

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



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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 THORSTEN REPP

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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 at Kwajalein Atoll. Photo by Thorsten Repp



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C'mon!

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

You can do better

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



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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

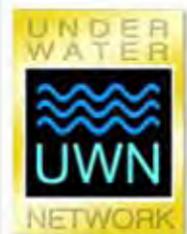
ambassador. This year's visiting luminaries include David Doubilet of National Geographic, Peter Scognes of BBC Blue Planet, Planet Earth, deep sea explorer Dr Phil Nyutten and many, many more.

The Celebrate the Sea Festival is a non-profit event funded and produced by OceanNEvironment 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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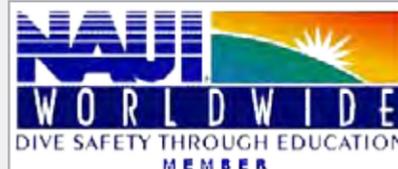
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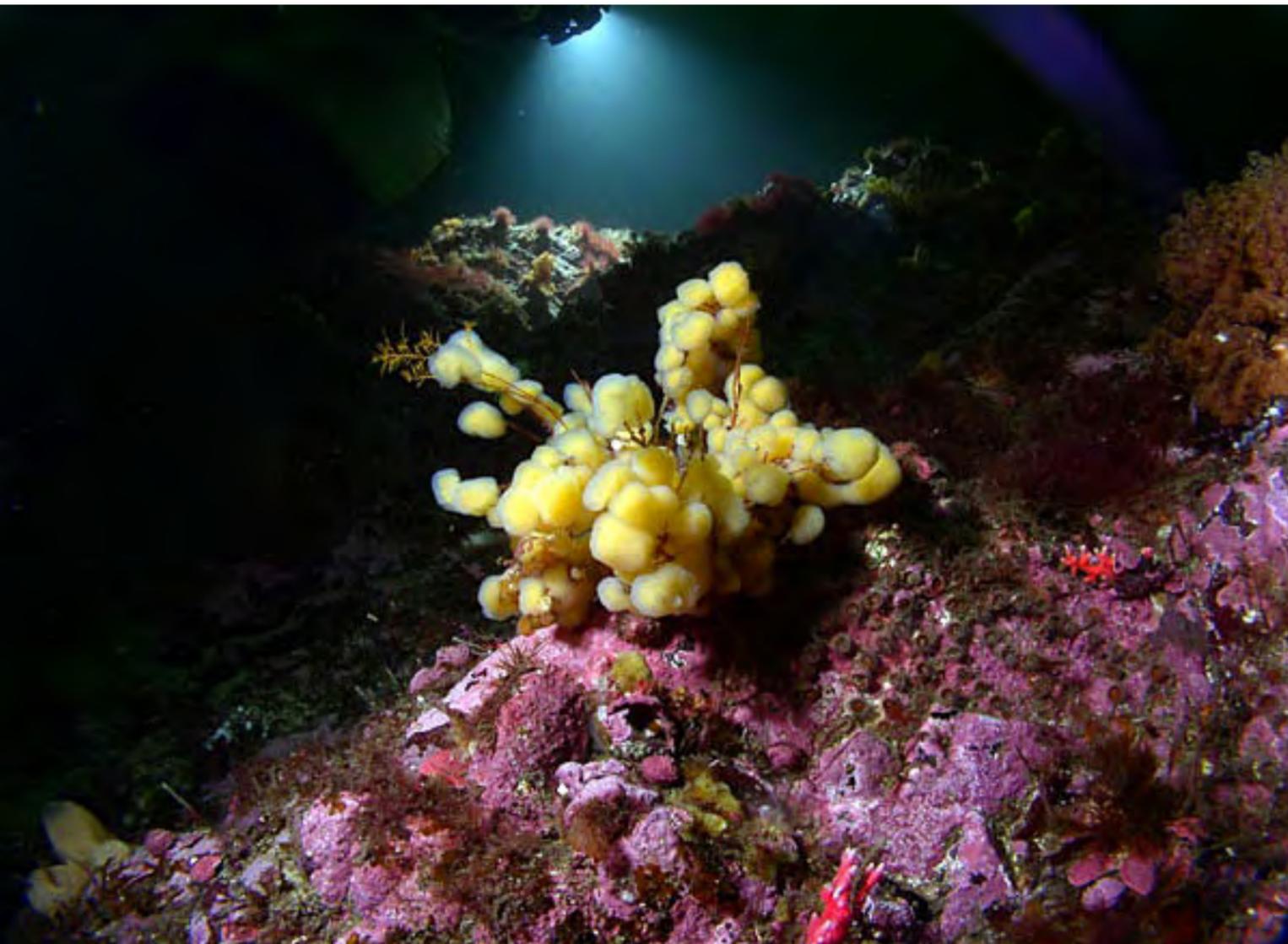


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News edited
by Peter Symes
& Arnold Weisz

NEWS

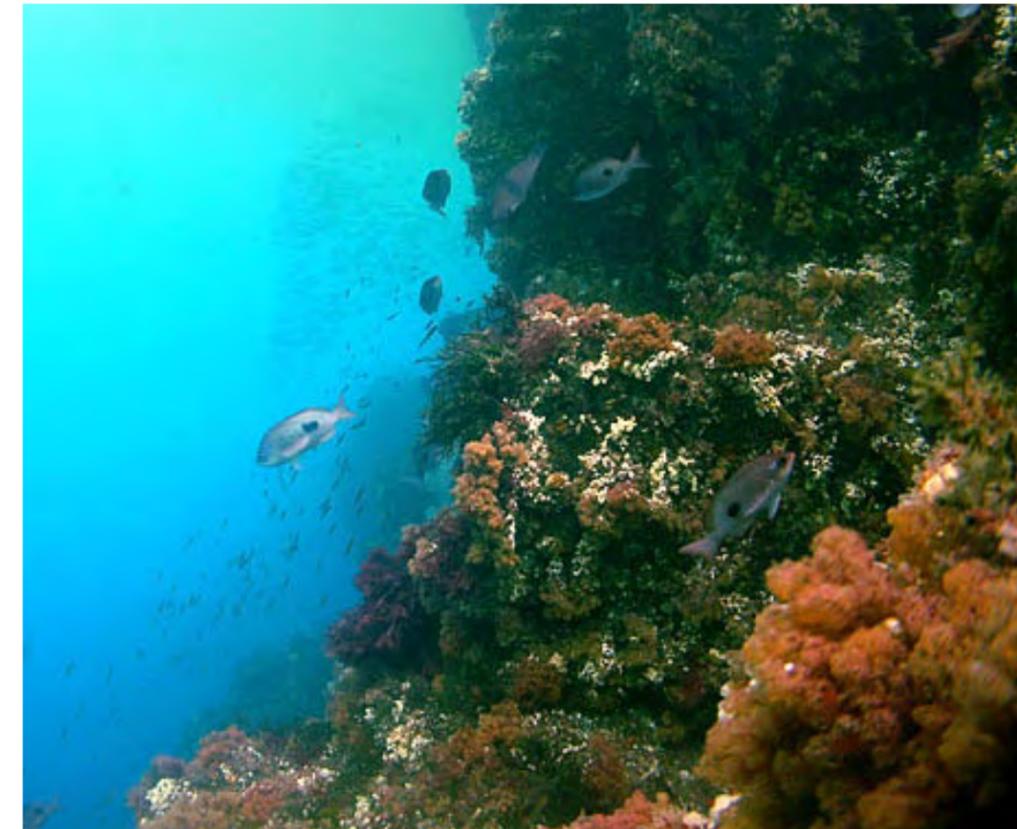
Scientific sub makes deep-sea discoveries



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.

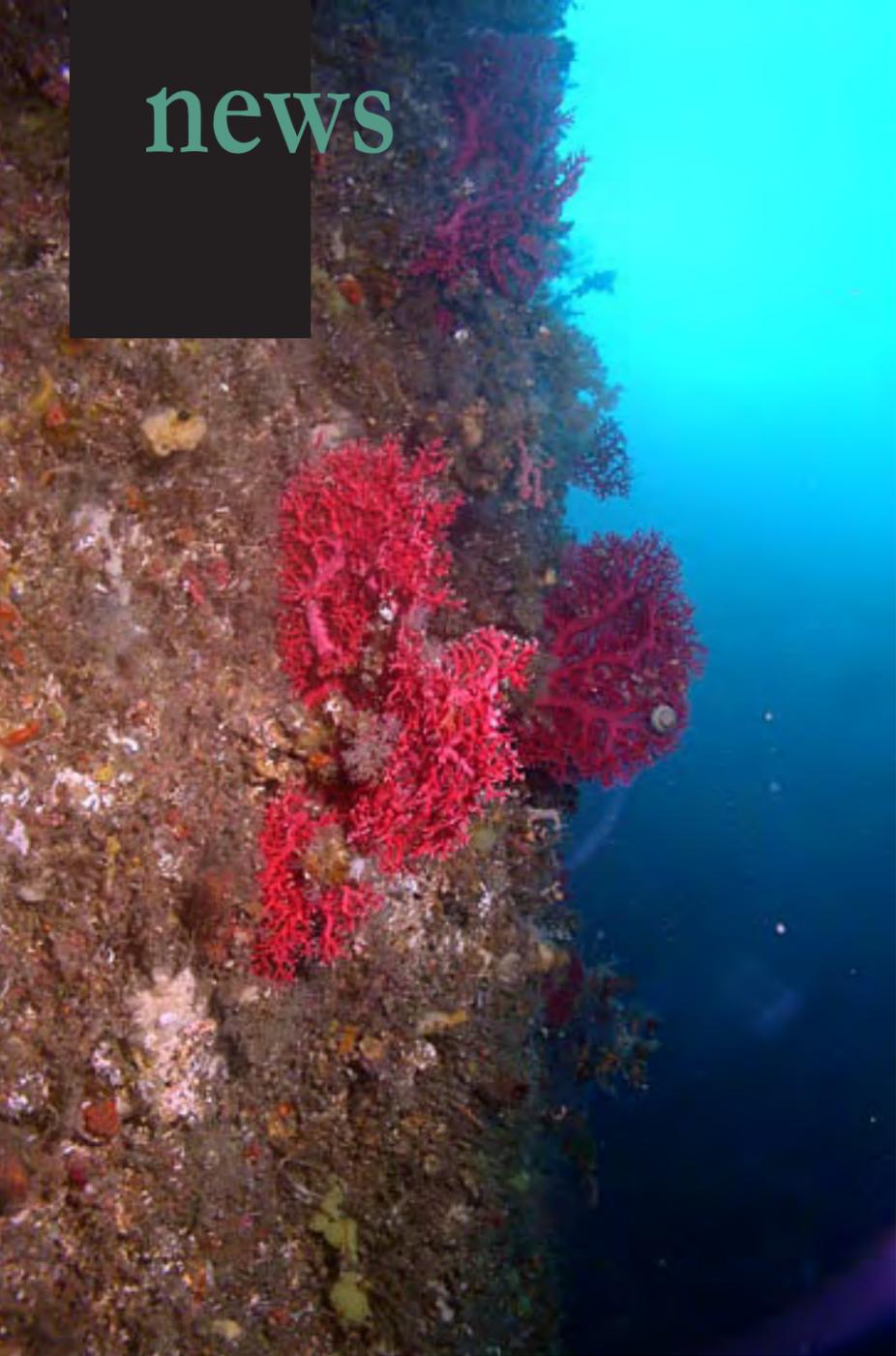


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A bright red, undescribed species of shell-less coral, called an anthomastid or gorgons-head coral, at 1700 metres deep at the Cascade Plateau, off southeast Tasmania



+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. ■



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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.

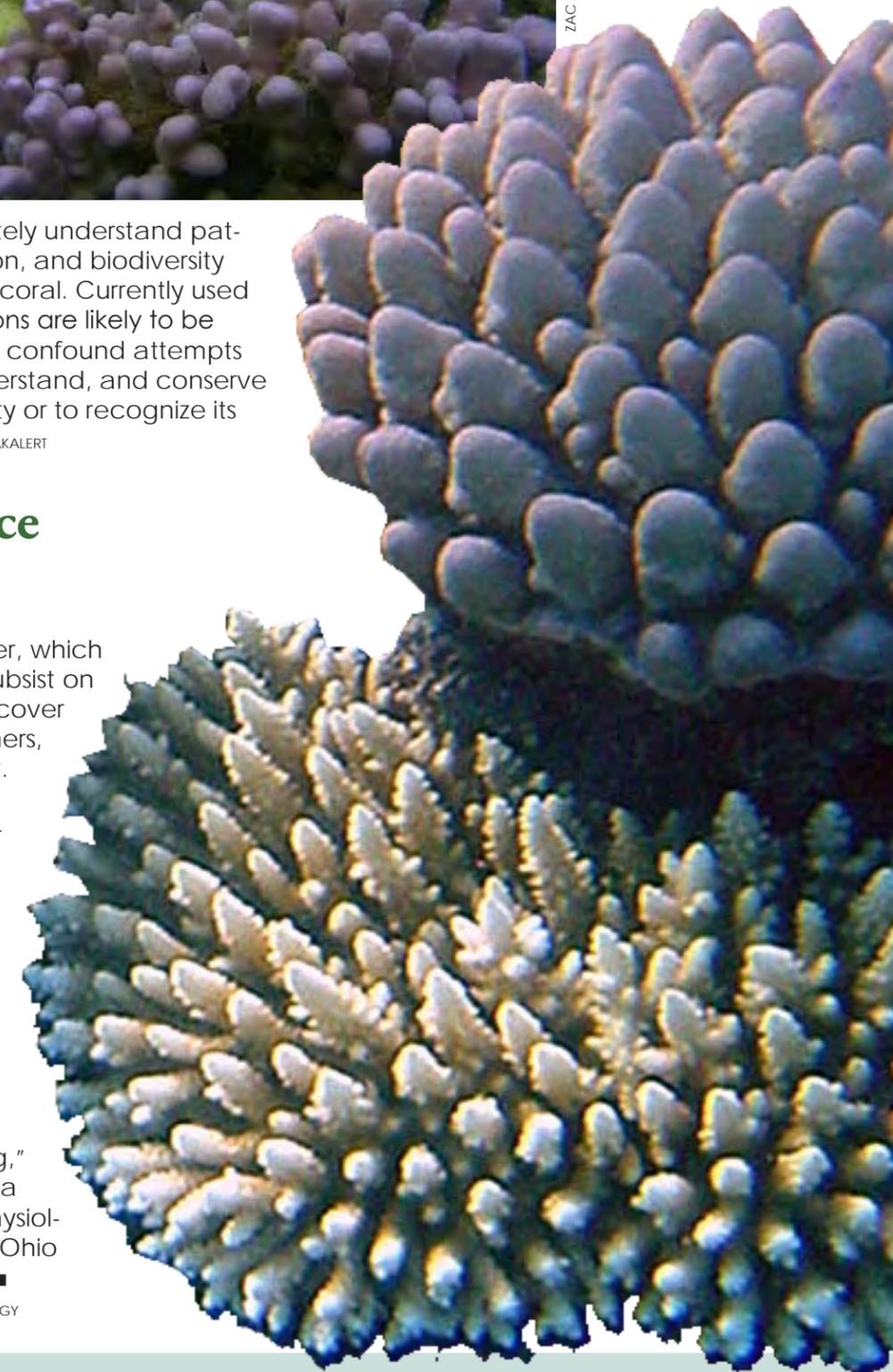
The main factor is the amount of energy stored as fat in the coral's tissues. This in turn depends on the level of the food supply in the water prior to the bleaching event, how recently the corals spawned and whether or not there have been other disturbances such as human activities, storms, low tides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

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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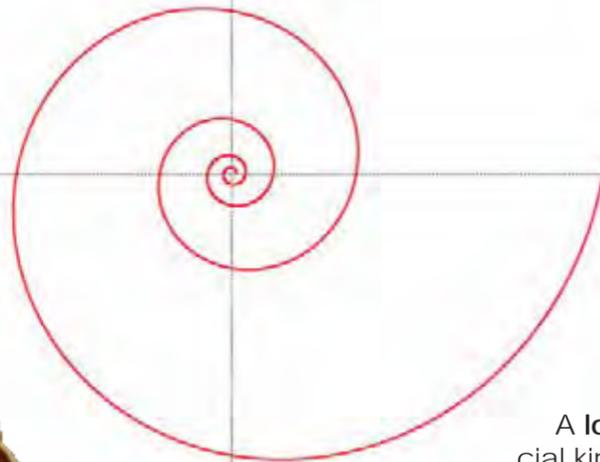
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Math rules Snails and shells

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

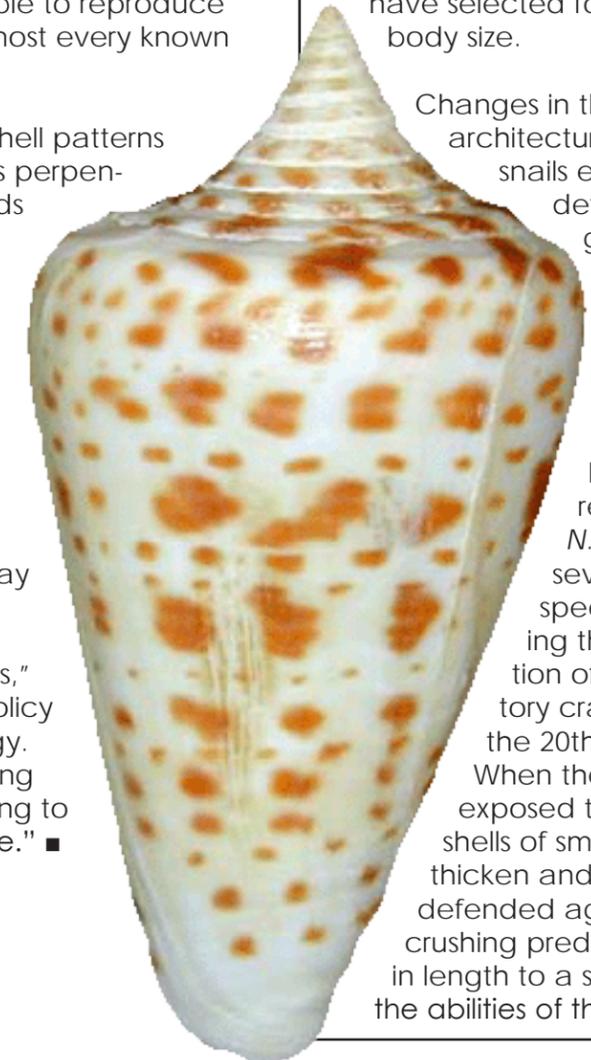
Molluscs in the northwest Atlantic Ocean have undergone a dramatic increase in shell size during less than a century since 1915. Atlantic dogwhelk, *Nucella lapillus*, has had its shell length increased by an average of 22.6 percent during the past century, with no evidence of changes in other shell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

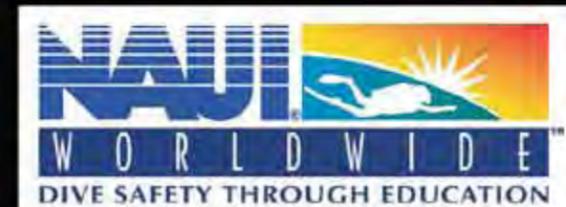


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Sea squirts able to regrow entire body from just one blood vessel

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

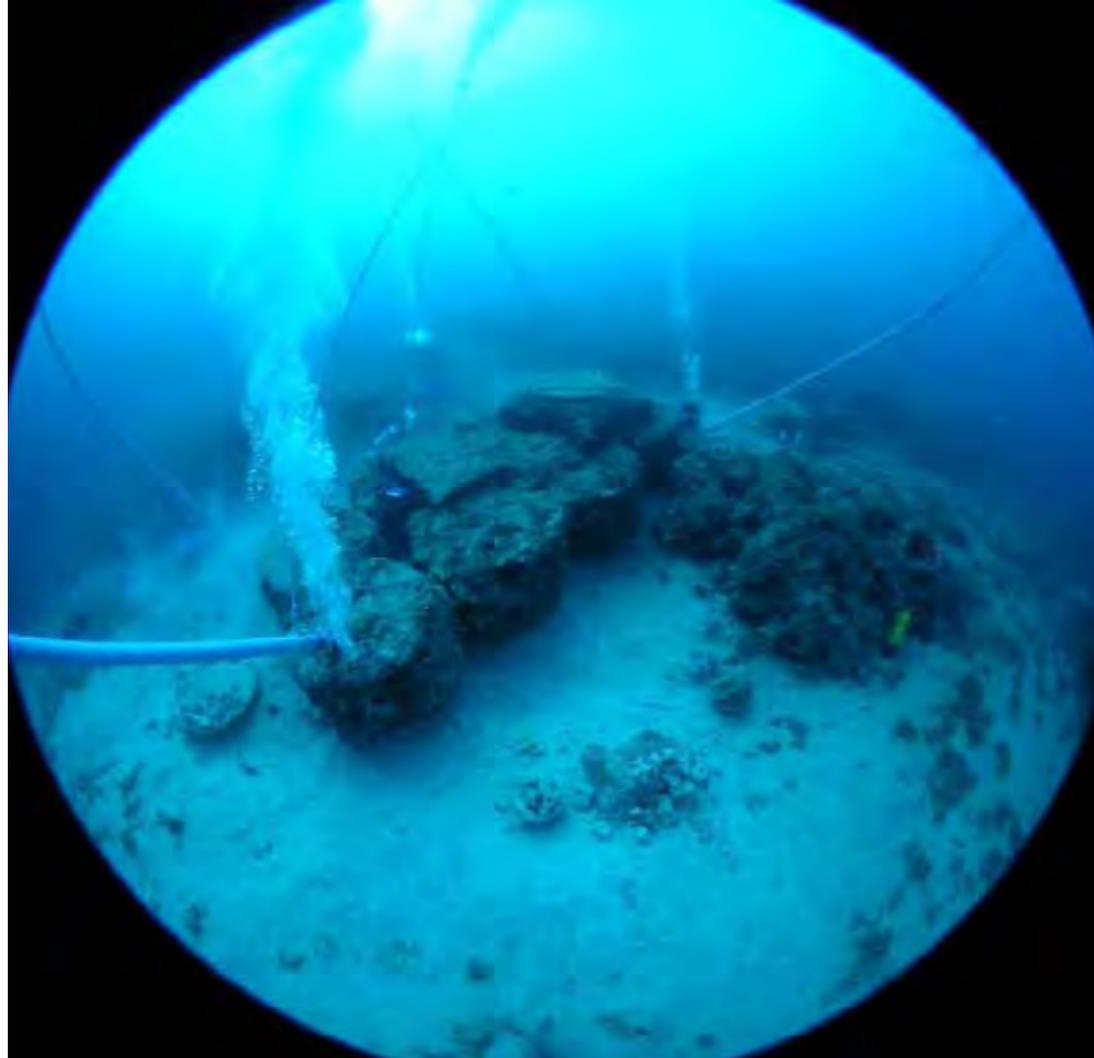
Ancient Shipwreck's Stone Cargo Linked to Apollo Temple

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. ■



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Low tide at Akko

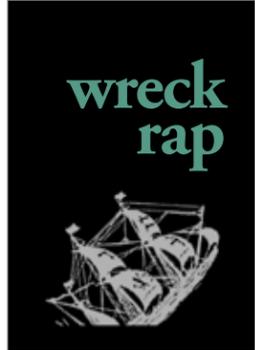
The ancient seaport of Akko (Acre) is one of the world's oldest continuously inhabited cities. The first recorded mention of Akko dates back to the reign of the pharaoh Thutmose III, who ruled from 1504 to 1450 b.C. Remains of a unique and impressive floor, discovered at a depth of one meter underwater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

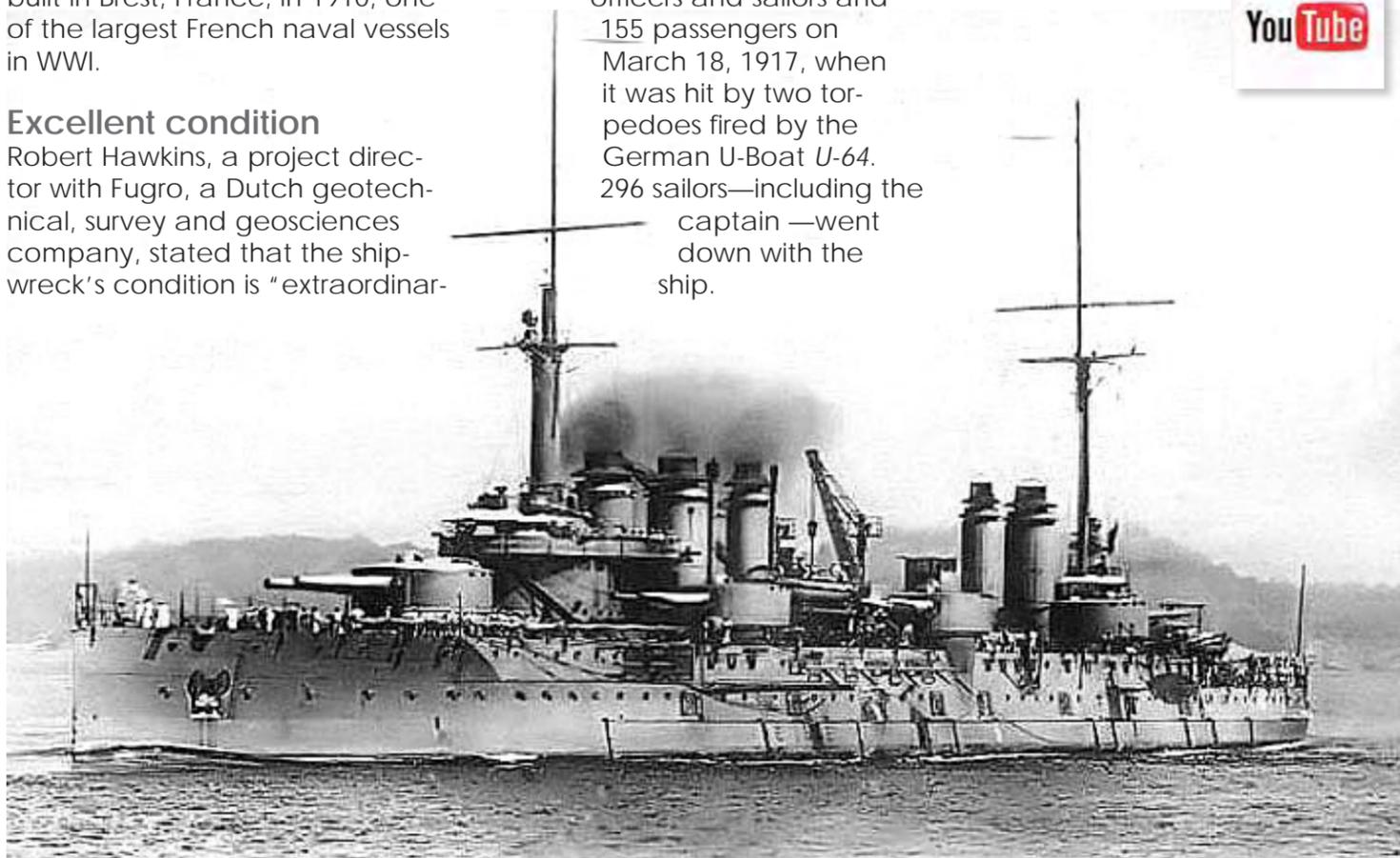
Robert Hawkins, a project director with Fugro, a Dutch geotechnical, survey and geosciences company, stated that the shipwreck's condition is "extraordinar-

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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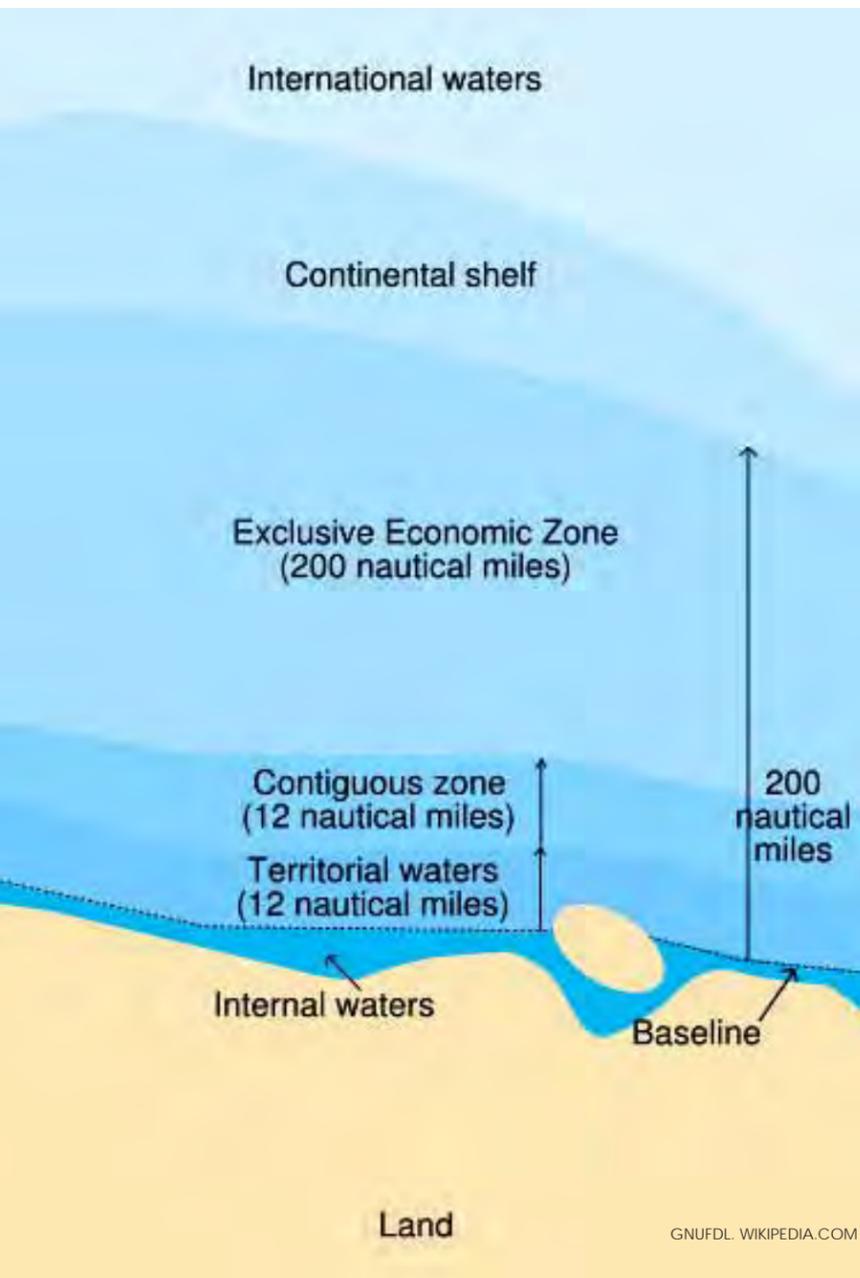
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Who Owns a Shipwreck?



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

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.

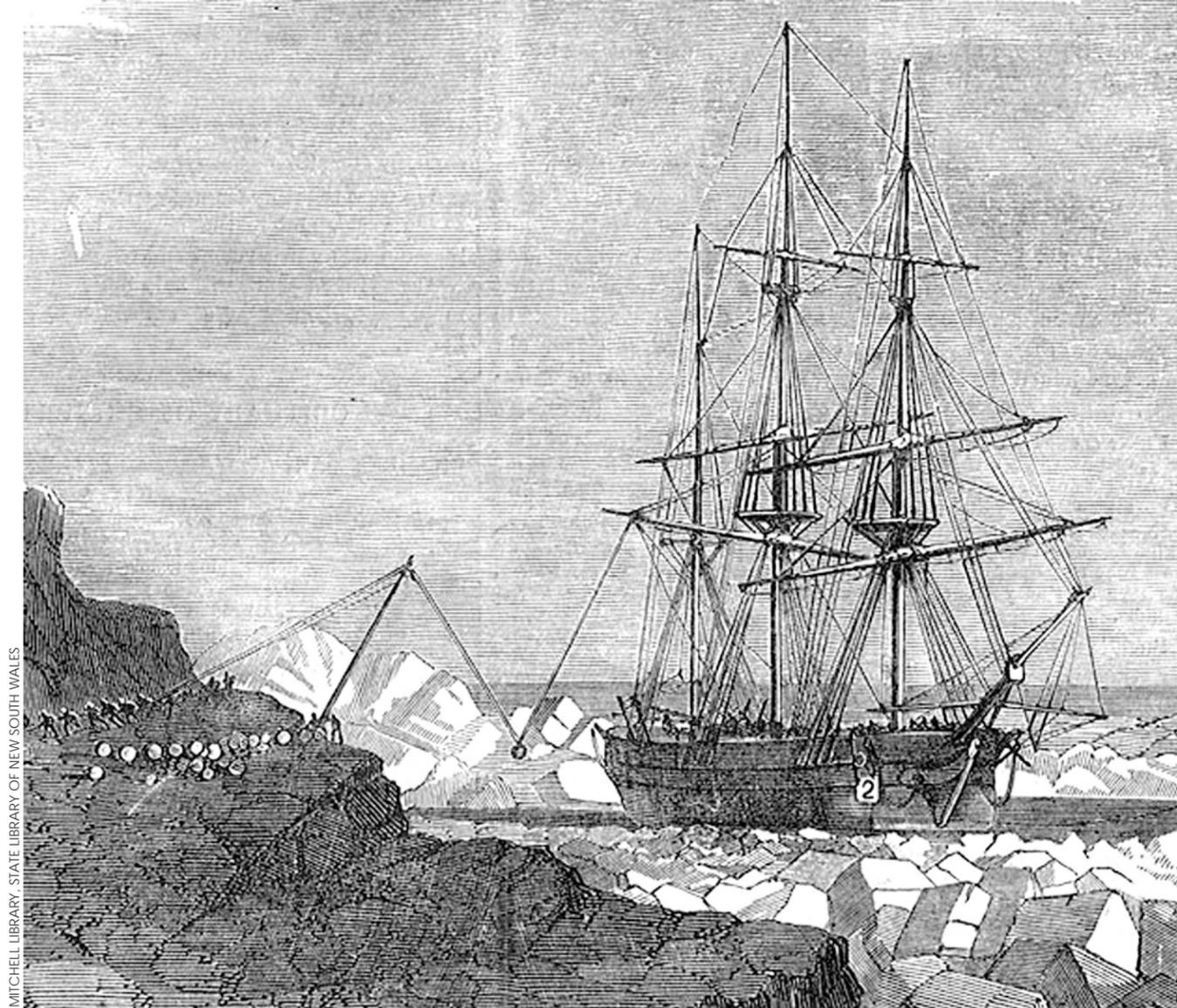
In 2007, the US implemented further legislation to protect the wreck, as part of an international agreement with the United Kingdom and Canada. The National Oceanic and Atmospheric Association (NOAA) will represent the US, regulating dives to *Titanic* from the United States.

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 ■

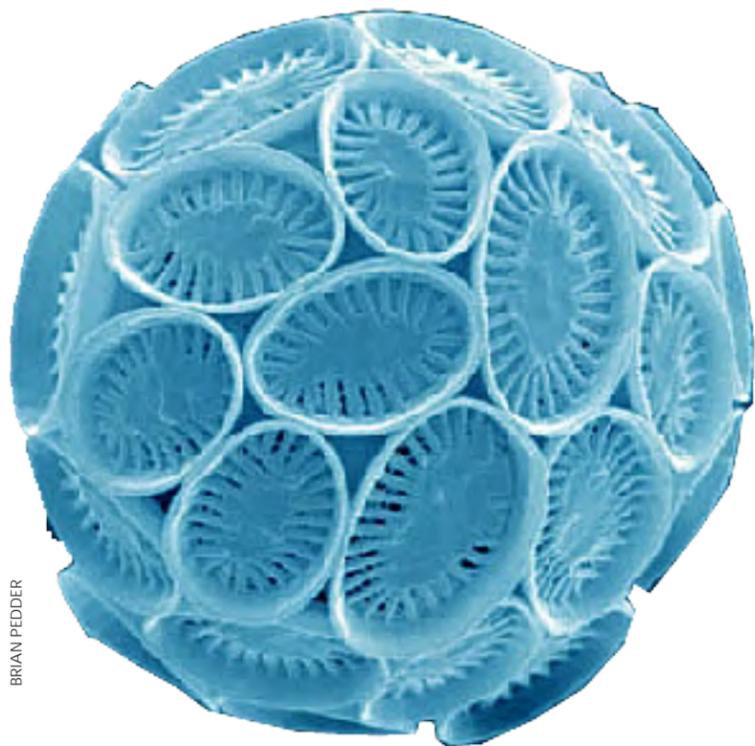


HMS Breadalbane

MITCHELL LIBRARY, STATE LIBRARY OF NEW SOUTH WALES

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

"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."

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." ■

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

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. ■



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. ■

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 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



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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. ■

