro Airão, Amazon - Brazil
Boto catching fish
www.BigAnimals.com - 08/22/08
Canon 1Ds Mark III. Seacam housing
14mm lens, 800 ISO, 1/60 @ f-11



Unique Dive Site



We aimed to scout an expedition route to encounter Anacondas underwater, Jaguars in the wild, Piranhas in the river and the Pink Dolphin too. It was an amazing 23-day tour the force of Brazil's wildlife. We had a superb guide who planed everything and researched my unusual requests, he was very supportive and photographer friendly during the entire journey. Daniel De Granville is a celebrated wildlife photographer himself, whom I recommend highly to anyone who ventures into Brazil's wilderness. There are two more people in Brazil who were most instrumental in making this adventure a success. Mr. Lawrence Wahba, an old guest

of mine during the first years of BigAnimals expeditions, who has become a national icon and a leading wildlife cinematographer in Brazil. Also Mr. Juka, the one maverick person who I attribute the successful Anaconda encounters, and a person who can do everything by one phone call — we ask and Juka always delivered.

Breaking new ground

It seems that nobody ever attempted and executed such an undertaking to find all these wildlife encounters in one expedition. We not only we broke new ground, found new locations for Anacondas, but we have

Pink Dolphin (left and above)

Anaconda snake (right); Pirana (top right)





Amos Nachoum Photography



Amos Nachoum Photography
Yellow Anaconda emerging through the grass & over light
Fornoso river, Bonito - Brazil
Canon 1Ds Mark III, Seacam housing
14mm lens, 400 ISO, 1/800 @ f-5.6
www.BigAnimals.com - 08/11/08

added value to the local tourism industry, as I will start a new photo adventure to Brazil through BigAnimals.com, offering the best of the findings on this trip at the prime time of the year.

The food was plentiful and wonderful too, in particular the fruits. The local people were always smiling at us and among themselves, touching you for affection and curious about what we were doing, ready to help, working hard for long hours, and glad to receive whatever we had to give them. My highest compliments goes to my partner who has been with me on many adventures in the past as a guest and for



Amos Nachoum Photography
Typical day at work on the river
Fornoso river, Bonito - Brazil
Canon 1Ds Mark III, Seacam housing
14mm lens, Superdome, 800 ISO 1/400 @ f-11
www.BigAnimals.com - 08/10/08



Amos Nachoum Photography
Scouting & Police expedition - participation
Fornoso River, Bonito - Brazil
Canon 1Ds, 14 - 35mm & Polarizer
200 ISO, 1/400 @ f-8

the first time joined me on a scouting trip, Mr. John Hall. He has become a dear friend and just an amazing person to travel with, with a great attitude toward the adventure, passion about the people and the environment, and always ready to do more no matter how tired and how long we went with no sleep. Brazil is an adventure and a country which I will return to again and again.

Diving Brazil

To get better images you need to change everything... the voice inside of me was so loud... "the elusive and mighty Anaconda underwater will happen today" — and it paid off in a big way. It paid off to push the envelope in an effort to get the ultimate images. I have rarely returned empty handed from an expedition. There is little luck when it comes to working with wildlife. In the wilderness and within mother nature's law, preparation, determination and flexibility will always



Amos Nachoum Photography
How wide is this Anaconda really? compare to my hand!
Fornoso river, Bonito - Brazil
www.BigAnimals.com - 08/11/08

FIRST ROW LEFT TO RIGHT: Diving in the Amazon River; Leopard stalking prey; two views of Anaconda snakes in the Amazon River
SECOND ROW LEFT TO RIGHT: Loading the river boat; Navigating the Amazon; Gently touching an Anaconda snake in the river

or as someone local named the river today as "amosconda river". As for the Anaconda, we saw 16 animals in ten days. The biggest or the longest was eight

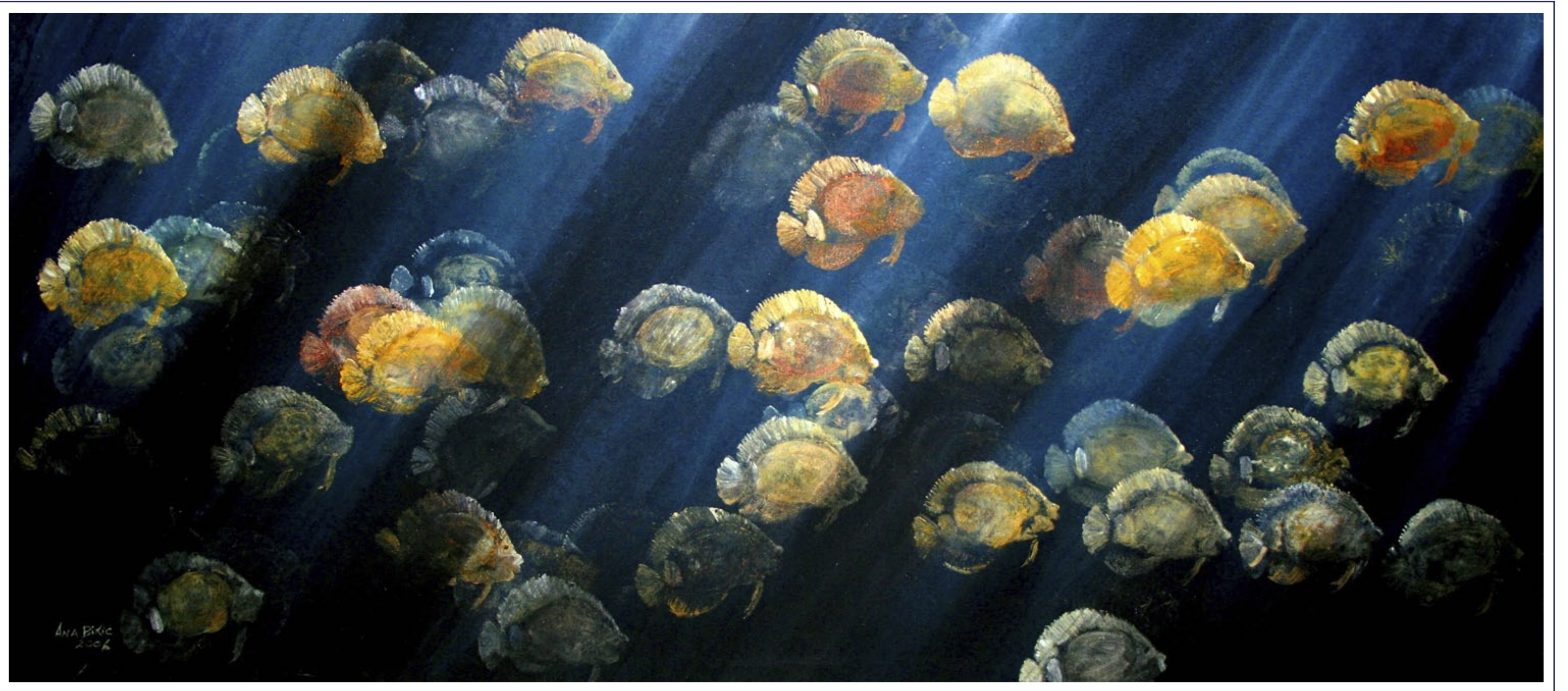
bring results, sometimes many times better than I have expected, and "it's never over until the fat lady sings"... and she sang alright on this hot, bright afternoon here on the river in Bonito,

meters (25 feet) and mighty. We swam with them, inches away with no sign of aggression. We touched them gently, and we were smiling.

For more info, see: BigAnimals.com ■



Ana Bikic



P O R T F O L I O



Originally from Argentina, artist and scuba diver Ana Bikic believes that art should play an active roll in environmental education and awareness. Her art work is designed and painted to inspire a positive message that provokes the audience to care and to participate in conservation. X-RAY MAG interviewed Bikic to find out what drives her work and inspires her artistic creations.

Bikic began her career as an artist after studying fine arts in Cordoba at the Figueroa Alcorta School of Fine Arts in Argentina. She then worked in art publishing and marketing in Spain, creating

designs for Moroccan Carpets and exhibited throughout Europe and the UK.

Bikic is currently based in Miami, Florida, and is an active advocate for various regional and International conservancy groups and community arts programs. With a profound fascination for the seemingly infinite designs of marine life and fauna, which continue to be discovered, Bikic has dived in sites around the Mediterranean Sea and now South Florida to explore the reefs.

Recently, Bikic introduced her thesis of Ecosymbolism to the international arts community at the Florence Biennale, Italy, as well as exhibiting some of her underwater paintings from her International Year of the Reef (IYOR) series, which she began in 2004. During the IYOR, Bikic exhibited these art works in South Florida at venues supported by regional groups and environmental

agencies. Her exhibits included petitions and literature, enhancing the visual experience of her paintings with facts and internet links to community conservancy groups.

Bikic edits several artist registries that promote educational and international arts networks and is currently writing a history of Miami's Freedom Tower mural for the Florida Museum and Miami Dade College. In 2007, the Reef Encounter Marine Science magazine featured her work on the cover.

Bikic's art work has been collected, purchased, auctioned and even stolen by a vast variety of people from various walks of life from colleagues in the arts to scientists to divers. Most recently, former governor of Florida, Jeb Bush, and his family acquired artwork by Bikic.



How did you become an artist?
My grandmother, Theresa Someraux, was an international fine artist who exchanged work with Picasso in the Paris café scene. Her home had a wonderful collection of Argentina's best painters, and my father, Dr Felix Bikic, was an avid art collector, too. I was fortunate

to have been surrounded by very good examples of fine art painting and sculpture from childhood on. I studied at Cordoba University and at the Firgueroa School of Fine Arts in the 1980's.

What is your creative process?
My art has been inspired by the

energy and power of creation, and so nature awakened my creativity at an early age. Because of my necessity of reaching others through my work, I have employed new symbols, ecosymbols and art that inspires 'hope' and solutions against 'fatalism' and 'contempt'. I invite you to follow the

trend of communication like the notes from a symphony; Symbols surround us all, uplift us or depress us. Art is linked to math, to learning, to investigation, to questioning, to try and try. We, the artists, have the gift of inspiration when we choose hope and communication. I am looking to inspire the 'art

world' and my peers with the art of 'Ecosymbolism'—to be a protagonist of hope, courage, dialogue and diplomacy; to exchange and engage a communication on modern contemporary art and the great responsibilities that we all are facing together.

LEFT TO RIGHT: *The Beginning*, acrylic on canvas, 26x58 inches; *Blue Tang & Sea Fan IV 2007* acrylic on linen, 18x14 inches; *The Garden*, acrylic on canvas, center panel of three, each 50x26 inches totaling 150x80 inches, from the Ecosymbolism series by Ana Bikic, 2006

portfolio

What is your mission as an artist?
My mission is to influence society and bring new ideas and a new Renaissance. Together, we need to find solutions, a new platform for change and protagonism. Our oceans, still undiscovered, are endangered; their beauty might not be witnessed by our grandchildren, so I paint to preserve that feeling of the quiet aquamarine depths. I find



Ana Bikic

TOP TO BOTTOM:
Manatee nursing ground
acrylic on canvas
66x20 inches

Loggerheads
acrylic on canvas
22x66 inches

Endangered Green
acrylic on canvas
21x53 inches



light. The kelp forests or the rain forests, the distortion caused by temperature differences in water or air, the underwater landscape can be just as vast even though you can't really see that far off. I spend hours pouring over other divers' wonderful photos and reading the latest marine biology reports. My environmentalist beliefs come from my family's scientific side. Reasoning, research and the rational solutions still leave us with the need for inspiring action. Art is a powerful tool to share concerns and provoke reactions. Last year, I wrote an art thesis and move-

ment called *Ecosymbolism*. It was presented at the Florence Biennale 2007 and as a literary piece at Books and Books, Coral Gables in 2008. Ecosymbolism art should be inspiring, positive and well studied. The current text is published on line at www.ecosymbolism.org. I invite everyone to read it and join my Facebook page, too.

Where would you like to dive in the future? Around the Indic and Western Pacific ocean would be a magnificent experience, having such diverse schools of colored fish and coral reefs.

that artists have created a reputation for themselves by their unwillingness to attempt difficult subjects and techniques. Symbols of banality abound in art shows, so I am very grateful to X-RAY MAG for this opportunity to talk. Art can catalyze awareness by its iconic or symbolic message; I paint to inspire environmental awareness.

What are your thoughts and feelings about the underwater world? The underwater world is mysterious, full of riches and spirituality, conceding an indescribable feeling. The sensation created by the combination of light, depth and diverse scenarios that this unknown realm has to offer us is truly magical.

Are you a scuba diver and how did you start diving? I'm not a professional scuba diver; I do it for fun and as a hobby, mainly as a working tool for my art work. In other words, I'm an enthusiast—an artist that dives into other people's underwater photography, too.

What are your favorite dive locations and why? Indonesia, Malaysia, and diverse locations around the Indic Ocean are some, due to their beauty and vast amount of different species they have to offer. I also promote and heavily support South Florida and the Caribbean for conservation.

How does the underwater world affect or influence your art work? It's all about the



portfolio

Who are your idols or mentors in art and/or diving? Most of us owe such a debt of gratitude to the Cousteau experience. Even in black and white, his films were so mesmerizing to me as a child. I sometimes wonder how great painters like Rembrandt and Da Vinci would have handled the underwater world if they had scuba dived and cameras to see nature beneath the waves.

What is your favorite quote about art or the underwater realm?

How inappropriate to call this planet "Earth" when clearly it is an Ocean. — Arthur C. Clarke

What are your thoughts on art and ocean conservation? I use my art world as a catalyst to create awareness, bringing humanity to understand we have a moral responsibility. Art has had an impact on society and politics. Everything that revolves around us has an influence on each other, and what we evoke, leaving a legacy of knowledge and dialogue for the future generations.

I hope these events will help us 'naturalist' painters to be taken more seriously and for the voices of conservancy to be honored with real policies that are based on science and not on short term profit gains. No matter how painful the facts that scientists acknowledge, we have a duty to at least listen. The message that some scientists are predicting is catastrophic.

Artists who create with these concerns for the environment will have plenty of challenges to find a more meaningful iconography for contemporary art tastes. I hope the fashion of concern for the conservancy movement really translates into a deeply cultural endeavor for everyone. The



annual beach and waterway clean ups are great local initiatives and spread globally, many artists around the world participate in bringing the media attention to the local culprits.

What are your current and future projects? The IYOR 2008 is ending, but I hope we can keep the awareness effort going, that we can join with other groups protecting rain forests and water quality, too, in order to explain how everything in nature is so indelibly linked.

Locally, I'm very interested in the problem of invasive species like the lionfish along our reefs; they are gobbling up the natural inhabitants at an alarming rate. I believe we are going to need to literally weed them out, like a vegetable garden needs weeding. I have concentrated on the Florida fauna recently, and I am currently researching the Barrier Reef's lat-



CLOCKWISE: *Face of the Reef*, acrylic on canvas, 52x36 inches; *Sponge Cave*, acrylic on canvas; *Blue Tang Sea Fan*, acrylic on linen





Ana Bikic

again with the brush. I want to encourage others to witness this, to explore the magnificence of the underwater realm.

Do you have prints available of your work, and if so, how can they be purchased? I have made most of my IYOR 2008 and Ecosymbolism series available on **fineartamerica.com**. I also donate 15 percent of my sales to the Reef Relief groups as well as some originals.



Is there anything else you would like to share with our readers about yourself, your artwork, and/or your relationship with the sea?

Through the dialogue of Ecosymbolism Art, I would like to continue promoting the oceans, educating society, since we need to bring solutions and positive outcomes to the dilemmas that humanity faces today. This year, I'd like to inspire and invite all the other art-

ists to participate and take on the challenge, and through this iconography, to find a new Renaissance of hope, optimism, change and creating a bridge between the sciences and the arts.

Ecosymbolism Art offers positivism expressed in art with sincere and intellectual emotion, empowered by the visual language of symbols. It aims to bring dialogue between audience and subject using inspiration of effort and integrity of content. It hopes to bring a more profound iconography for art, which aspires to create hope and noble solutions through the dialogue of humanity's symbols.

For more information, visit Bikic's website at: **Anabikic.com** and **Ecosymbolism.org** ■

est updates from Reef Encounter, which used my art last year.

www.fit.edu

This year, I'm also working on a theme of immigration and writing an art history article for the Florida Historical Museum about the Miami Freedom Tower Mural. I was involved with the Miami Artisans, and we are very proud to have a significant public art work included with this Landmark Status building.

Are you an underwater photographer and if so, how do you use this in your art work?

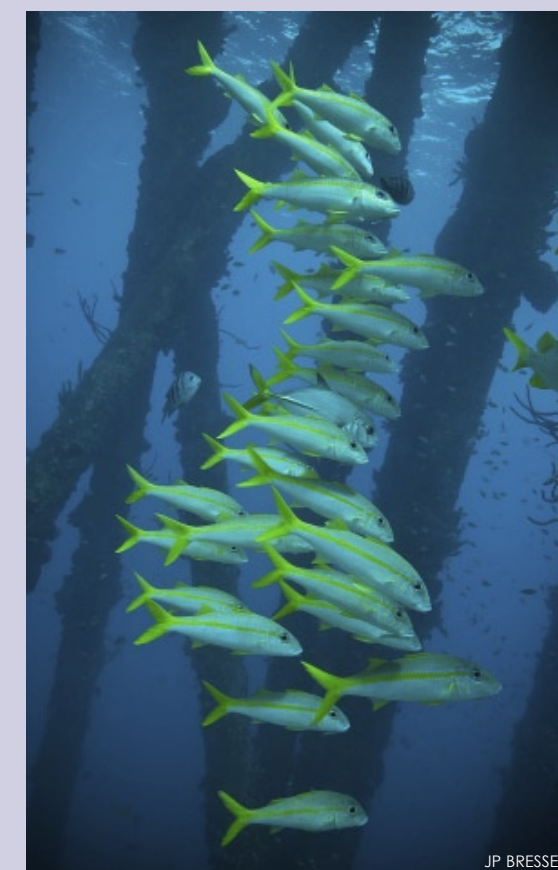
I'm not exactly an underwater photographer, I'm more of an enthusiastic, demonstrating my fascination of its environment through my paintings. Everyone has been so generous sharing their images on the net. The advantage of painting an underwater landscape rather than enlarging a photo is that I can create the picture composition and control the light, movement and color. The drama and the ballet of life begin to come to alive

IN OUR NEXT ISSUE

Fiji
Bonaire
The Amazon



SCOTT JOHNSON



JP BRESSER

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Redreef, acrylic on canvas, 18x24 inches (above) and *Turning Point*, acrylic on canvas, 30x54 inches (top left) from the Ecosymbolism Art series by Ana Bikic, 2006; portrait of the artist (center inset)

