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COVER PHOTO BY PAUL FLANDINETTE

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COVER PHOTO: Endemic Oman anemonefish in bubble coral, Dhofar, Oman
Photo by Paul Flandinette (**paulflandinetteimages.com**)

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Schools of bannerfish and fusilier, Dhofar, Oman. Photo by Paul Flandinette

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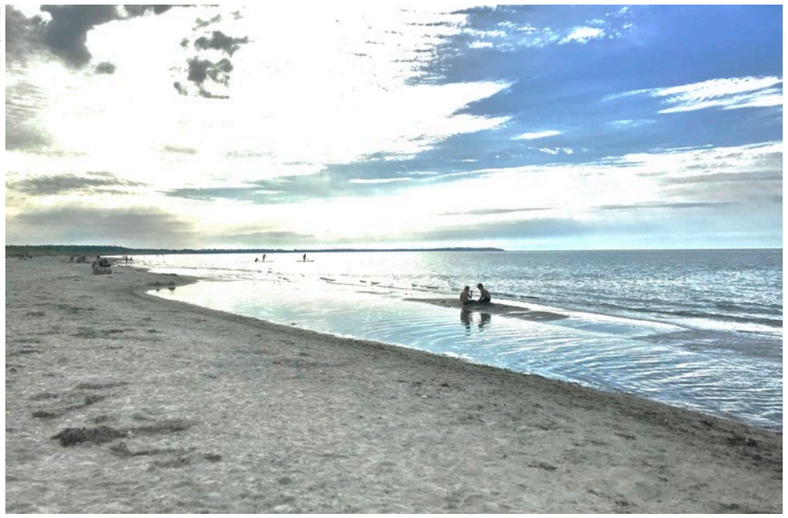
An Innate Connection

PETER SYMES



Take a close look at this image. When was it taken? Last year, actually, but it could have been 60 years ago. It shows the beach where I spent most of my childhood summers, since I was a toddler, and where I have spent most of my summer holidays ever since. In the photo, it is as if time has stood still. Those kids playing on the sandbar could have been my brother and me as children.

So little has changed. This place has always been my sanctuary, and it remains so, over half a century later. I still feel a deep connection to the ocean here, where I can sit and daydream, disconnected from the chaos of everyday life. I still explore the shallow lagoons that have formed inside the protective sandbars, searching for small creatures like shrimp, crabs and fish. You never know what you might find. Beachcombing never gets old, nor does taking a refreshing plunge head-first into the incoming surf.

Back then, my grandparents watched out for me and ensured I was safe and did not get sunburned. Now, I am a grandparent myself, which instils a wonderful sense of continuity.

Of course, I am also all the wiser now. I have since gained a graduate degree in biology, a thick deck of dive certifications, and I have been fortunate to explore breath-taking underwater worlds across the globe.

Yet, this beach is where my passion for the ocean began. I vividly remember wondering about the mysteries hidden beneath the waves. Now, I have had the privilege of uncovering some of those secrets.

Perhaps some of the children playing on the beach today will also grow up to be drawn to the ocean, becoming biologists or passionate divers. I hope they do.

However, I cannot help but worry about the world we are leaving to future generations. Climate change and coral reef bleaching events cast an ominous shadow over the future of our oceans.

It saddens me that my generation has been criminally poor at heeding the many warnings and taking the necessary action. For decades the signs have been clear, yet we have failed to act decisively. Now, our children and grandchildren are bearing the consequences. Can we repair the damage? It is uncertain. While some ecosystems can recover with proper management, others may be lost forever.

Despite these challenges, there is hope. Marine-protected areas have shown that ecosystems can rebound if given the chance.

We have the power to protect the ocean, but it will take dedication and sacrifice. The question is: Do we cherish the ocean enough to safeguard it for future generations? Do we believe in leaving behind a better world?

— Peter Symes
Publisher & Editor-in-Chief

Greece Announces Major Initiative for Marine Parks

Greece commits €780 million to establish marine parks but rival Turkey and environmental groups are not impressed.

In a significant environmental move, Greece has announced plans to invest €780 million (US$848 million) in the creation and maintenance of marine parks across the country. These initiatives aim to protect marine biodiversity and make Greece a leader in marine conservation in Europe, including a ground-breaking ban on bottom trawling in all marine protected areas.

Extensive marine parks

According to the Greek Prime Minister, this investment will facilitate the establishment of extensive marine parks to ensure the protection of marine life and habitats. Greece's commitment also includes the innovative step of banning bottom trawling, a fishing method that causes significant damage to seabed ecosystems, in all of its marine protected areas—a first in Europe, as reported by Euronews.

The funding will be used to improve marine biodiversity and support sustainable fishing practices, which are expected to benefit both the environment and local economies dependent on fishing and tourism. These efforts are part of a wider strategy discussed at the recent Global Ocean Conference, where Greece showcased its commitment to marine health and sustainability.

Criticisms

However, the plan has not been without its critics.

> *The ocean has paid a heavy price for its service to humankind. It has been a vital source of life and livelihood. We have not been kind to it in return.*
>
> — Prime Minister Kyriakos Mitsotakis

Regional geopolitical tensions have surfaced, particularly over the demarcation of marine parks in areas disputed by neighbouring Turkey. Comments from both Greek and Turkish officials highlight ongoing disputes over territorial waters, which could complicate the implementation of conservation projects.

Moreover, some environmental groups and experts argue that while the creation of marine parks is a positive step, the measures do not go far enough to address the root causes of marine degradation. Concerns remain about enforcement and the actual effectiveness of these marine parks in conserving biodiversity, suggesting that the creation of these zones is only the first step in a more complex conservation effort.


PETER SYMES

Meeting the goals

Despite these challenges, Greece is pressing ahead with its ambitious plans, marking a significant step forward in marine conservation and setting a precedent in Europe. However, the success of these efforts will depend on careful management, international cooperation and addressing the underlying issues raised by critics to ensure that the parks achieve their intended conservation goals. ■ SOURCE: REUTERS

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Antarctic Wildlife Threatened by Lingering Hole in Ozone Layer

In recent years, the hole in the ozone layer over the Antarctic has persisted all the way to December, thereby exposing the local wildlife and emerging vegetation to the sun's ultraviolet rays.

The ozone layer is back on our radar. Although its condition has improved after the Montreal Protocol was implemented, the hole reappears every spring over the Antarctic.

In recent years, it is no longer just a winter phenomenon anymore; it Is stretching into the early summer, coinciding with crucial times in the life cycles of local wildlife and emerging vegetation, exposing them to the sun's ultraviolet rays. As our planet changes, the timing of this exposure could have profound effects on the delicate ecosystems of the Antarctic.

Hole in the ozone layer

The hole in the ozone layer was first discovered in 1985, caused by chemicals, primarily CFCs (chlorofluorocarbons) that were used as refrigerants. To prevent further depletion, the Montreal Protocol treaty was signed two years later in which countries agreed to phase out the use of such chemicals.

This has aided in the recovery of the ozone layer, However, this does not last throughout the year. "... There's a hole—an area where the ozone layer is very depleted—that appears every spring over Antarctica," said Prof Sharon Robinson, deputy director of University of Wollongong's Securing Antarctica's Environmental Future research programme.

The hole usually peaks around September and October, when most land-based animals and plants are under snow cover and the marine animals are under thick sea ice. Such conditions are beginning to last till December-Antarctic summer-and this is not ideal.

"That's when things will be exposed and most vulnerable," said Prof Robinson.

Effects on animals

In humans, exposure to certain types of ultraviolet radiation from the sun, called UV-B rays, increase the risk of skin cancer and cataracts. As for the Antarctic animals, while Robinson thinks that they could possibly be protected by their fur and feathers, the biggest risk to them would be eye damage.

After reading through past studies about the effects of UV on Antarctic plants and animals, the research team found evidence of Antarctic mosses that synthesised their own protective "sunscreen compounds", as well as krill moving progressively deeper into the ocean to avoid UV rays. A consequence of the latter was that the animals that consumed krill (like whales, seals and seabirds) would need to swim deeper to feed on them.

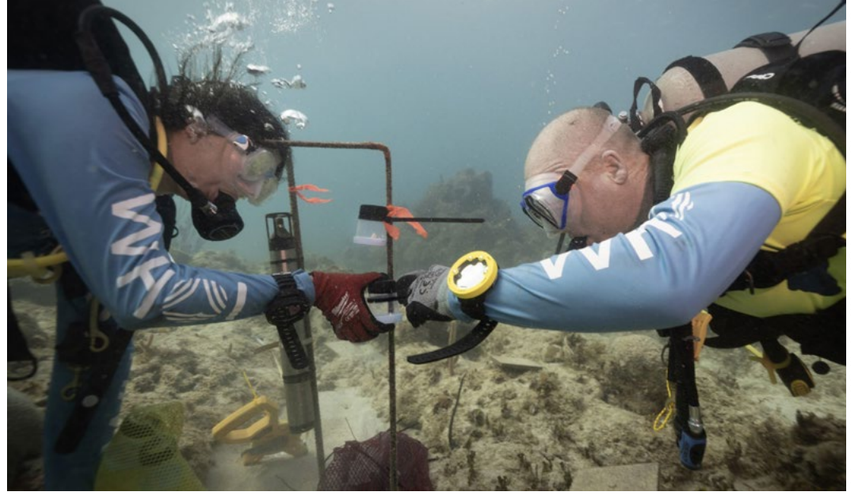
Roadblocks to recovery

The ozone hole's recovery has not been a smooth one. Reasons for this include large volcanic eruptions and wildfires-including the massive Australian bushfires in 2019 and 2020 that release particles that fuel ozone-depleting reactions in the ozone.

Jim Haywood, Professor of Atmospheric Science at the University of Exeter, described the record duration of the Antarctic ozone hole in recent years as "a wake-up call" in a BBC News report.

"Society cannot be complacent about our achievements in tackling it," he said. ■

SOURCES: BBC, GLOBAL CHANGE BIOLOGY



DAN MELE/ © WOODS HOLE OCEANOGRAPHIC INSTITUTION / VIA MEDIA RELEASE

WHOI biologists Nadège Aoki (left) and Aran Mooney set up an underwater speaker system to emit the sounds of a healthy reef at a site in the US Virgin Islands.

Playing Thriving Reef Sounds Could Save Damaged Corals

Researchers at the Woods Hole Oceanographic Institution (WHOI) are investigating the potential of using the sounds of thriving reefs to aid in the restoration of damaged ones. Nadège Aoki, a doctoral candidate at WHOI and the lead author of a study on this topic, stated that her research indicates coral larvae may use sound cues when selecting a location to settle.

A reef that has deteriorated due to factors like coral bleaching, disease, or human activities loses its ability to sustain a diverse range of species and emits a significantly quieter and less vibrant soundscape. According to the recent WHOI study, sound could be an important tool in the efforts to restore coral reefs.

Last summer, the team conducted their research in the US Virgin Islands. They set up speakers to broadcast the soundscape of a healthy coral reef in an area where the reef had deteriorated. Their findings revealed that this acoustic environment prompted coral larvae to recolonise the damaged site.

An increase in settlement

The WHOI researchers told CAI the coral "settled at rates 1.7 times (and up to 7x) higher in a degraded environment enriched by recorded sounds than at reefs where no sounds were added, underscoring the power and potential of this enrichment technique."

Aoki expressed optimism that this method could contribute to coral reef restoration efforts, admitting that sound alone would not solve all the problems on a reef, but to give corals a fighting chance, there needs to be an array of tools available to use and sound could be one of them. She noted that her team also observed fish congregating near the speakers, which she hopes could initiate a beneficial cycle.

"If you are able to attract some of these animals to an area that maybe they aren't going to for some reason, and if they're able to survive and thrive there, then they are going to start producing those sounds and those cues that will attract more animals back," said Aoki.

A passive approach

Aoki mentioned that certain reef restoration techniques can be quite labor-intensive, whereas using sound offers a more passive approach. The research involved collaborating with WHOI Engineer Ben Weiss to ensure that the recordings were played from the speakers at the appropriate times of day, aligning with when fish and other marine creatures would naturally produce the sounds being broadcast. WHOI intends to conduct similar studies on Pacific corals in Hawaii later this year. ■ SOURCE: CAI, WHOI

Edited by
G. Symes

COURTESY OF MIDE

COURTESY OF MIDE

THIS PAGE: Scenes from the Malaysia International Dive Expo 2023, at MITEC in Kuala Lumpur.

AsiaEvents Unveils the 18th Malaysia International Dive Expo 2024

AsiaEvents Exsic is delighted to announce the 18th Malaysia International Dive Expo (MIDE) in 2024. Set for 7-9 June 2024 at the Malaysia International Trade Exhibition Centre (MITEC) in Kuala Lumpur, this year's expo, themed "Embracing the Ocean's Majesty," promises to be an immersive celebration of diving and marine exploration.

A premier event for diving enthusiasts, adventurers and marine conservationists, MIDE 2024 will showcase the latest innovations, trends and experiences in the diving industry.

Attendees can look forward to exploring cutting-edge dive gear and equipment from top manufacturers and brands, a diverse range of exhibitors, interactive workshops and compelling presentations. The expo will offer a chance to discover exciting travel destinations and dive sites around the world. Engaging with experts through informative seminars and panel discussions on marine conservation, underwater photography, and more is another highlight. Participants can also engage in hands-on demonstrations and test the latest dive technologies, as well as connect with fellow diving enthusiasts and professionals to share experiences and insights.

Show highlights

A major highlight of MIDE 2024 will be the screening of the documentary, *50 Hours Underwater – A Dive for Hope*, on 8 June. This documentary celebrates the underwater world's diversity and complexity, aiming to spark meaningful conversations about marine conservation and promote a better understanding of the underwater wolrd. The expo will introduce a new platform called Careers in Scuba Diving, allowing individuals to explore various career paths within the scuba diving industry. Live demonstrations will offer beginners the chance to experience diving firsthand, guided by experienced professionals.

Forum and dialogue sessions will delve into various facets of diving, from adventure and exploration to conservation efforts and sustainable practices, featuring expert speakers. Visitors can participate in expert-led workshops and seminars on topics such as dive safety, underwater photography, marine biology, technical diving, sustainable diving practices and more. The event will also include interactive activities and educational presentations for younger visitors, focusing on important environmental issues like plastic pollution, coral reef conservation and marine biodiversity.

Networking opportunities will abound, allowing attendees to connect with industry leaders, fellow divers and potential collaborators during networking sessions and social events. Exhibitors' efforts will be recognized with the Best Booth Award during the event's opening ceremony. Daily prizes, including dive vacations, equipment and courses worth over RM80,000 (nearly US$17,000) , will be awarded throughout the three-day expo, courtesy of generous exhibitors, suppliers and partners.

Register today

To avoid queues, visitors can secure tickets by visiting **mide.com.my**. The event will be held on 7-9 June from 10:00 a.m. to 7:00 p.m. at MITEC in Kuala Lumpur. Follow MIDE on Facebook and Instagram at mide-expo, on YouTube at AEEExpo, or visit the website at **asiaevents.com.my** for more information.

About the organizer

Established in Malaysia in 2001, AsiaEvents Exsic specializes in event management, exhibitions, media services and project management. With 25 years of experience, they provide consultancy, technical support and services for leisure and hospitality projects. Their dedication, excellence, and commitment to their core vision and mission has earned them several awards, including the 2018 Exhibition Excellence Award, the 2021 Above & Beyond Recognition Award, the 2023 Platinum Business Award for SME Women Entrepreneurs, and the 2023 Malaysia Business Events Award for Consumer Exhibition Excellence. ■

NAOHIRO HASEGAWA AND HIROSHI KAJIHARA / WIKIMEDIA / CC BY 4.0 DEED

Four *Clavelina ossipandae* zooids attached to the seabed, off the coast of Kumejima, Japan.

Introducing the Skeleton Panda Sea Squirt

First described in 2024, this little sea squirt resembles a tiny baby panda in a Halloween costume. It lives off the coast of the Japanese island of Kume and feeds on plankton and other minute organic matter.

Given the scientific name *Clavelina ossipandae*, scientists discovered that it was a new species of sea squirt after divers posted images of it online. Naohiro Hasegawa, a researcher at Hokkaido University and co-author of the study that first described the species in the journal *Species Diversity*, told Reuters: "The white parts that look like bones are the blood vessels that run horizontally through the sea squirts' gills. The black parts on the head that look like a panda's eyes and nose are just a pattern, and we don't really know why the pattern is there."

When photos of these unusual critters first surfaced online in 2017, researchers saw some photos that a dive center had posted and came to the realization that the species might be new to science. After analyzing specimens that had been collected by divers on a crowdfunded expedition, the scientists confirmed that this type of sea squirt had never been described before.

Researchers describing the new species named the animal "gaikotsu-panda-hoya," which means "skeleton panda ascidian," for their distinctive markings, which give it the appearance of a bony body with a panda face and a gaping mouth. The first part of the scientific name in Latin, *Clavelina*, means "little bottle" and the second part, *ossipandae*, combines the Latin "os" (which means "bone") and "panda."

Less than an inch long (20mm), skeleton pandas, like other sea squirts, are filter-feeding marine invertebrates. Found in shallow waters of up to 66ft (20m), they anchor themselves to the substrate of coral reefs with strong currents and filter nutrients from the water by pumping water through their siphons. Living in colonies of one to four individuals, they can reproduce asexually through budding but are also hermaphroditic and are capable of sexual reproduction. ■

SOURCE: LIVE SCIENCE, WIKIPEDIA

Dhofar

Diving Oman's Monsoon Sea

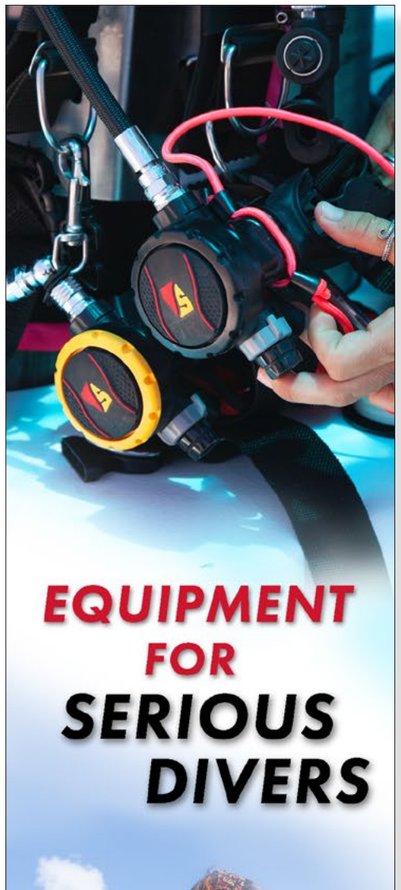
Text and photos by Paul Flandinette

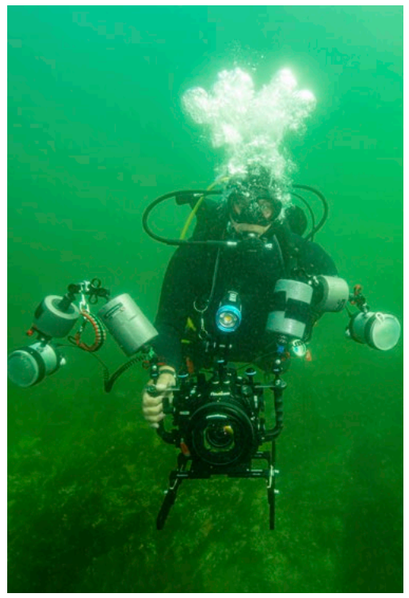
Honeycomb moray eel in the capital area of Dhofar (above); Temperate and tropical Oman anemonefish and anemone surrounded by various seaweeds and Mysida, small, shrimp-like crustaceans (top right); Stormy seas at Salalah during the southwest monsoon, or *Khareef* (right); Spanish dancer nudibranch (left); Diver with golden sweepers (previous page)

Dhofar, Oman's southernmost region, offers a unique blend of tropical and temperate diving, with carpets of kelp and seaweeds, diverse marine life, a range of endemic tropical species, sea turtles, whale sharks, manta rays and Arabian Sea humpback whales. Paul Flandinette has the story.

It is late May in the Arabian Sea, and the rumblings of one of the world's most powerful weather systems are growing stronger, producing a massive transformation of an underwater world that occurs nowhere else.

Dhofar, the southernmost region of Oman, is a unique place. Each summer, between the months of June and September, the region experiences the effects of the southwest monsoon, or *Khareef* as it is known locally (Arabic for "autumn"). The south-westerly monsoon winds grow stronger and heavy seas lash the Dhofari coastline. These winds weave their magic on land by bringing weeks of coastal rain and condensing fog that turn the landscape from an arid wilderness into a wonderland of lush green hills, flower-filled meadows and waterfalls. More rain falls on





Arid Dhofar (top left); Flower-filled meadows in Salalah after the Khareef (top right); Green turbid water in Dhofar just after the end of the Khareef (right); Kelp beds in Mirbat (above); Carpets of seaweed in Dhofar (left)

Dhofar during this time than the whole of Arabia combined in a year, and the landscape quickly resembles the green hills of Ireland. When the rains end, the greenery progressively dies, and the arid conditions return.

While the effects of the Khareef on land are plain for all to see, the enormous changes it brings to Dhofar's underwater world are seen by just a few. Diving is not allowed during the Khareef months, but when it resumes in early October, we enter a world of turbid, green waters.

Carpets of seaweed

We also see something else that is truly remarkable in a tropical sea—carpets of seaweed. In the rocky shallows, sargassum seaweeds, kelp, red and green algae have grown rapidly during the summer and now dominate the seascape.

It can be a strange experience for someone used to diving in temperate and tropical waters. Here, you will get both on the same dive.

With this abundance of seaweed, diving in Dhofar would be similar to diving in the coastal areas of Norway or Scotland, were it not for the presence of tropical species. When gliding over carpets of kelp or finning around taller growths of seaweed, one can encounter tropical, Indo-Pacific species such as the Oman anemonefish, stingrays, colourful parrotfish, moray eels or even a cockatoo

At Dhofar: Dragon moray eel (left); Emperor angelfish (top centre); Cockatoo waspfish (above); Arabian parrotfish (right); The endemic Oman anemonefish (bottom right)

waspfish (*Ablabys taenianotus*) resting under the seaweed.

Meanwhile, underneath the dense growth, coral communities wait for the seaweeds to disappear and once again have access to sunlight to grow and prosper during the winter months. This unique coexistence of temperate seaweeds and tropical coral communities occurs nowhere else on the planet. So, how and why does this happen?

The monsoons

The marine climate of the Arabian Sea is dominated by the seasonally alternating monsoons. In the winter, from December to March, the northeast monsoon carries cool, dry air from the Indian subcontinent to the Arabian Sea. However, it is the summer southwest monsoon that has the greatest impact on the region that stretches from Somalia to Oman along the western margin of the Arabian Sea.

Strong south-westerly winds (known as the Findlater Jet) blow parallel to the shores of Somalia, Yemen and Oman, creating a coastal upwelling from deep waters. The south-westerly winds generate a powerful current that pushes the coastal waters northeast along Dhofar's coast, equal to the volume of the water carried by the Gulf Stream.

The Earth's rotation deflects this large volume of water eastwards, leaving a vacuum near the coast. Cold, deep water rushes up to fill the gap creating a "wind-driven upwelling." Surface water temperatures near the coast drop from 28°C in May to 17-19°C in August.

Although wind-driven upwellings happen in other places, such as along the coast of Chile, Mauritania and Namibia under the influence of the trade winds, the seasonality of the Omani upwelling is unique.

The water coming up from depths of around 150 to 200 metres is relatively poor in oxygen but is extremely nutrient-rich, generated by hundreds of years of decomposition of falling organic matter by deep-sea microorganisms. This enormous input of nutrients into the surface water, bathed in hours

Indo-Pacific bottlenose dolphins at Dhofar

Golden sweepeers in cavern at Dhofar (above). Sicklefin lemon shark (top right). Sharks are very rare in Oman due to overfishing.

of bright sunlight, triggers the development of a massive three-month-long bloom of phytoplankton that is carried hundreds of kilometres offshore. Meanwhile, in shallow waters, this bloom also feeds a variety of fast-growing seaweeds.

Marine life

In these southern waters, the temperature, currents and seasonal abundance of food support a wide range of endemic tropical species, including the Oman anemonefish (*Amphiprion omanensis*), an abalone (*Haliotis mariae*), the Dhofar parrotfish (*Scarus zufar*) and, perhaps the most majestic of all, the magnificent, but elusive, Arabian Sea humpback whale (*Megaptera novaeangliae*). Just 70 to 80 individuals form an endangered sub-group of the species, which, thanks to the effects of the Khareef, uniquely remain in the Arabian Sea to both breed and feed, unlike other humpback whales that must migrate to either feed in polar waters or breed and give birth in shallow tropical bays.

By the end of September, the south-westerly winds subside, the upwelling ceases and the supply of deep-water nutrients ends. Water temperatures slowly return to tropical levels and the seaweeds and algae, now deprived of mineral nutrients, progressively die off or are consumed by grazers, disappearing completely by May when the cycle begins once again.

Diving

For those who prefer to dive in clearer waters, Oman's productive seas offer world-class diving and many opportunities for exciting encounters. Oman is one of the least-known diving destinations in the entire Indo-Pacific, even though it is easier to reach for European divers than most other warm-water destinations.

With a coastline of over 3,000km, Oman's seas stretch across three

In Musadam—known as the Norway of Arabia because of its many fjords—and the Daymaniyat Islands, you can see healthy reefs (top right), sea turtles (left) and whale sharks in season (above and right).

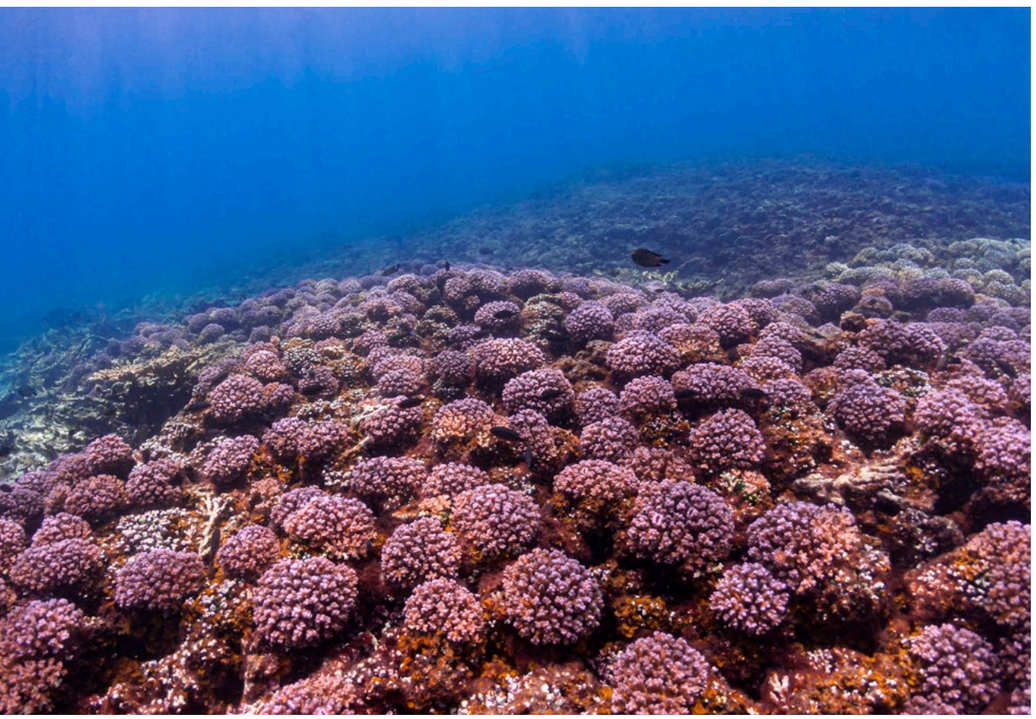
oceanic basins, each with very different characteristics. The Gulf of Oman is one of the world's busiest sea lanes—some 40 percent of all the world's oil is transported through these waters. With an average depth of just 35 metres, it is subject to high levels of evaporation, making the water very salty.

Musadam

Musandam, in the north, with its many fjords and rocky inlets, is known as the Norway of Arabia. Its dramatic landscapes and azure waters are very inviting. Healthy corals, whale sharks (in season), turtles and a myriad of colourful reef fish can be seen.

Daymaniyat Islands

Close to the capital, Muscat, lie the Daymaniyat Islands, a UNESCO protected nature reserve. The island group comprises nine islands that offer some of the very best diving not just in Oman, but the whole region. There are dozens of dive sites where you will find a rich diversity of marine life at a range of depths that are suitable for novices and advanced divers alike.



Pocillopora stony corals (above); Green sea turtle taking a breath at the surface (right)

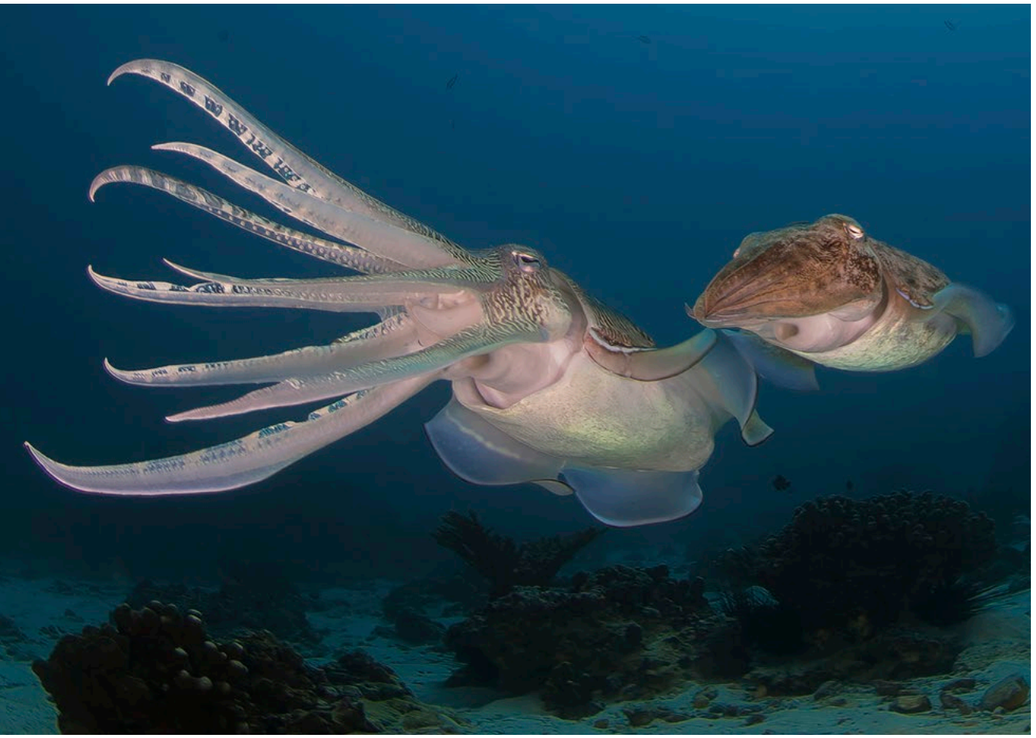
Aerial view of Daymaniyat Islands (above); *Acropora hyacinthus* coral at Kharabah Island in the Daymaniat Islands (top right)

Here, you will find healthy colonies of both hard and soft corals, although as elsewhere, corals are susceptible to climate change, pollution, cyclones and human impact, all of which can adversely affect their long-term survival. However, coral bleaching, which is increasingly common and deadly in many parts of the world, often appears to be reversible in Oman and so far, has rarely led to massive loss. Again, this is due to the unique oceanography of Oman's seas.

In the Arabian Sea, the summer upwelling of colder water protects the reefs from overheating. In the Sea of Oman, minor upwelling events force thermoclines upwards, where they meet the surface waters that have been heated by the sun. The two layers of water do not mix, allowing the layer of cool water to act as a protective blanket for the corals below.

Whale sharks (*Rhincodon typus*) are regular visitors between June and October, sometimes seen in large aggregations of 20 or more. Sea turtles and several species of moray eels abound, while colourful reef fish and dense carpets of corals are part of the rich tapestry of life on the reefs.

Cardinalfishes, damselfishes and fusilier on a reef-scape of leather corals, *Goniopora* flowerpot coral and sponges (right); Pharoah cuttlefish pair (below); *Crambionella orsini* jellyfish (bottom right)



Green sea turtle digging a nest at the Ras al Jinz Turtle Reserve.

Ras Al Jinz Turtle Reserve

At Ras Al Hadd, where the Sea of Oman meets the Arabian Sea, is the Ras Al Jinz Turtle Reserve. This is Oman's only official centre that provides expert guided experiences for visitors to watch green turtles nesting and laying eggs, and hatchlings taking their first ungainly steps to the sea.

Green turtles (*Chelonia mydas*) nest all year round at Ras al Jinz, with the peak nesting season between June and September and the lesser nesting season from October to May. This nesting pattern is linked to the seasonality of the southwest monsoon and is extremely rare, if not unique, amongst other turtle populations elsewhere.

Each year, an estimated 10,000 to 20,000 female turtles return to Ras Al Jinz to dig nests and lay eggs on the same beaches where they hatched some 25 to 35 years earlier. This high number of turtles returning to nest makes Ras Al Jinz one of the world's most important turtle rookeries.

Capital area

Dive sites at Bandar Khayran, Fahal Island and Ras abu Doud in the capital area frequently throw up some surprises, such as encounters with ocean sunfish (*Mola mola*) or false killer whales (*Pseudorca crassidens*).

Hallaniyat Islands

One of the most exciting places to dive is the pristine Hallaniyat Islands, which lie about 40km east of the Dhofar mainland. This group of five

PAUL FLANDINETTE
MICHEL CLAEREBOUDT

Damselfishes hiding in reefscape of hard corals (above); Zebra shark (top centre); Map of Oman (top right); The endemic two-faced toadfish (bottom right); *Risbecia pulchella* nudibranch (centre); Sohal surgeonfish (left)

islands forms a remote archipelago that sees relatively low numbers of divers, and the dive sites are best reached from a liveaboard vessel. Here, there are opportunities to see large schools of fish, manta rays, mobulas and the Arabian Sea humpback whale.

Salalah and Mirbat

Other dive sites in Salalah and especially Mirbat could get you an encounter with the occasional shark, the stunningly beautiful dragon moray eel (*Enchelycore pardalis*) or the endemic and rather strange-looking two-faced toadfish (*Bifax licinia*).

Final thoughts

The productivity of Oman's seas is massively influenced by the unique effects of the Khareef. With some 1,600 species of fish, nearly 200 species of hard and soft corals and 20 species of cetaceans that either reside here or migrate through, Oman's seas are amongst some of the world's most bio-diverse waters. In an underwater world that remains largely unexplored, Oman's seas still hold many secrets waiting to be revealed. ■

An avid diver and underwater photographer for over 25 years, Paul Flandinette is an acclaimed filmmaker, commercial photographer, author and artist with extensive experience in creating promotional and informational films for leading global companies and government bodies, earning international awards including Gold and Silver at the US International Film and Video Festival and World Media Festival. In 2013, he relocated to Oman, where he produces films and underwater photographic projects for companies and agencies. He serves as a consultant producer to Scubazoo in Malaysia and contributes to major broadcasters, including BBC TV, Netflix and Discovery Channel. He has been a speaker at universities, environment organisations, camera clubs and the London Eco Film Festival. His notable publication includes ***Secret Seas****, a pioneering photographic book on Oman's marine biodiversity. Please visit:* ***paulflandinetteimages.com***

DIVE OPERATORS

There are now many diving and snorkelling operators in Oman. The ones I know well and dive with are:

MUSANDAM
Ras Musandam Divers
rasmusandamdiver.com

CAPITAL AREA
Euro Divers
euro-divers.com
Extra Divers
extradivers-worldwide.com
Omanta Scuba Diving Academy
divescover.com
SeaOman
seaoman.com

DHOFAR
ABT Divers
abtdivers.com
Extra Divers Oman Explorer
extradivers-worldwide.com ■

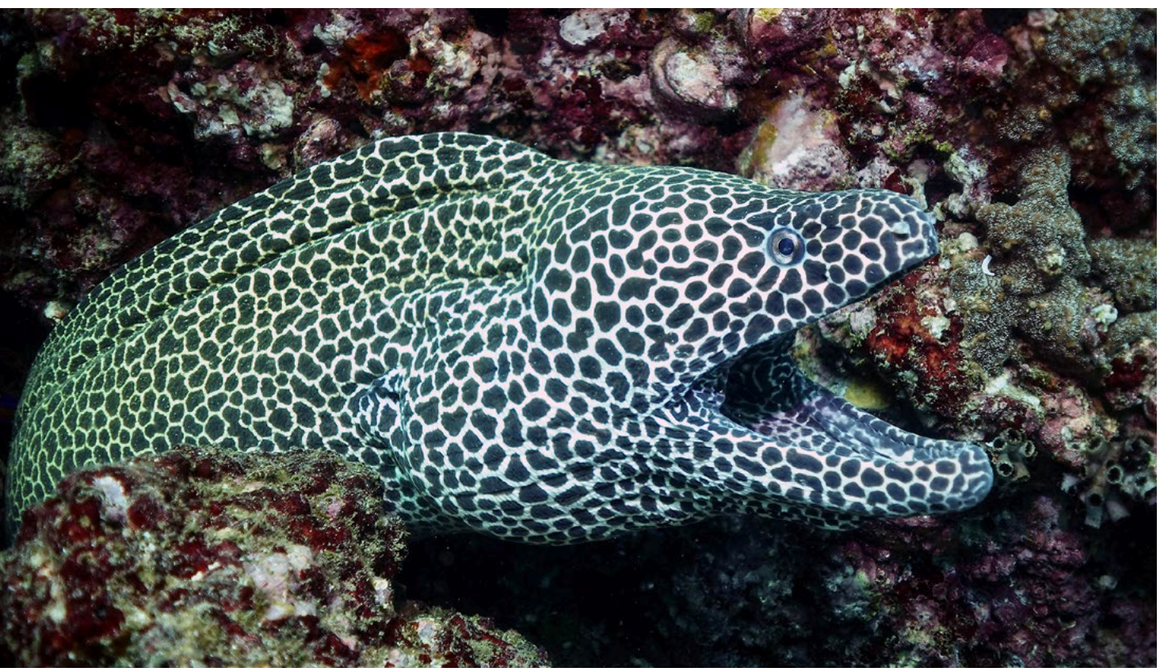
Oman

The Arabian Sea & Gulf of Oman

Text and photos by
Pierre Constant

Oman

Variable-lined fusiliers at Abu Rashid (above); *Goniobranchus annulatus* nudibranch on a drift dive at Abu Rashid (right)



Laced moray at Abu Daud (above); Yellow soft corals on wall dive at Abu Rashid(top left)

In Oman, there is plenty of diving to enjoy and marine life to observe in the Arabian Sea and the Gulf of Oman. Pierre Constant shares his adventure there.

Stretching along the southeastern coast of the Arabian Peninsula, between Africa and Asia, Oman is bordered by the Arabian Sea to the southeast, the Gulf of Oman to the northeast, and the Persian Gulf to the northwest. It has a land area of 309,000 sq km and 3,000km of coastline. Its immediate neighbours are Saudi Arabia, the United Arab Emirates (UAE) and Yemen. Iran lies to the north, across the Strait of Hormuz.

Oman lies between 16° and 28° N latitude and 50° and 60° E longitude. It comprises mostly gravel desert plains, with the Al Hajar mountain range along the northeastern coast and the Dhofar mountains along the southeastern coast. Muscat, the capital of Oman, is located at 23°35'20" N and 58°24'30 E. Oman is an absolute monarchy with a population of 5,492,196 and is under the rule of Sultan Haitham bin Tariq—successor to Sultan Qaboos bin Said, who passed away in 2020.

Historical background

Early human populations migrated from Africa to Arabia in the late Pleistocene. Discovered in 2011, a site belonging to the African

lithic industry was attributed to the Arabian Nubian complex and dated to 106,000 years ago. The first settlers arrived from Yemen in the 8th century. Over time, tribes from

Limestone cliff at Cat's Eye dive site (above); Great blue heron at Abu Daud Island (left)

western Arabia settled in Oman for fishing, farming and herding.

The Omanis adopted Islam in the 7th century. The Omani Azd established the Imamate of Oman and built a maritime empire whose fleet controlled the Gulf. Under the influence of the Seljuk Empire in the 11th and 12th centuries, the Omani coast fell to the Nabhani dynasty until 1507.

The Portuguese captured Muscat and occupied it for 143 years, from 1507 to 1650. Colonisation was extended to the north and south to control access to the Persian Gulf. Muscat fell briefly to the Ottoman fleet in 1552.

In the 17th century, the Portuguese fought a major naval battle in the Persian Gulf against an armada from the Dutch East India Company (VOC) and the English East India Company. It ended in a draw and a loss of influence for Portugal. The Omani Imams took over, establishing a maritime empire in East Africa and even fighting the Persians in the process.

To block commercial competition from the French and the Dutch, the British signed treaties with the sultans in the late 18th century. British influence grew until the end of the 19th century.

A major slave market and producer of cloves, Zanzibar became a part of the Oman Empire and was chosen as its capital in 1887. Zanzibar and Muscat later became two separate sultanates.

The shores of the Persian Gulf (above); Ospreys (left)

Oil reserves were discovered in Dhofar in 1964. Following the Dhofar rebellion in the 1960s, Sultan Said bin Taimur was deposed by his son, Qaboos bin Said, in 1970. The latter opened up the country with economic reforms and modernisation, spending on health, education and welfare. Slavery was outlawed. Qaboos died in January 2020 and was succeeded by his cousin, Sultan Haitham bin Tariq.

Dive centre

Anticipating my arrival, Lauren Davies, the Welsh manager of Musandam Discovery Diving, greeted me with smiles at Khasab Airport. I was driven to the staff villa, which also served as the company's guesthouse on the outskirts of town. The dive centre was downtown, conveniently located on a canal not far from Dhow Harbour, where all the tourist cruises departed from. The only dive operation in Khasab, Musandam Discovery Diving was founded in late 2015 by the friendly 37-year-old Bader Al Shehi. Dressed in the *dishdasha*, a traditional Omani white robe, with *kummo* (prayer hat) and *mussar* (red and white turban), Bader also works in the oil and gas industry.

"You'll be able to dive with Bader on Saturday," confirmed Lauren. "He is a very busy man but very fond of nudibranchs!" she added with a smile. The dive centre was very professional, with a classroom for instruction and a convivial wooden terrace overlooking the water. The dive boat was a 35ft Sinbad fibreglass speedboat from the UAE with twin 225 Mercury outboards. It had tank racks and comfy benches along the sides and a capacity of ten divers, ideally. Dive instructor Calton and his wife, Tasnee, the divemaster, were both from Kerala in South India. Hamud, the first boat captain, was from Oman

Sultan Qaboos Grand Mosque in Muscat (top left); Dhow cruise in a traditional boat (top right); Khasab Castle, an ancient Portuguese and Omani fort (far left); Female rose-ringed parakeet (left); Indian Ocean humpback dolphins in the Shamm fjord (above left); Ancient rock engraving of a hunter on horseback at the village of Tawi (above right)

and spoke English. Mahesh, the other boat captain, was from Kerala and spoke fluent Arabic, having worked as a fisherman for many years.

Topside attractions

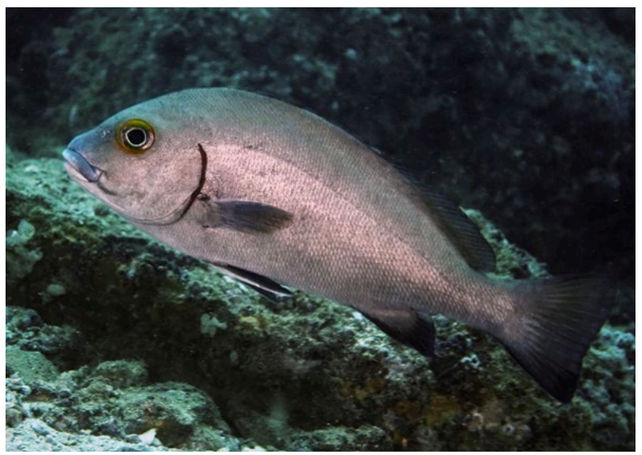
Lauren drove me to the main harbour, then to the gigantic Lulu Hypermarket near the dive centre, and finally to the old Khasab Castle. A Portuguese fort built in the 17th century and refurbished by the Omani sultans, it had interesting historical displays and informative panels on geology and natural history. As we strolled around the bulwarks, we were greeted by mynahs, pigeons and joyful green, black and rose-ringed parakeets (*Psittacula krameri*) nesting in the holes or playing in the native palm trees. It was a must-see attraction with an entrance fee of 3 OMR. However, a sudden heavy downpour forced us to retreat indoors. Some of the streets in Khasab were flooded in no time.

Musandam Peninsula

Isolated far to the north, between the claws of the UAE, the mountainous Musandam Peninsula is a separate enclave of Oman. It is 90km long and 35km wide, with an elevation of 2,100m at Jebel Harim. The Musandam is made up of 270-million-year-old Permian limestone and a 3,300m thick Jurassic and Cretaceous carbonate shelf. Pale grey and reddish, it consists mainly of hard dolomite.

Eighty-five to 15 million years ago, when the continental plate of Arabia collided with the Eurasian Plate, these limestone deposits were uplifted from the seafloor by tremendous tectonic forces and folded into what are now the Musandam mountains. A complex geological phenomenon of subduction/obduction occurred when the Arabian Trias-Jurassic crust went under, then collided with, the western Iranian Makran continental margin, creating the Zagros Mountain range in Iran and the Al Hajar Mountain range in northeastern Oman.

View through the windows of the bridge inside the *Humsi* wreck (left); Cowtail stingray at the Aquarium dive site (above); Flowerpot coral (right), beaded anemone (lower far right) and pair of shrimp gobies (below right) on the *Humsi* wreck



Yellowfin hind (left), sordid sweetlips (above) and parrotfish (right) at Aquarium

Dive sites

Aquarium. The first dive site was at the base of a Cretaceous cliff at the entrance of Khawr Ghubb Ali fjord. Underwater visibility was poor, with lots of particles in the water. The rocky bottom was uninspiring. However, there was fish life, mainly yellowbar angelfish (*Pomacanthus maculosus*), schools of long-spot snappers (*Lutjanus fulviflamma*), parrotfish species and what looked like a peacock grouper, which was brownish red with blue dots and had a yellowish saddle on the caudal peduncle. A regional endemic, a yellowfin hind (*Cephalopholis hemistiktos*) I spotted here, was rather shy. A cowtail stingray (*Pastinachus sephen*) gazed stoically at me from the sandy seabed. The water temperature was a balmy 30°C.

***Humsi* wreck.** At the entrance of Khawr Shamm was the next dive, the *Humsi* wreck. A 10 to 11m-long fishermen's landing barge, it was all rusted and deliberately sunk in 10m (~33ft) of water some years ago. Closer to Khasab, the visibility was that of a pea soup. "The sea has been rough lately. It's been raining too," explained Calton.

I noticed schools of Arabian monocle bream (*Scolopsis ghanam*) and variable-lined fusiliers (*Caesio varilineata*). A small group of pearly goatfish (*Parupeneus margaritatus*) hovered over the deck. Two shrimp gobies were on the lookout at the entrance of a burrow in the sand. A short distance from the wreck, some pyramid-shaped metal structures had been installed to aid the replanting of staghorn coral.

With strong winds the next day, the dive was cancelled. The suggestion was for me to go on a dhow cruise—on a traditional

Pearly goatfish on the *Humsi* wreck site (above)

Indian ocean humpback dolphin in the Shamm fjord (top left); Swim-through with angelfish, butterflyfish, squirrelfish and sergeant majors at Decorator Bay (above)

Green sea turtle taking a breath at the surface.

wooden boat—in the Shamm fjord. It was very scenic and gave great views of the Trias-Jurassic-Cretaceous cliffs of the Musandam Peninsula as the boat passed by fishing villages. It was also an incredible opportunity to see the normally elusive Indian Ocean humpback dolphin (*Sousa plumbea*), which followed the boat, porpoising in a playful display.

Currents and marine species

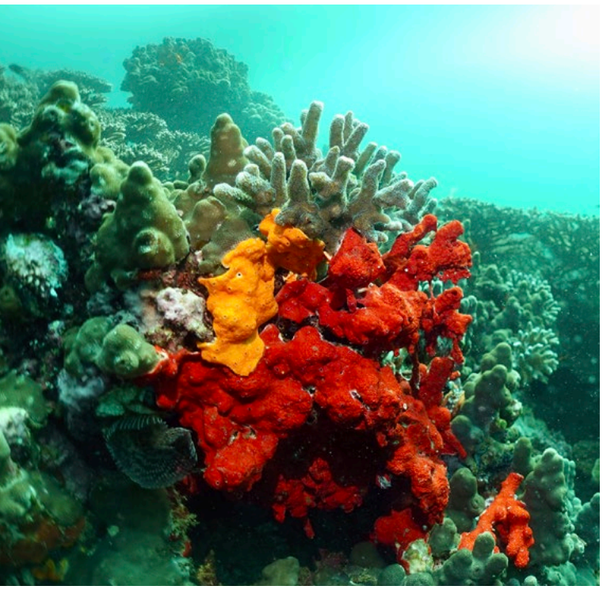
Located in the eastern horn of Arabia, Musandam lies between the Persian Gulf to the west and the Gulf of Oman to the east. The role of marine currents in the region is complex and not well understood.

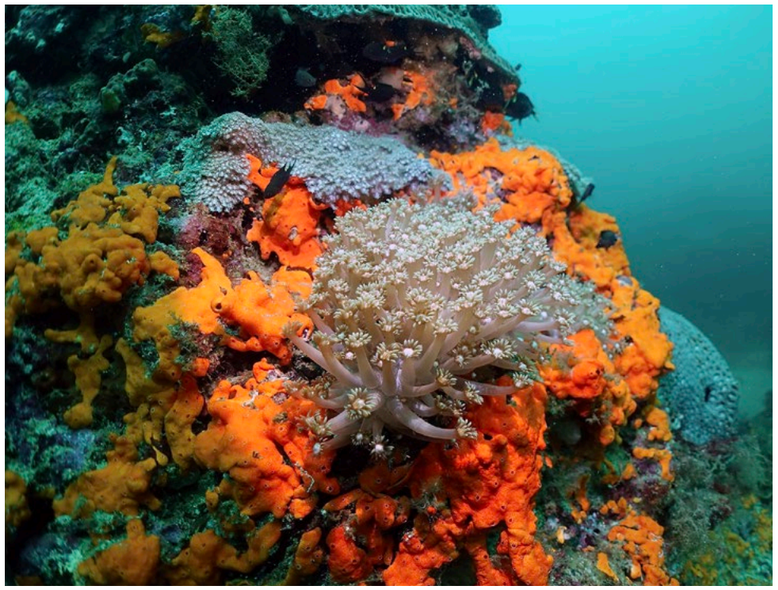
Two main bodies of water appear to be at work, including the Persian Gulf Water (PGW), which flows northwest to southeast into the Strait of Hormuz, and the Indian Ocean Surface Water (IOSW), which flows southwest to northeast along the coast of Oman in the Arabian Sea from Salalah to Ras Hadd (on the eastern cape of Oman) with a diversion into the Gulf of Oman along the coast of Iran. A prominent "upwelling" zone can be seen at Abu Rashid Island on the eastern side of Musandam, with cold water coming up from the deep.

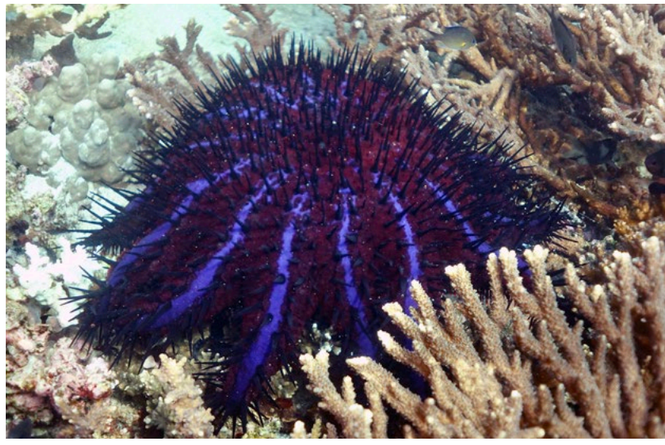
In his book *Coastal Fishes of Oman* (published in 1995), the renowned American ichthyologist John E. Randall reported a total of 1,078 species in the country and its islands. The most recent list of reef fishes (updated in 2010) recorded 1,179 species (including freshwater species) belonging to 527 genera and 165 families. Of these, 29 marine fish species are endemic to Oman (2016).

The northern part of the

Hanging sponges (top left), orange and red sponges on hard coral (far left), and flower-pot coral on orange sponges (left) at Coral Garden; Diver with conical mound of hard coral (top centre) and mound of plate coral (top right) at Cat's Eye; *Hypselodoris pulchella* nudibranch at Cat's Eye (above)







Crown-of-thorns starfish (above) and Arabian grainy cushion star (centre far right) at Cat's Eye

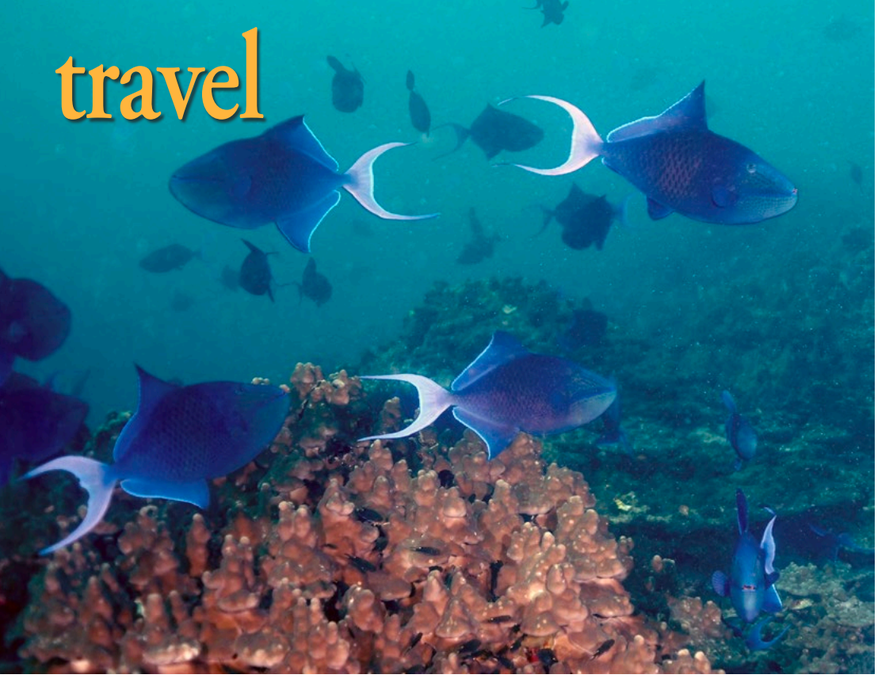
Musandam Peninsula is accessed via Khawr Al Quway, a fjord that separates the military island of Umm Al Ghanam from the mainland. The water is clearer here, and underwater visibility is even better when the sea conditions improve with stable weather.

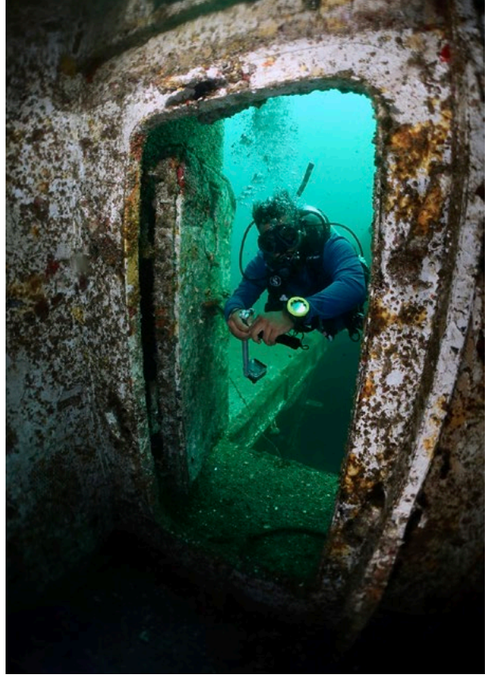
Abu Sir and Al Khayl Islands

Coral Garden. This dive site at Abu Sir Island was at the base of a Cretaceous limestone cliff. At a depth of 20m, the surprise was finding blueish-purple gorgonians and yellow bushes of black coral (*Antipathes* sp.). The water was clear but still greenish. I noted the presence of yellowbar angelfish, yellowfin hind, variable-line fusiliers, gold-spotted jacks (*Carangoides bajad*) and the regional endemic Arabian butterflyfish (*Chaetodon melapterus*), which was yellow with a black bar on the face. The black-spotted butterflyfish (*Chaetodon nigropunctatus*) was rather common, and schools of three spot dascyllus (*Dascyllus trimaculatus*) and silvery grey sordid sweetlips (*Plectorhinchus sordidus*) roamed at depth.

Cat's Eye. A 30-minute boat ride to Al Khayl Island brought us to a striking cat's eye rock formation carved into the Jurassic limestone. Many hard corals were found here, including *Porites*, *Acropora*, *Montipora* and *Pavona sp*. There was good fish life. I saw pretty cushion stars (*Culcita coriacea*) on the sand as well as the blue-black predatory crown-of-thorns starfish (*Acanthaster planci*), which has caused a lot of damage in Musandam.

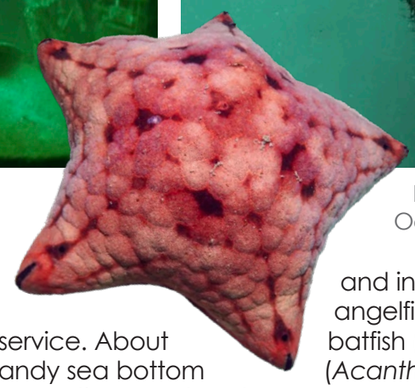
A slight eastward current was felt here. At 15m a rather charming nudibranch,





Divers under the bow of *Al Bathina* wreck (above); School of redtooth triggerfish at Cat's Eye (top left)

Diver inside a corridor (top centre), red and yellow sponge growth on the deck (top right), yellowbar angelfish (above left) and diver over the hold (centre) on the *Al Bathina* wreck



Diver over the bow (above) and Indian Ocean cushion star (left) on *Al Bathina* wreck

Hypselodoris pulchella, caught my eye. It was white with yellow spots and a purple-edged girdle. Its gills and rhinophores were also purple. This dorid of the Chromodorididae family is found from the Red Sea to the Indian Ocean.

***Al Batinah* wreck.** On the other side of Al Khayl Island, behind Cat's Eye, was a secluded cove. An Oman Navy patrol boat had just been sunk here on 7 February 2023 after 30 years of service. About 15m long, it lay upright on the sandy sea bottom at 22m. It already had a lot of concretions. Red and orange encrusting sponges covered the edges of the deck colourfully against an eerie apple-green background. Penetration was possible in the hold and in some of the corridors inside. Yellowbar angelfish were present, as were two round batfish (*Platax orbicularis*), twobar seabream (*Acanthopagrus bifasciatus*), some pennant coralfish (*Heniochus diphreutes*) and cushion stars.

On weekends, expats often drive down from Dubai two hours away. Bader, the dive centre owner, showed up on Saturday.

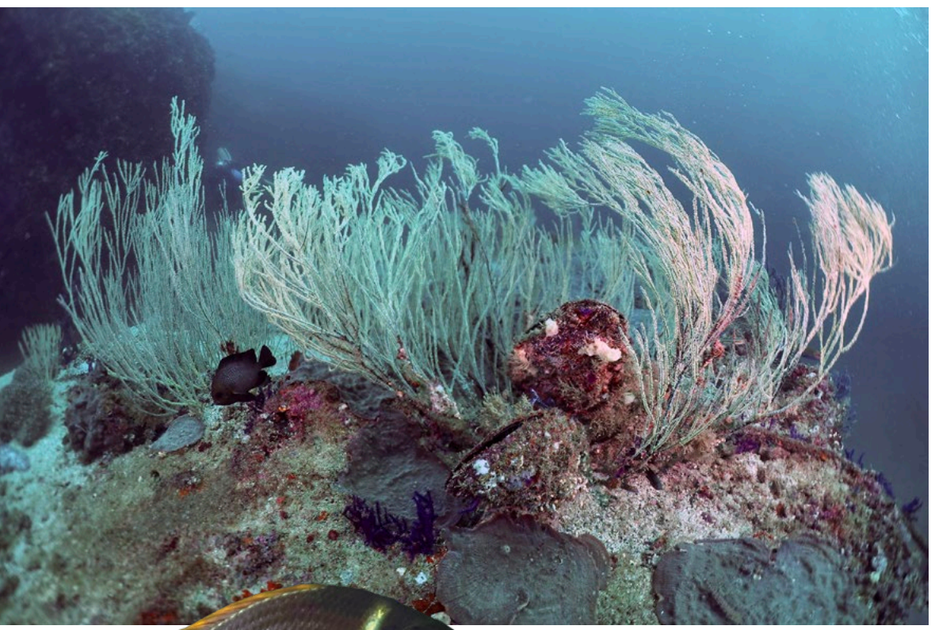


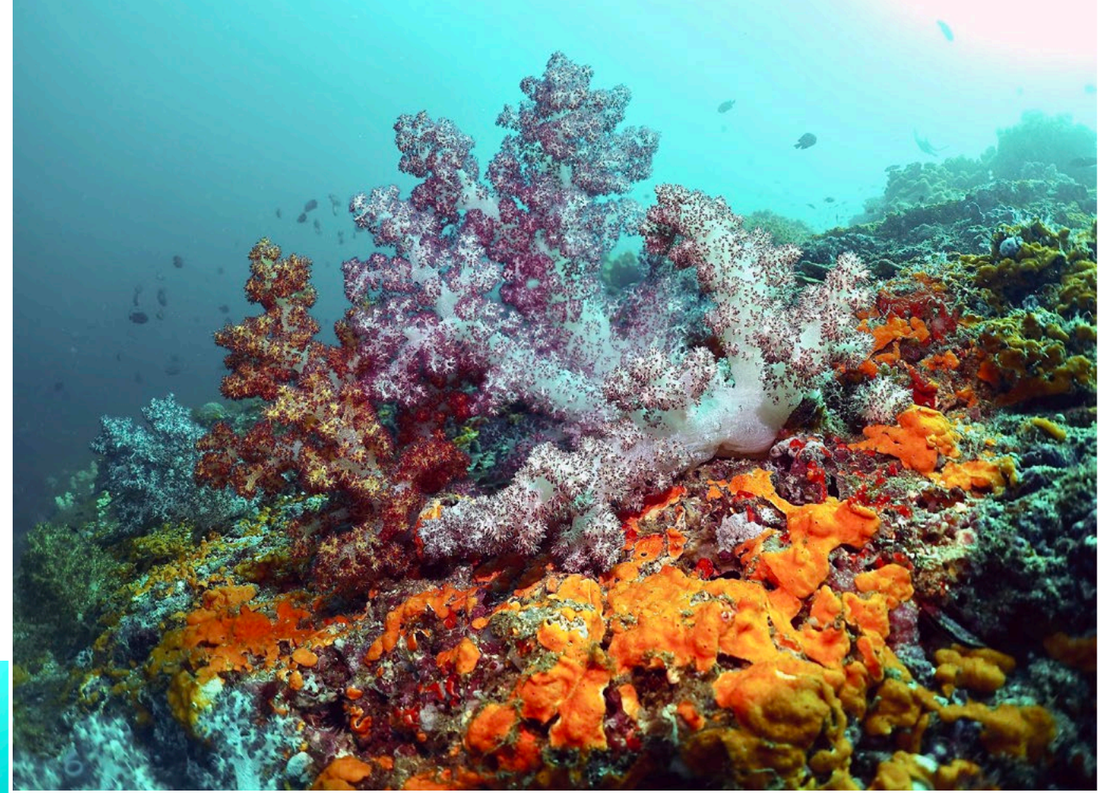
Table coral in the shallows (top left) and Arabian butterflyfish with sergeant majors (top right) on Beachems drift dive; Yellowbar angelfish (right), Clark's anemonefish (above), batfish (top centre), black coral bush (left), and whitecheek monocle bream (bottom left) at No Palm Beach

No Palm Beach. East of Musandam Island is a little beach in a secluded bay surrounded by mountains. At Smirnoff Point, an illegal shipment of vodka bottles had been dumped by smugglers trying to evade the coastguard. It was found by divers.

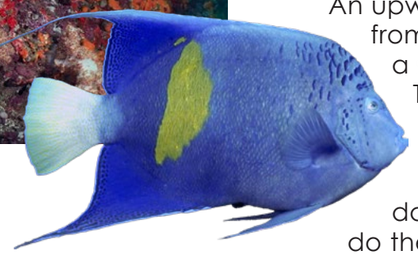
The water looked clear from the surface but was murky again at depth. Underwater, there were huge boulders and bushes of black coral hosting giant oysters in clusters. Bader pointed out a yellowmouth moray (*Gymnothorax nudivomer*), which was brown with white dots. Some round batfish hid under a ledge. Rusty parrotfish (*Scarus ferrugineus*) roamed around, and the Sohal surgeonfish (*Acanthurus sohal*) foraged in the shallows. Twobar seabreams were common.

Abu Rashid Island

Musandam Discovery Diving visits up to 24 dive sites around the peninsula. The very best of these are at Abu Rashid, the northernmost island. When the Gulf of Persia is as smooth as an oil slick, and the sea conditions are perfect, it is the right time to go.



Dendronephthya sp. soft corals and orange sponges (above and left), field of *Sarcophyton* sp. leather corals (top left), yellowbar angelfish (lower left) and parrotfish (lower right) at Abu Rashid

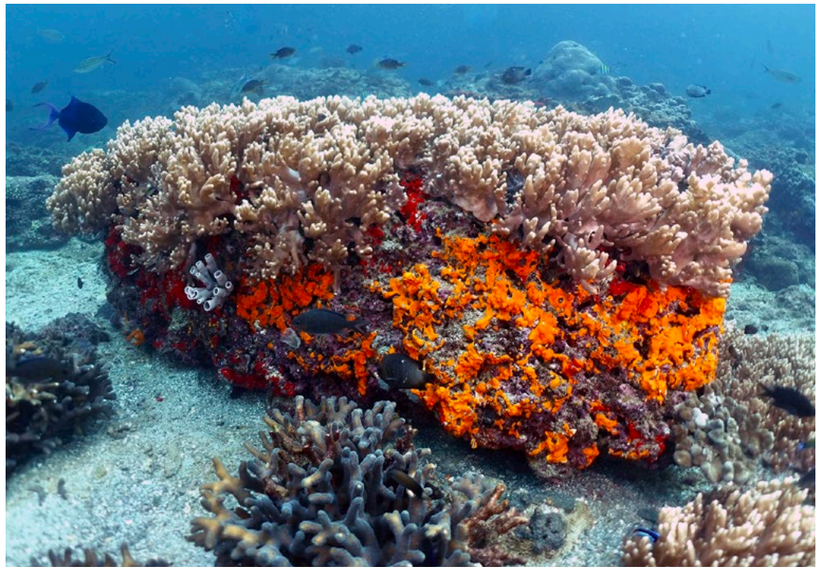


Abu Rashid drift dive. On the west side of the island, there was a succession of slopes and ledges in various steps. Bushes of black coral decorated the depths. In the shallows was an enchanting prairie of yellow and white soft corals (*Dendronephthya klunzingeri*) with patches of red sponges in between.

The fish seemed tame here as the visibility improved. Large sweetlips and snappers were spotted along with clouds of the redtoothed (blue) triggerfish (*Odonus niger*) with white tails. Big painted lobsters hid under ledges, and the Arabian picassofish (*Rhinecanthus assasi*) wandered around.

On the east side of the island, the wall at Abu Rashid has a prominent drop-off and a thermocline at 15m. An upwelling of cold water from the deep created a sudden blurred layer. The water temperature suddenly dropped to 26°C. For the fourth time in the last four days, I could not do the second dive—because I could not clear my left ear. I suspected that bacteria from algae had caused an infection. There was no

Mixed school of triggerfish and three spot dascyllus with boulder covered in soft corals (above) on drift dive at Abu Rashid



Dendronephthya sp. soft corals (left and top left), diver with giant oysters, gorgonians and black coral (top right), boulder with soft corals and sponges (above right), yellowfin hind (centre) on Abu Rashid wall dive

Black-spotted butterflyfish, Abu Rashid

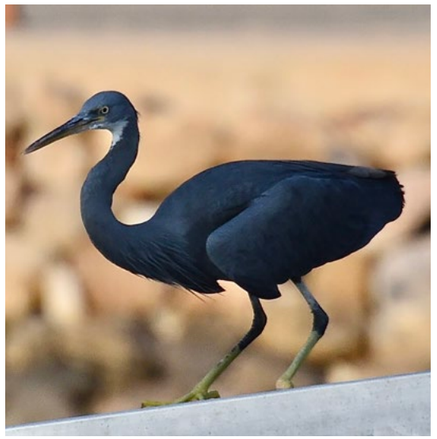
option but to administer ear drops, with mixed results.

Topside excursions

When not diving, a worthwhile excursion is to drive west along the coast to Qiba and inland to the village of Tawi. Here, 3,500-year-old rock engravings of a hunter on a horse and camels can be seen on different boulders on the left side of the road. Further along the coastal road to Dubai, the old fort of Al Bukha is perched on a hilltop with a good viewpoint overlooking the surrounding area. On the way back to Khasab, a dirt road up to Al Harf leads to the top of the mountain. A breathtaking panorama of Musandam's geological wonders awaits to the east, with views of the village of Mukhi blending into the environment. Looking to the west, the top of the cliff overlooks the picturesque coastline of the Persian Gulf and the town of Al Bukha.

Back to Muscat

An Oman Air flight took me back to Muscat. Then, a one-hour taxi ride across a rugged, mountainous landscape of red and black



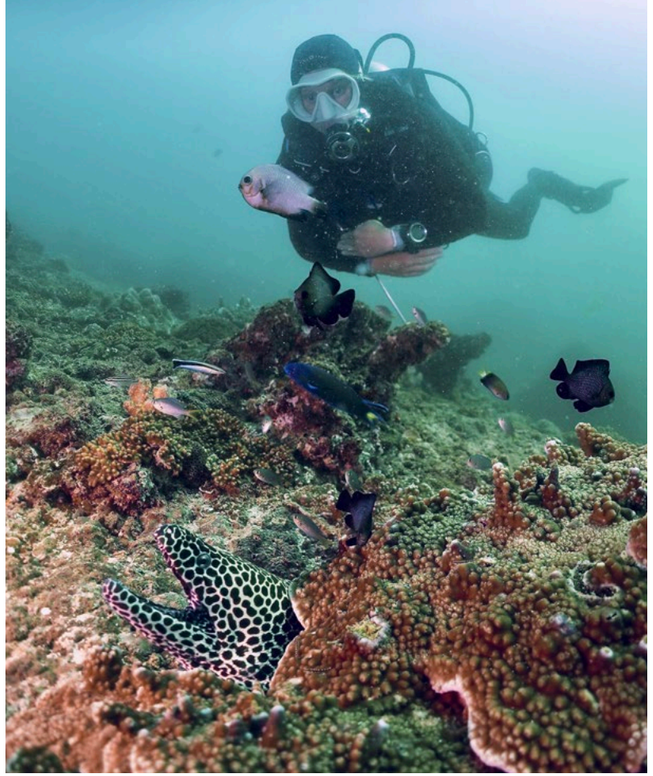
Jebel Sifah on the northern coast, near Muscat (top left); Lesser crested tern (above left) and blue reef heron (above centre) at Al Sifah; 3,500-year-old rock engravings of camels in the village of Tawi (above right)

rock formations brought me to Jebel Al Sifah. An artificial paradise in the middle of nowhere, it was a retreat for idle holidaymakers with a taste for luxury, a swimming pool and a marina. Not my kind of heaven, though.

The Extra Divers dive centre was a ten-minute walk in the sun along the glistening waters of the marina. Swiss manager Guillaume Chapuis greeted me on the way. With blond hair combed back and a salt-and-pepper beard on a square chin, he reminded me of Kit Carson or David Crocket. "I'm on my way to lunch," he said. The connection in our ensuing chat was immediate. Guillaume was a former banker involved in the high spheres of finance before changing his life to run a dive centre in Malta.

The diving at Al Sifah in the Gulf of Oman covered three different areas: Abu Daud Island to the southeast, Bandar Al Khairan to the west and Fahal Island, which was much farther away into the blue, depending on sea and weather conditions. Altogether, the dive centre ran trips to 30 dive sites.

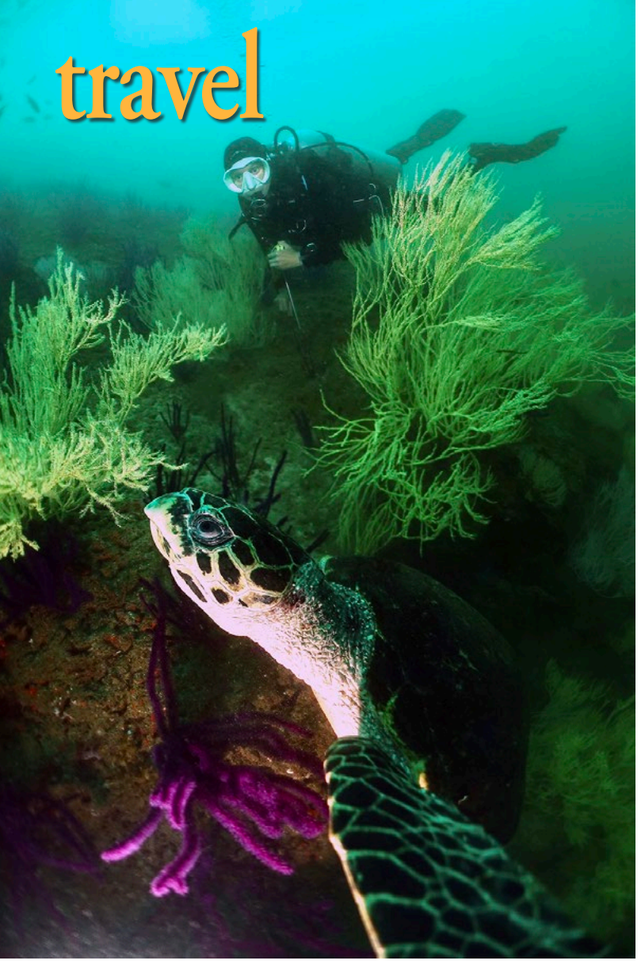
View of the Persian Gulf and the coastal village of Al Bukha (above); Al Bukha Fort (top right)

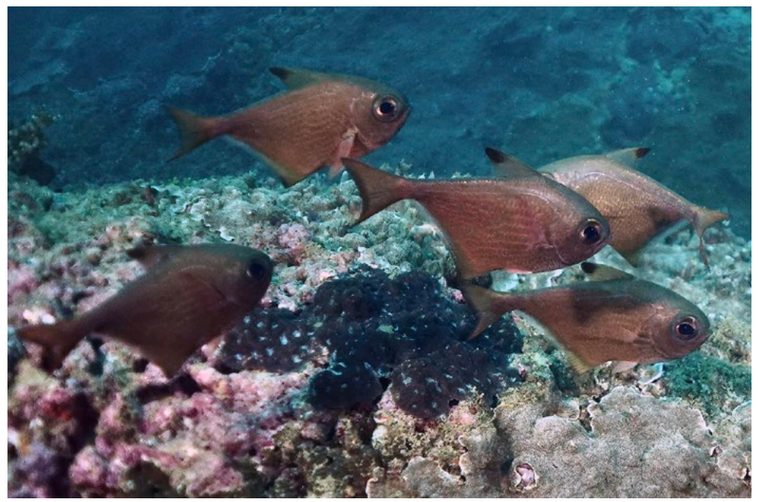


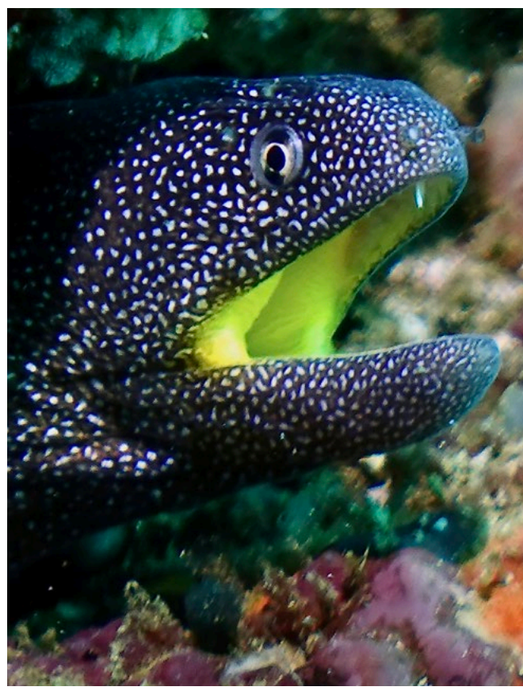
Marbled torpedo ray at First Entrance (above); Three spot dascyllus (left) and Longfin bannerfish (far left) at Abu Daud

Yellow-spotted burrfish (top left), diver with laced moray, three spot dascyllus, cardinalfish, cleaner wrasse and chromis (top centre), golden cardinalfish (top right) and diver in the green haze (below) at Abu Daud; Arabian cushion star (above)

Abu Daud. There were two main dive sites here. One was West Corner, and the other was East Corner. Elongated and shaped like a tibia, the island attracted great blue herons. Schools of golden or ring-tailed cardinalfish (*Apogon aureus*) hovered in small caves. Charged with plankton, the green waters were subject to a slight current from the southeast. I came across the Gardiner's butterflyfish (*Chaetodon gardineri*), the laced or honeycomb moray, the Sohal surgeonfish, the redtail butterflyfish (*Chaetodon collare*), the yellowtail tang (*Zebrasoma xanthurum*), which was royal blue with a yellow tail, and the blackspotted rubberlip or sweetlips (*Plectorhinchus gaterinus*). The pretty Arabian picassofish was always wary of photographers. A little school of speedy diamondfish (*Monodactylus argenteus*) zoomed back and forth under the surface.





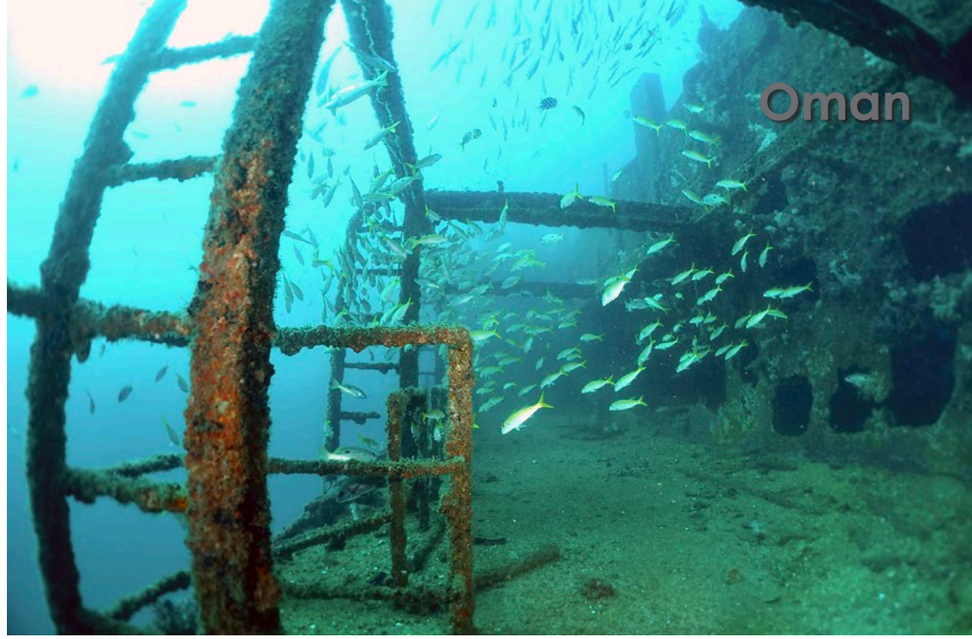


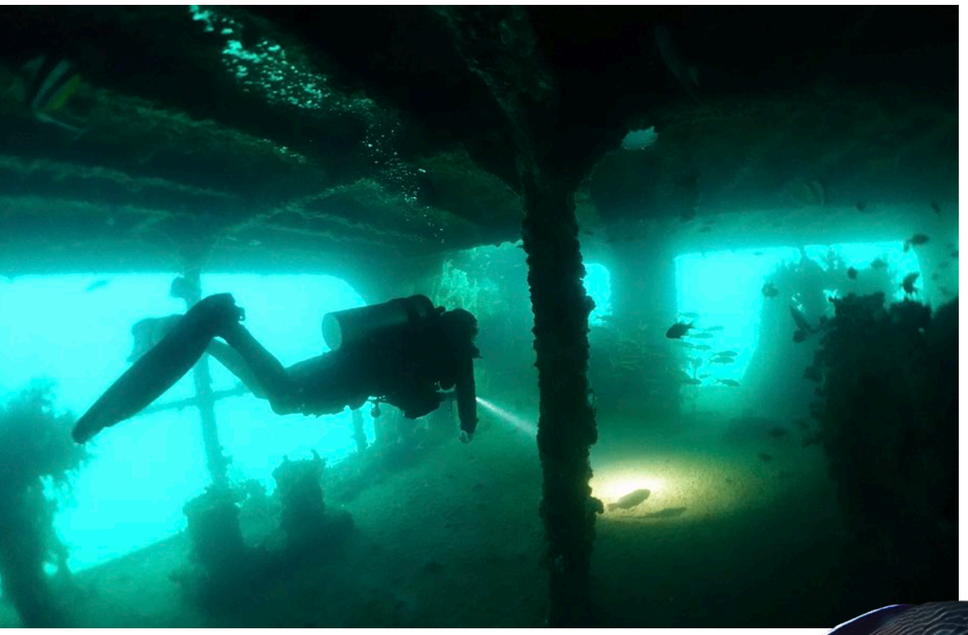
Flower urchin (left), Vanikoro sweepers (above left) and bluetail trunkfish (above right) at First Entrance

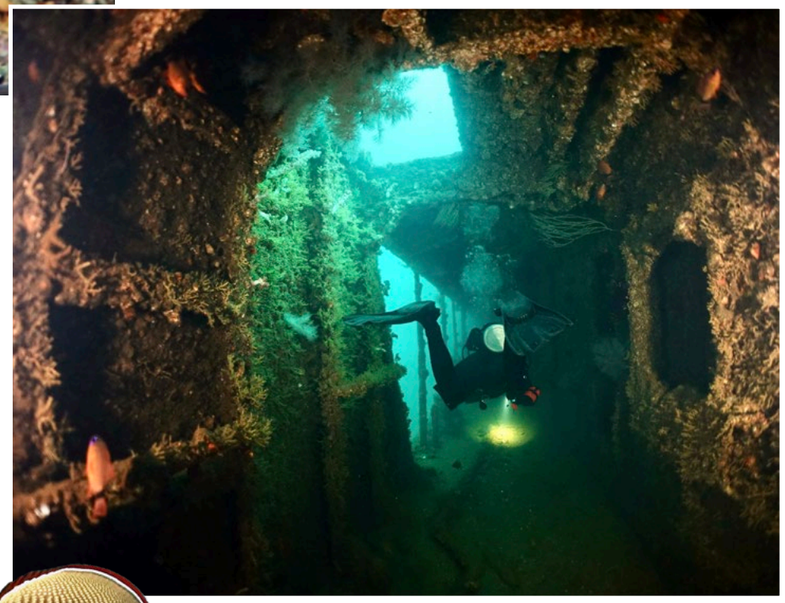
Laced or honeycombed moray at Abu Daud (above); Bigeye snappers (top right), purple whip coral (top centre), and diver with hawksbill sea turtle in black coral (top left) at First Entrance

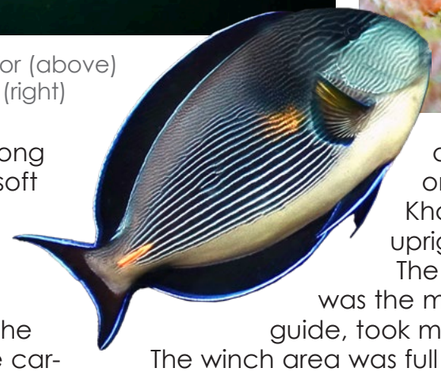
First Entrance. Located in Bandar Al Khairan, this dive site was a mixture of boulders and a white sandy bottom. Anna Sara, the Finnish dive instructor, pointed out a marbled torpedo ray (*Torpedo sinus-persici*) that commanded respect. Numerous yellow-spotted burrfish (*Cyclichthys spilostylus*) rested on the slope. A forest of black coral concealed a large hawksbill sea turtle munching on yellow polyps. A school of bigeye snappers (*Lutjanus lutjanus*) hovered about, together with the Arabian monocle bream. A few flower sea urchins (*Toxopneustes pileolus*), with pieces of shell attached, dotted the sand.

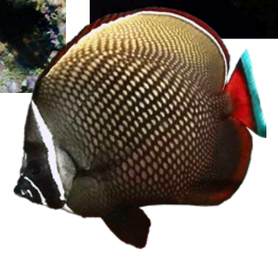
Mermaid Cove. This dive site had roughly the same seascape as above. In between purple gorgonians, a green sea turtle dozed on a rock. A tandem pair of *Hypselodoris pulchella* nudibranchs cruised on the face of a large boulder. Above a sandy patch, two cuttlefish were engaged in a courtship display. Blacktip jacks (*Caranx heberi*)











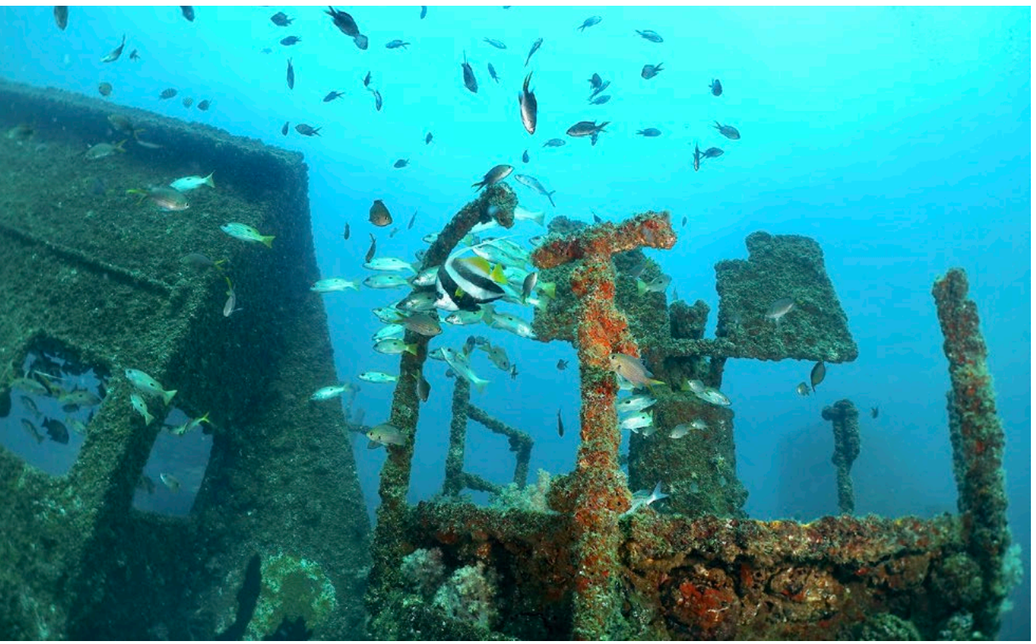
Window at stern (top left) and diver exploring interior (above) of *Al Munassir*; Sohal surgeonfish at Mermaid Cove (right)

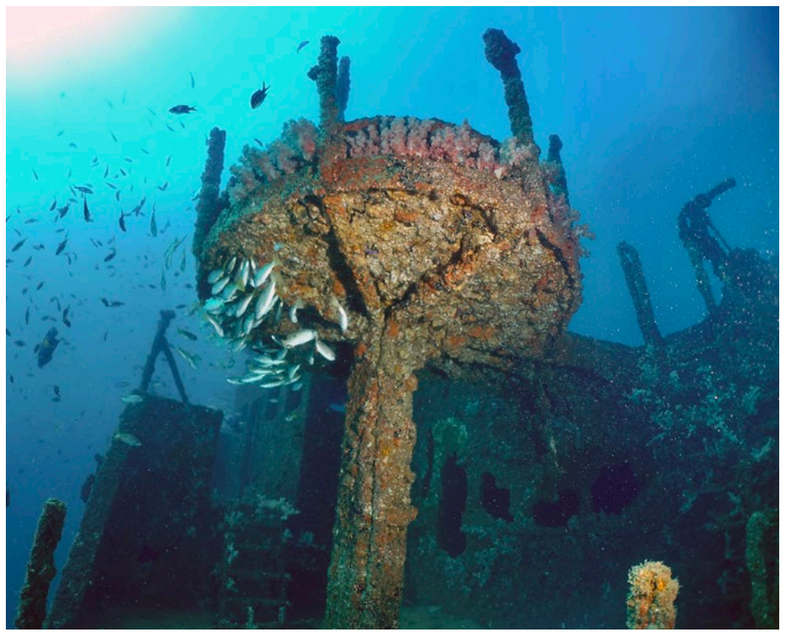
flashed by me towards the end of the dive along the rock face. A vast field of *Sarcophyton* sp.soft corals carpeted the shallows.

***Al Munassir* wreck.** Once a British-made amphibious warfare vessel, this 84m-long ship was launched from Glasgow in 1978. Sold to the Oman Navy as a helicopter and small vehicle carrier, it was in service for 25 years with a crew of 45 and nine officers. It sank on 22 April 2003 near Al Khairan, and is now lying upright in 25m of water.

The visibility was great, and so was the marine life. Richard, the Irish dive guide, took me from the bow to the stern. The winch area was full of colourful *Dendronephthya* sp. soft corals teeming with fish, including golden car-

Port side (top right), rusty parrotfish (top centre), female bluetail trunkfish (centre), grey moray (bottom centre), redtail butterflyfish (left), diver in the port-side corridor (above), laced moray dancing on deck (centre far right); *Hypselodoris pulchella* nudibranchs at Mermaid Cove (right)





Yellowmouth moray at the Cave dive site (above); Gun emplacement on the port side (top right), diver on the port side (top centre), and fish life on the starboard side (top left), on the gun emplacement (far left), and under the turret (left) on the *Al Munassir* wreck

dinalfish, redtail butterflyfish and yellowbar angelfish. Dark and silty, the nearby deep hold was a garage for helicopters.

We cruised along the gangway on the port side, which was exposed to the sun's rays. Various penetrations inside offered an eerie feeling, with beams of light gushing through the portholes. Schools of long-spot snappers and bigeye snappers fluttered around the gun emplacements and superstructure. Male and female bluetail trunkfish (*Ostracion cyanurus*) were easily approached and showed no fear.

Final thoughts

Before I ascended to the safety stop, a honeycomb moray slipped out of hiding to meet me, joined soon after by an equally inquisitive grey moray (*Siderea grisea*). This last image encapsulated perfectly both the thrill and the enchantment of diving in Oman's waters. "I know it is not the last time we see each other," concluded Guillaume on the morning of my departure. Oman's great south beckons…

*Thanks go to **Musandam Discovery Diving** and to **Extra Divers Sifah**.*

*With a background in biology and geology, French author, cave diver, naturalist guide and tour operator Pierre Constant is a widely published photojournalist and underwater photographer. Visit: **calaolifestyle.com**.*

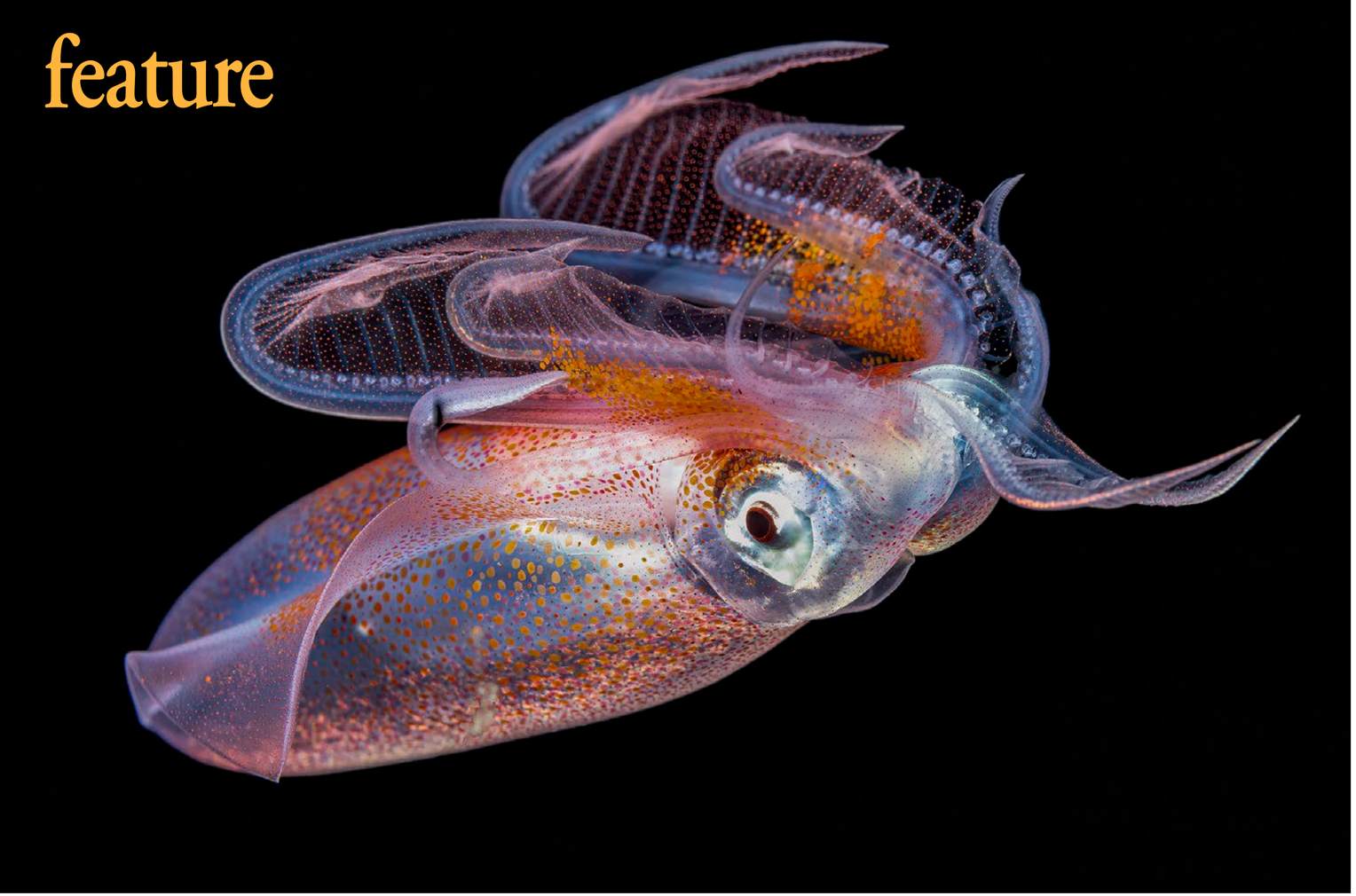
SOURCES:
AL-ABDESSALAM TZS. 1995. MARINE SPECIES OF THE SULTANATE OF OMAN. MUSCAT (OMAN): MARINE SCIENCE AND FISHERIES CENTRE, MINISTRY OF AGRICULTURE AND FISHERIES.
CLARKE MH. 2006. OMAN'S GEOLOGICAL HERITAGE. PETROLEUM DEVELOPMENT OMAN.
FISHBASE.SE
FLANDINETTE P, CLAEREBOUDT M. 2021. SECRET SEAS. FRENCH. OMRAN GROUP.
POUS S. 2005. DYNAMIQUE OCÉANIQUE DANS LES GOLFES PERSIQUES ET D'OMAN. UNIVERSITÉ DE BREST.
WIKIPEDIA

Getting into

Blackwater

The Anilao Night Shift

Text and photos by Don Silcock



Juvenile octopus (above), diamond squid (top left), and driftfish inside jellyfish (previous page) on blackwater dive at Anilao in the Philippines

The images are what immediately grab your attention—seemingly alien creatures lurking somewhere out there in the dark of night, long after most people have called it a day. Don Silcock takes us on a blackwater dive.

What are these creatures and why are they there? How does it work? Was it all just another clever marketing gimmick to suck you in, or was this thing something really new and compellingly different?

After a lot of discussions with people I trust, it seemed clear that I just had to give it a try, and so at the end of January I took my seat on the Qantas flight to Manila in the Philippines, as I made my way to Anilao—Southeast Asia's blackwater diving capital!

What is blackwater diving?

Also known as pelagic diving, blackwater is basically night diving on steroids. Sites for traditional night dives are typically chosen because they are in relatively shallow areas that are protected from the elements and provide a reasonably safe location to be underwater at night. Blackwater locations on the other hand are the complete opposite.

They are in open water where there are currents and well away from land with depths of more than 200m! Why, may you ask? Well, this is where those strange creatures are found as they rise from the depths once the sun goes down. The actual dives are typically conducted in the 15 to 25m zone, but the occasional foray deeper does happen when a special visitor appears!

Why are the creatures there?

In much the same way as many of the most special underwater experiences involve entering the water during annual aggregations—such as South Australia's giant cuttlefish mating season or Tonga's southern humpback migration—blackwater diving is all about the diel vertical migration

Argonaut (top left) and blanket octopus (top right) on blackwater dive at Anilao in the Philippines

(DVM). Virtually unknown outside of the scientific community, DVM was first described by the 19th century French naturalist Georges Cuvier, who noted that a type of plankton called daphnia appeared and disappeared in a diel (daily) pattern.

But DVM is not just another migration; in terms of biomass, it is considered to be the largest synchronous movement of creatures in the world, and it happens every night, in every ocean. So intense is this vertical migration that during WWII, it was detected by sonar by the US Navy and initially interpreted as attacking enemy submarines, but further testing established what was then called the deep scattering layer (DSL), which we now know as the DVM.

DVM for dummies

Every night, as the sun slips below the horizon, an incredible phenomenon unfolds beneath the ocean's surface. Billions of tiny animals, primarily zooplankton such as small fish, shrimps and jellyfish, along with the juvenile stages of larger creatures, embark on an upward migration from the depths towards the surface.

While the exact reasons for this nightly migration are the subject of many theories, it is widely believed that these creatures ascend to feed in the food-rich surface waters. They do this at night, when light is scarce, because they are less visible to predators that rely on light to hunt.

Theories about the reasons for this migration include circadian rhythms, temperature changes, prey abundance and predation risk. However, the energy-intensive expenditure involved in this movement raises questions about its true purpose. As dawn approaches, the creatures return to the depths, only to return at dusk and repeat this nightly ritual in an intriguing cycle that superbly illustrates the intricate balance of life beneath the ocean's surface.

COURTESY OF MIKE BARTICK

Illustration of ocean depth zones

Comb jelly on blackwater dive (left). Mike Bartick (above) leads blackwater dives at Crystal Blue Resort (top right) where he developed the "pumpkin" technique of blackwater diving.

Nature's carbon pump

The abundant food source in the surface layer of our oceans that drives the upward migration of zooplankton, is called phytoplankton. Often referred to as the "plants" of the plankton world, phytoplankton sit at the very bottom of the marine food chain and scientists classify them as "primary producers," critical to life as we know it.

Phytoplankton thrive at the ocean's surface, because they can absorb sunlight and use it in a process called photosynthesis to convert carbon dioxide into glucose and oxygen. Thus, carbon dioxide, both organic (from the atmosphere) and inorganic (pollutants from fossil fuels), is removed, glucose is created as an energy source, and oxygen is produced (as a by-product) and released into the atmosphere.

Individually, phytoplankton absorb microscopic amounts of carbon dioxide and release equally small amounts of oxygen, but size matters. There are so many phytoplankton in our oceans that the total amount absorbed and released is at least equal to that of all the plants and trees on land.

So, what happens to the carbondioxide absorbed by phytoplankton? Zooplankton are herbivores and consume phytoplankton in vast quantities, effectively ingesting the carbon dioxide and on return

Traditional *bangka* boat adapted for diving, at the start of the "night shift" (above). Getting the "pumpkin" ready (right). This plastic orange buoy with its own video light supports the 25m-long, weighted downline, drifts with the current, and is easily followed by the divers.

to the depths each morning they release it as organic waste to become part of the ocean floor.

One theory as to why DVM occurs at night is that phytoplankton can use the daylight hours in relative safety to photosynthesise and multiply—nature's way of ensuring that the basic building block of the marine food chain remains robust and fully functional.

How it works

There are several versions of blackwater diving, starting with the original, pioneered in Kona, Hawaii, where (as I understand it) a lighted "downline" is used, with video lights performing the primary function of attracting the creatures. But you are tethered to the downline and cannot go off-piste even if you wanted to. Plus, you have to be careful not to get entangled with other tethered divers, and your reach is obviously restricted to the length of the tether—so you have to hope that the critters come within that range.

Another version is called the "bonfire" and is apparently done in much shallower water with a powerful light secured to the bottom and shining upwards.

The third version, which I experienced, closely resembles the Kona method, but offers greater freedom of movement. This innovative approach was developed by Mike Bartick of Crystal Blue Resort (CBR) in Anilao, drawing from his extensive experience in adapting blackwater diving to local conditions.

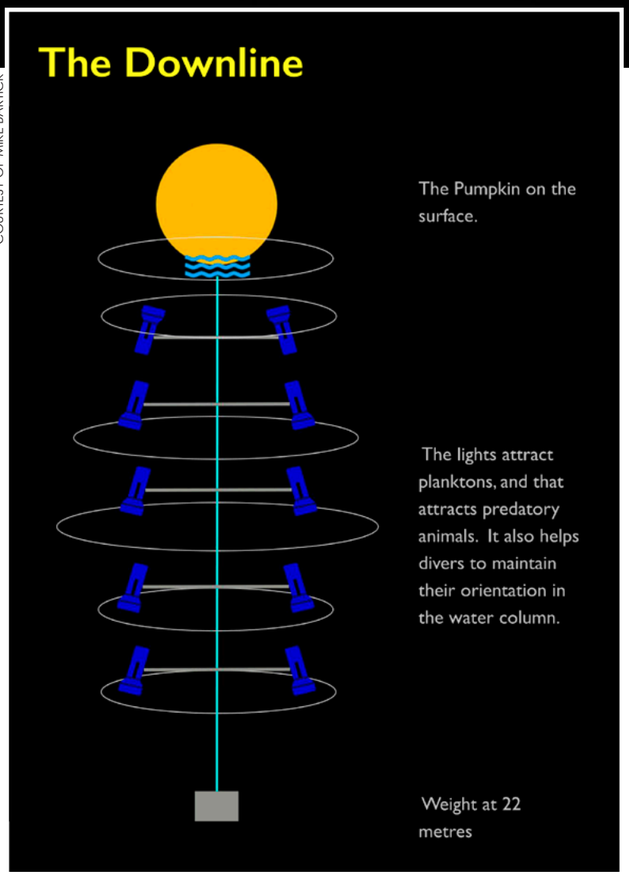
Central to this method is the "pumpkin"—a plastic orange buoy that supports the downline and has its own video light. The 25m long downline is weighted at the end and equipped with powerful video lights every five metres to attract plankton and the intriguing critters that follow.

The pumpkin drifts with the current but is not accelerated by the surface wind as it is when the downline is secured to the boat, so divers in the water can easily keep up with it instead of being left behind in the dark!

The video light on the pumpkin ensures visibility for the boat crew, who maintain a safe distance as they follow the divers. In addition, the lights along the downline serve as reference points for divers in the dark waters below.

The first dive

It starts off with a 7 p.m. departure from the resort, and it



COURTESY OF MIKE BARTICK

Juvenile crab (above) and larval flounder (right) on blackwater dive at Anilao; Illustration showing the setup of the downline in the "pumpkin" technique (left)

can take up to an hour to get to the dive site. By the time the engines are stopped, it is well and truly dark. The crew immediately start preparing and deploying the downline, the video lights and the pumpkin and then it is time to get in the water!

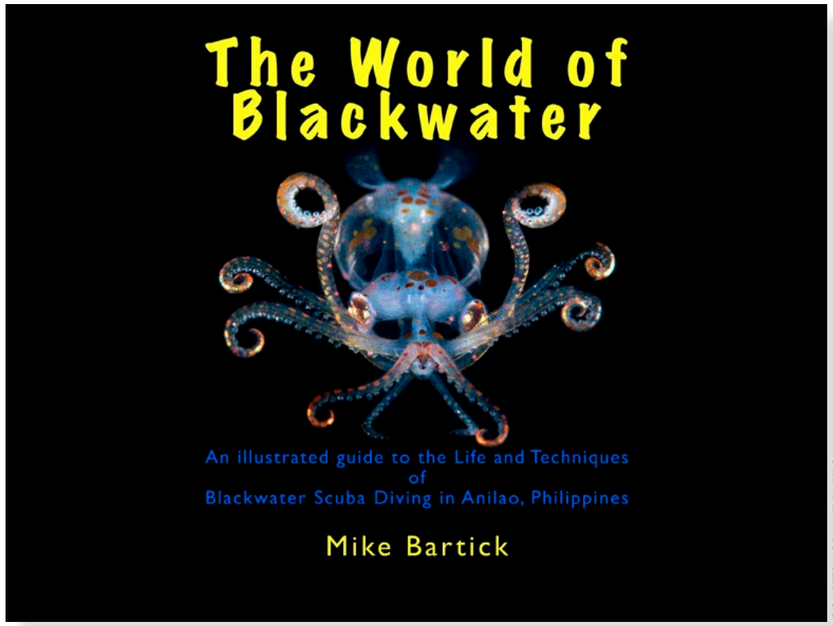
It is hard to properly describe how you feel on that first dive, but "strange" is probably the best way to put it. The combination of being in open water in the compete darkness of night with the downline lights as your only visual point of reference is quite challenging, but what really plays on your mind are the Stephen King-esque imaginings of what is out there in that darkness. Then there is the challenge of trying to photograph what you do see; the *Reader's Digest* version is that it is no easy feat!

Each dive has a time limit of one hour and you have to surface near the pumpkin and then signal with your torch as you rotate at the surface, so the boat crew can see that you are up. At first you cannot see the boat, so the sound of its engines as it approaches is very reassuring.

For safety reasons, divers swim away from the pumpkin to be picked up by the boat. After each dive, there is a one-hour surface interval before venturing into the darkness once more. It is not uncommon to return to the resort at around 1:00 in the morning, which is why I call it the Anilao Night Shift.

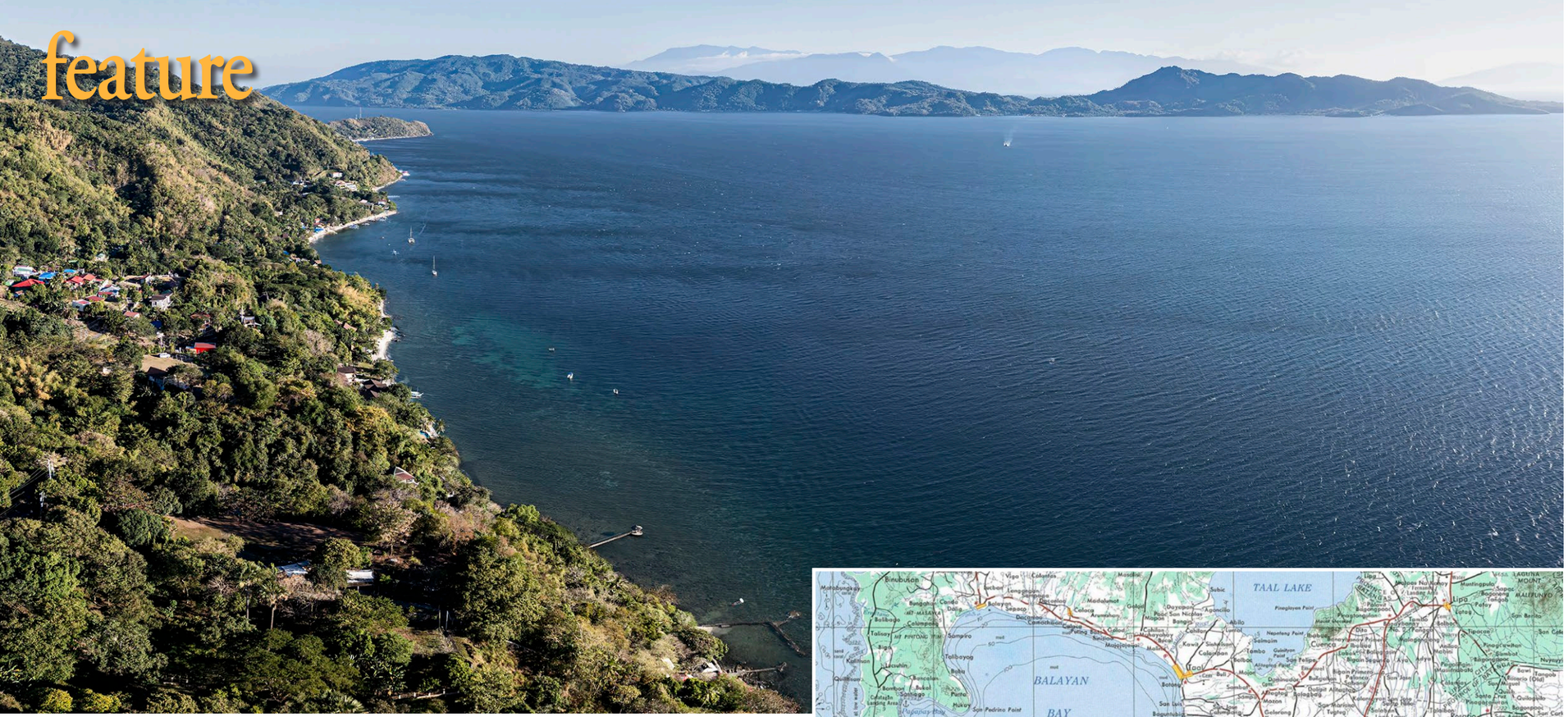
Is it safe?

Blackwater diving is not something you would consider doing with "Doug's Discount Diving" as you are definitely near the effective limits of recreational



COURTESY OF MIKE BARTICK

This ebook by Mike Bartick is available on **Gumroad** and **Apple Books**.



COURTESY OF MIKE BARTICK

View of Anilao in the Philippines (above); Location of the resort on a map of Balayan and Batangas Bays (right)

diving. So, it is imperative that you do blackwater diving with an operator that really knows their stuff and has the crew to support it. You also need to be a confident and competent diver with excellent buoyancy control, good self-awareness and a strong sense of adventure.

I was in Anilao for a total of nine days of diving, but the first three involved regular day dives focusing on the general critters the area is known for. Then, on the evening of the third day, I did my first night shift and simply did not bother with day diving after that.

It took me four night shifts to start to get it, and after that there was no looking back. Although I was very much out of my personal comfort zone during those first three days, I never once felt unsafe or in danger, no. Strange yes, but in danger, no. So yes, I think it's safe!

To sum up

Reflecting on my experience in Anilao, I realise that blackwater diving was an itch I did not know I needed to scratch—until I did. To be more precise, it is blackwater diving combined with underwater photography that has truly captivated me. The unparalleled visual opportunities it offers are unlike anything I have experienced before. I am already plotting my return for another series of Anilao night shifts and actively scouting other locations to indulge in this truly compelling form of diving. ■

Don Silcock is an underwater photographer and photojournalist based on the island of Bali in Indonesia. Visit his website for extensive location guides, articles and images of some of the best dive locations in the Indo-Pacific region and "big animal" experiences globally. Go to: ***indopacificimages.com****.*

SOURCES:
BARTICK M. 2022. THE WORLD OF BLACKWATER. SELF-PUBLISHED. APPLE BOOKS.
WIKIPEDIA.ORG

Shaff Naeem

50 Hours Underwater

How a Cause Became a Regional Record

Shaff Naeem, two hours into his record-breaking 50-hour dive at the island of Maafushi in the Maldives

Text by Mohamed Rehan
Photos courtesy of
Shaff Naeem / Ocean Six Fifty

At first, when Shafraz Naeem, a former military diving instructor with an impressive 27-year career, decided to take on the ambitious mission of a 50-hour non-stop dive, he had no idea the feat would go on to be recognised as a new record. Mohamed Rehan interviewed Naeem to find out more.

Shafraz Naeem, known to friends and acquaintances by the nickname "Shaff," did not embark on the odyssey with the vision of setting a regional record but rather with the far more sincere and admirable intention of raising awareness about plastic pollution in the seas.

Speaking about his mindset before the dive, Shaff noted that he had decided to undertake the underwater expedition of a 50-hour non-stop dive to commemorate the 50th anniversary of the Maldives tourism industry, which the country celebrated in 2022.

The dive

On 25 February 2022, Shaff descended below sea level at exactly 15:34 hours. This dive was conducted in a side-mount configuration, which allowed Shaff greater mobility and flexibility with less strain on his spine, as well as easier exchange of cylinders.

Two days later, on 27 February, Shaff emerged from the water with a sense of relief and accomplishment, having successfully completed his 50-hour dive. Although visibly exhausted, he was in stable condition.

Reaction

The event garnered regional interest, especially from those who were interested in understanding the long-term implications of such a daring dive attempt. Despite attracting praise and recognition regionally, it still flew under the radar of the Maldives government and the media in Shaff's home country.

The story would go unnoticed for another two years before it was picked up by the Maldivian media outlet Sun Online, which was interested in learning about Shaff's diving adventure and the planned release of a documentary chronicling his odyssey.

Shaff at the garbage dump on the island of Maafushi in the Maldives (left)

to ensure that they can be safely passed on to future generations.

While there have been attempts and efforts to address environmental sustainability and conservation, Shaff stressed that it is still not enough. He pointed out that while there are plenty of people advocating and proactively working towards protecting the environment, there are others who remain equally indifferent to environmental degradation.

He was also critical of the extent of the Maldives government's current involvement in environmental conservation, stating that while there are a few "good environmental organisations who are doing real work" to preserve the environment, there are others that are merely "name-sake" organisations or those that have been established simply for cash-grab purposes. He added that the Maldives government was

About Shaff

Shaff's diving career, spanning almost three decades, began as a dive instructor with the Maldives National Defence Force Coast Guard. He then progressed to technical diving in 2002. As a technical diver, Shaff tackled deep exploration dives of the reefs and cave systems of the Maldives in recent years while also trying his hand at underwater photography whenever he could.

While his career was already an impressive tale worthy of recognition in its own right, Shaff said his discovery of new underwater cave systems in the Maldives and winning an underwater photography competition held by the Maldives Tourism Board were chief among his notable achievements.

He went on to set the Asian record for the longest scuba dive, a record he was unaware of either before or after he completed his 50-hour dive. In fact, Shaff might not have realised the extent of his achievement had it not been for a friend who brought it to light.

Raising awareness

Speaking about what motivated him to embark on this underwater odyssey, Shaff highlighted the fact that the Maldivian environment is an incredibly delicate and important one, with its vibrant coral reefs, diverse marine life and pristine islands—all complementing each other. He added that the preservation of these natural resources is vital

Shaff ready to descend down to 6m (~20ft) for 50 hours on 25 February 2022

Shaff, all geared up and ready to go (left). *Hydrate!* Getting some fluids by using a squeeze bottle (top left). The team of support divers, known as the DTs, pose with Shaff underwater (top right) as he holds up a sign that reads: "Do or do not. There is no try." – a quote from the *Star Wars* character Yoda. Spending time watching a series on Netflix, using a tablet provided by Valtamer (right).

Preparation

The veteran diver recounted his steps leading up to the 50-hour dive. The idea for the dive came to him back in 2018, which was originally planned as a 24-hour dive.

"But I didn't get much support to make it happen [back then]," he said, noting that the Maldives government in 2022 had announced that the country would be celebrating its tourism industry's 50th anniversary that year, which led him to expand the idea of a 24-hour dive to a 50-hour dive, matching the duration of his underwater mission with the age of the island nation's strongest economic industry.

"The planning was hard as I had to prepare myself for such a long dive, which is not good for the health as well," he said. "I talked to a lot of people in the dive community and got their advice and managed to come up with a good plan on how to executive it—especially [from] my close friend and technical diving legend, Ben Reymenants," Shaff said, elaborating on the planning stage.

"I had a very good team of safety divers … They were briefed well on what to do if something happens," said Shaff. "Since the depth was shallow, if I didn't feel well not doing its best either, given all the urbanisation and infrastructure development across the island nation, which almost always came at the expense of nature.

Craving a burger on the last day

or anything [was wrong with] me while I was down there, the team could have brought me up to the surface immediately," he added, noting that a Maldives National Defence Force Coast Guard vessel was stationed at the dive site, on standby and vigilant for any potential need to assist in any emergency scenario.

Acknowledgements

Reflecting on his experience, Shaff was quick to express his heartfelt gratitude to those without whom he would not have been able to complete the long dive. He highlighted the commitment and dedication shown by the Maldivian team of support divers and noted the contributions of some of the best dive gear manufacturers in the world, including Fourth Element, Shearwater Research, Ocean Reef and XDEEP.

Shaff also thanked the contribution and assistance of Dhiraagu, the country's largest telecommunications and internet service provider; the National Boating Association of Maldives (NBAM), the premier association advocating for the rights of tourist vessels; Maldivers; Ocean Warriors; Noo Raajje; Sea Gear; and CROSSROADS Maldives, the country's first-ever integrated tourism island project.

He also highlighted the support extended by the Maldivian tourism board, Maldives Marketing and Public Relations Corporation (MMPRC).

Challenges

Shaff recalled his state of mind prior to the dive, noting that he had sifted through the "what ifs" that could happen, and divulged that on the first night of the dive, he felt nauseous and vomited twice. His woes multiplied during the experience when, on the last day of the dive, his drysuit started to leak and he had to deal with a drop in temperature.

Documentary film

The impressive feat might have gone unrecognised by the Maldivian authorities or the government for two years had the expedition not been chronicled in a feature-length documentary film that was officially premiered on 19 April 2024 at the UCI cinema (AMC Group) in Bochum, Germany.

The documentary was screened by an audience of 240 invited guests, including members of the global diving community, local celebrities and the press. The film will also have its official Asian premiere at the Malaysian International Dive Expo on 8 July 2024 at 13:40, with an audience of an estimated 10,000 visitors.

Speaking about the decision to release the documentary, Shaff said that he had never intended to do it, but he was approached by Lifton Media, who expressed an interest in immortalising Shaff's 50-hour dive experience on the silver screen. Given the extensive underwater footage taken during the actual dive, Shaff gave the nod of approval for the documentary, which chronicles the event from start to finish.

He explained that the documentary, which explores the entire expedition, also touches on Shaff's story and his training routines as well. Primarily, the documentary highlights two main aspects: firstly, the personal motivation behind the decision to embark on the lengthy, non-stop dive, and secondly, the urge as a technical diver to push his own limits.

The feature-length documentary also provides an in-depth look at the environmental aspects of the dive, with anecdotes from the dive boat crew members and support divers about their experiences. Lifton Media, the documentary's producer, also covered the "non-touristy side" of K. Maafushi, the island where the dive took place, to better understand the ill effects of plastic waste—which was the secondary and more venerable objective of the event.

Accompanied by Ben Reymenants and Riikka Haakana, Shaff holds up a sign: "Mission complete."

Ascending on 27 February 2022, after 50 hours underwater (left); The team of support divers (below)

What's next?

With a brilliant track record of multiple dives, discovering new cave systems in the Maldives, winning an underwater photography competition, successfully completing a 50-hour non-stop dive that went on to be recognised as an Asian record, and now having a documentary chronicling his marvellous achievement, released on an international front, one would assume that Shaff would be kicking back a little, relaxing under a palm tree and sipping a few tropical mocktails—but no, that is not the case.

In fact, the veteran diver is already gearing up for his next adventure, as he excitedly said: "Yes, I'm planning another extreme dive for next year. Hoping to announce it soon."

Despite the monolithic nature of his achievement, it is unfortunate that his feat has not yet received the recognition it deserves from the Maldivian authorities, even to this date. Commenting on this, Shaff regrettably pointed out the lack of support or acknowledgement by the Maldives government, both previous and current.

However, he expressed his gratitude for the immense support and admiration he has received from the international diving community for his daring odyssey. Among the notable international entities that reached out in praise were the tourism boards of Indonesia, Thailand and the Philippines. The event has also been recognised by several international dive magazines.

Insights

If given the chance to re-live the whole experience again and do it differently, Shaff said he would never hire an event manager who lacked the intimate understanding of what the art of diving is, which he learned through bitter experience. He pledged not to fall into the same trap twice, calling it his "biggest mistake and regret", both during and after the dive.

For all the achievements and decorations in his impressive three-decade diving career, Shaff is at heart a Maldivian son who remains infatuated with the pristine island nation's wonderous underwater world and will always be an ardent advocate of environmental preservation. He promised to launch similar initiatives in the future, all with different concepts but with the same profound message: "Protect the environment." ■

Screening of *50 Hours Underwater* in Kuala Lumpur

The Asian premiere screening of the documentary film *50 Hours Underwater – A Dive for Hope* be held on Saturday, 8 June 2024 during the Malaysia International Dive Expo at the Malaysia International Trade and Exhibition Centre (MITEC) in Kuala Lumpur.

Offering a rare glimpse into the mysterious world beneath the waves, the documentary follows technical diver Shaff Naeem on his quest to raise awareness of ocean pollution by completing a 50-hour dive in the Maldives. The film presents compelling untold stories, vivid visuals and thought-provoking themes that explore resilience, triumph and societal issues.

COURTESY OF MIDE

By celebrating the incredible diversity and complexity of the underwater world, along with its many inhabitants and issues, the documentary's goal is to inspire conversations and a greater understanding and appreciation of the deep blue.

After the screening, attendees will have the opportunity to meet the documentary's creators, who will share their thoughts and insights into the making of the film.

Film highlights

The documentary film features Shaff Naeem, Schasi Ma, Victor Socin Daoonq, Michelle Wettstein, Michael Menduno, Bappu Najeeb, Azim Musthag, Ahmed Basheer, Ahmed Ghiyas, Federico Giunto, Jim Standing, Helen Frances, Daren Marshall, Ismail Hameed, Ahmed Mujthaba, Afsheen Mohamed, Anna Etc, Mohamed Rifshan Shaheem, Raymond Wennekes, Saeed Rashid, Hashma Haidar, Ahmed Shan, Paighdé Voodoo, Mohamed Jinah Ali, Alexander Kassler, Piotr Czernik, Bart Lukasik, Dharshana Jayawardena, Nigel J De Zilwa, Bhushan Bagadia, Ben Reymenants, and Riikka Haakana. ■

For more information, go to:
mide.com.my

POINT & CLICK ON BOLD LINKS

Equipment

Edited by
Mats Gunnarsson,
G & P Symes

PHOTOS COURTESY OF THE MANUFACTURERS

Shearwater Peregrine TX

The Peregrine TX, developed by Canadian brand Shearwater, is a dive computer designed for sport divers. It integrates the user-friendly interface of its predecessor, the Peregrine, with the advanced features of the high-end model, Perdix 2. These enhancements include a full-colour, easy-to-read screen, air integration, and a tilt-compensated, three-axis digital compass. It supports multiple dive modes such as Air, Nitrox, and Gauge, and can connect up to four transmitters. Its depth rating is 120m. Additional features include full sidemount support, wireless charging, Bluetooth connectivity, vibration alerts and a silicone strap with a stainless steel clasp. **shearwater.com**

Cressi Atom Mask

The Cressi Atom is a frameless mask. The amount of material used in the mask has been reduced to an absolute minimum. Embedded in the silicone is a rigid core that supports the two lenses and gives the mask just the right amount of rigidity. This semi-rigid core replaces the usual outer plastic frame and has reduced the mask's internal volume. Another feature of the Atom is the ergonomic shape of the nose. Two small cavities created by the nostrils facilitate pressure equalisation. This makes the mask extremely stable during the dive. The Atom will not move when you release the pressure with your fingers. The Atom is a great mask for the experienced free-diver or underwater hunter who wants maximum performance from their equipment. **cressi.com**

Aqualung Helix Compact Pro

You do not have to be big to make a big difference. This is the thought behind the Helix Compact Pro. The Helix Compact Pro is the smallest and most compact regulator Aqualung has ever produced. Designed for both warm and cold water, it is perfect for the frequent traveller, the light packer or the local diver who simply wants great performance per kilo. Despite being equipped with venturi knobs and breathing resistance adjustment, the Helix Compact Pro weighs 30% less than a standard regulator. The first stage is equipped with an auto-closure device, which prevents water from entering the first stage when it is removed from the tank, for example when rinsing. **aqualung.com**

DynamicNord TI-500 Titanium

The stylish TI-500 automatic dive watch is crafted from titanium and scratch-resistant sapphire crystal glass, making it a durable backup timepiece for diving and other watersports. The bezel with luminous markings, which provide excellent readability, includes a ceramic inlay. The safety buckle is titanium-coated. The crown, positioned at 2 o'clock, and the date window at 6 o'clock, add to its classic design. The screwed-on case back safeguards the Japanese Miyota 8215 automatic movement. Depth-rated to 500m (1,650ft), the 45mm watch is available with a blue or black dial and an interchangeable strap. **dynamicnord.com**

equipment

Edited by
Peter Symes

Apeks
drysuit
valves

Aqualung Warns of Counterfeit Apeks Valves

Photo showing the counterfeit suit valve on the left and the genuine Apeks suit valve on the right. Arrows point to the details that differ between the two.

Aqualung Group has discovered counterfeit Apeks drysuit valves on the market. Both inlet and outlet valves are affected. Here is how to tell the difference between the real valves and the copies.

The counterfeit valves can be distinguished from the originals by several differences. These include the characteristics shown in the photo. The easiest way to tell the difference without disassembling the valve is look at the colour of the inner cap.

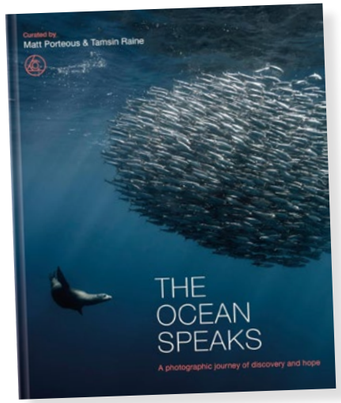
On the counterfeit valve (left) the inner cap is black and the silicone gasket is grey. On the original (right), the inner cap is grey and the silicone gasket is purple (or grey, pre-2022).

Viewed from the side, the silicone "cut-out" clips on the counterfeits are 1.25mm-1.9mm wide (bottom left), whereas the cut-out clips on the Apeks valve are 1mm-1.5mm wide.

Download the pdf below for further details: **Apeks_Suit_Valve_Counterfeit_Identification.pdf**

books &media

Edited by
G & P Symes



The Oceans

The Ocean Speaks: A Photographic Journey of Discovery and Hope, edited by Matt Porteous and Tamsin Raine

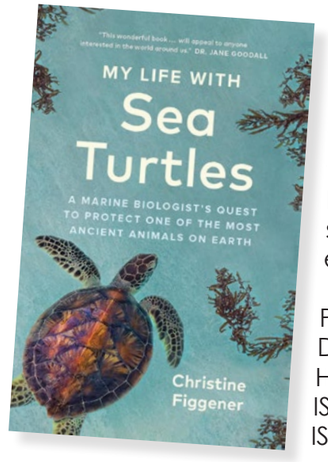
This book, curated by Ocean Culture Life, features 45+ advocates of ocean conservation, including divers, scientists, surfers and influencers. Through compelling narratives and over 200 underwater images, contributors explore uncharted waters, fostering a deeper connection between humanity and the ocean, our planet's vital ecosystem. Organized by region, stories range from documenting tiger sharks in the Maldives to patrolling UNESCO sites in the Tropical Eastern Pacific. They uncover poignant sites like Malaysia's turtle graveyard and natural wonders like French Polynesia's grouper spawning. This anthology celebrates those who champion ocean protection and strive to unveil its mysteries.

Publisher: White Lion Publishing
Date: 14 May 2024
Hardcover: 240 pages
ISBN-10: 0711288933
ISBN-13: 978-0711288935

Sea Turtles

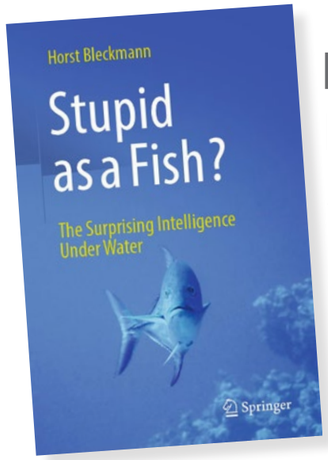
My Life with Sea Turtles: A Marine Biologist's Quest to Protect One of the Most Ancient Animals on Earth, by Christine Figgener

Imbued with profound admiration for nature, this captivating narrative unveils the enigmatic realm of sea turtles, among Earth's oldest inhabitants, chronicling a female scientist's fervent quest to secure their future.



Reminiscent of Jane Goodall's memoir, the book by marine biologist Christine Figgener recounts her journey from a small industrial town to Costa Rica's vibrant coast, where she dedicated her life to studying and protecting these iconic creatures. Through her experiences patrolling beaches and facing male-dominated conservation spaces, Figgener illuminates the urgent need to safeguard sea turtles from current threats, inspiring readers to enact change for their preservation.

Publisher: Greystone Books
Date: 21 May 2024
Hardcover: 280 pages
ISBN-10: 1778400582
ISBN-13: 978-1778400582

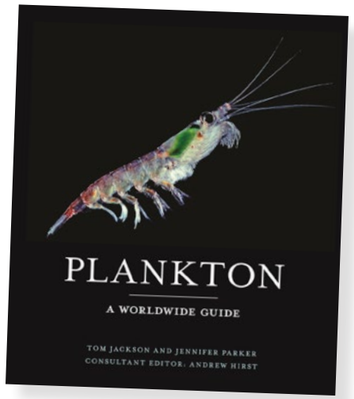


Fish Intelligence

Stupid as a Fish?: The Surprising Intelligence Under Water, by Horst Bleckmann

In challenging the misconception that fish lack complexity compared to mammals, Horst Bleckmann, professor emeritus of sensory and neurobiology at the University of Bonn, sheds light on the advanced cognitive abilities of these aquatic creatures. With approximately 30,000 species, fish are the largest group of vertebrates and inhabit all aquatic environments. They exhibit a diverse range of specialized sensory systems and behaviors. Recent studies unveil their highly sophisticated sensory organs and well-developed central nervous systems, akin to those found in mammals. Furthermore, Bleckmann addresses pressing environmental threats such as water pollution, habitat degradation and overfishing, highlighting the urgent need for conservation efforts to protect fish populations worldwide.

Publisher: Springer
Date: 17 April 2024
Hardcover: 227 pages
ISBN-10: 366268375X
ISBN-13: 978-3662683750



Plankton

Plankton: A Worldwide Guide, by Tom Jackson and Jennifer Parker

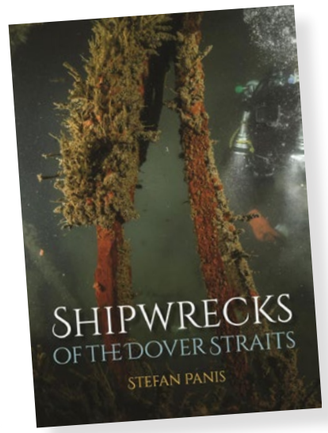
A beautifully illustrated guide, this book unveils the astounding diversity of plankton globally, how they are affiliated with a variety of living groups, and how they have adapted to live in a wide range of environments. Passive drifters in oceans and freshwaters, most of them are tiny or invisible, but some can exceed the length of a whale. They make up the foundation of food chains and support not only all marine life, but are also vital to land-based plants, organisms and animals. Learn about their life cycles, how they feed and grow, the many ways they use to reproduce, and where, how and why plankton drift through the water. The authors present perspectives on migrations, why population explosions called "blooms" occur, and how global warming, pollution, diminishing resources and overexploitation impact planktonic life.

Publisher: Princeton University Press
Date: 9 April 2024
Hardcover: 224 pages
ISBN-10: 0691255997
ISBN-13 : 978-0691255996

Shipwrecks

Shipwrecks of the Dover Straits, by Stefan Panis

Stefan Panis' book serves as both an engaging guide and a comprehensive reference to the myriad of shipwrecks in the Dover Straits, offering valuable insights. It dives into the Dover Straits' rich maritime legacy, showcasing a selection of shipwrecks through vivid photographs and engaging narratives. Each wreck is presented with historical context and a glimpse into the diver's experience, highlighting the thrill of uncovering ancient artefacts. The volume offers a glimpse into the numerous wrecks lying in these challenging waters, many in remarkable condition, providing a fascinating read for enthusiasts of maritime history and wreck diving.



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ISBN-13: 978-1849954969

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Abort!

A Dive Truncated…

Text by Simon Pridmore

There are times when conditions on a dive may become challenging, and divers must decide whether to abort the dive. Simon Pridmore offers insights and advice on how to handle such situations and how to abort dives in a safe way.

It was the second dive of a long-anticipated trip, and the site was Mioskon Island in Indonesia's Dampier Strait—one of the crown jewels of the area known as Raja Ampat or Four Kings. This is where new arrivals often get their first glimpse of the vast volume and variety of life in the waters of this protected patch of northwest Papua.

This relatively shallow, encircling reef is also where many divers see a wobbegong shark for the first time. Justifiably, expectations can be sky-high for a dive at Mioskon. Normally, it is a benign site—the current is mild enough to ensure that the schooling fish come close enough to the reef for you to see them, but not so strong as to cause any problems. On most dives here you would not even notice the current.

A full moon

But this was not a normal day. There would be a full moon rising over Raja Ampat that night, and many dive operators were avoiding the popular submerged pinnacle sites in the strait for fear of awkward strong currents. So Mioskon was busier than usual. A dozen tender boats were drifting just offshore, waiting to pick up post-dive passengers, lined up like tour busses at Disneyland.

Unusually, they had all dropped their divers at the same spot, because on this particular day at Mioskon, the speed of the prevailing current had shrunk the sheltered—and therefore diveable—section of the reef to just a few hundred metres.

The group of seven—a guide and six diving customers—entered the water near the top of the reef and descended. As they drifted along, they came upon divers from other

Group of divers reef-hooking in strong current.

Mioskon Island in Indonesia's Dampier Strait (right)

groups. Everyone was getting in each other's way, all the gear looked the same, they were finding it difficult to stay together and the guide was working hard to keep the group united. The current was becoming erratic and unpredictable, and twenty minutes or so into the dive, one of the seven divers lost control of his buoyancy. The guide went to help the diver and stayed close to him after that.

Splitting up

As they went deeper, beyond 20m, the group eventually became divided into three mini-groups: the guide plus one, a buddy pair next to the reef, and the remaining three divers close to the sandy seabed. The visibility was good, and they could all see each other, but the current had become stronger. Soon it reached a point where everyone had to cling to a rock to stay in place. Nobody was having any fun. They had reached the end of the reef line. There was nothing interesting to see and if they let go of their rocks and allowed the current to take them, they would be swept out into open water.

They were still only halfway through the planned dive time, but they were all more than halfway through their air. Although the goals of the dive had not yet been met—they had seen no wobbegongs nor schooling fish—it was now clear that they were not going to be achieved. There was only one sensible thing to do.

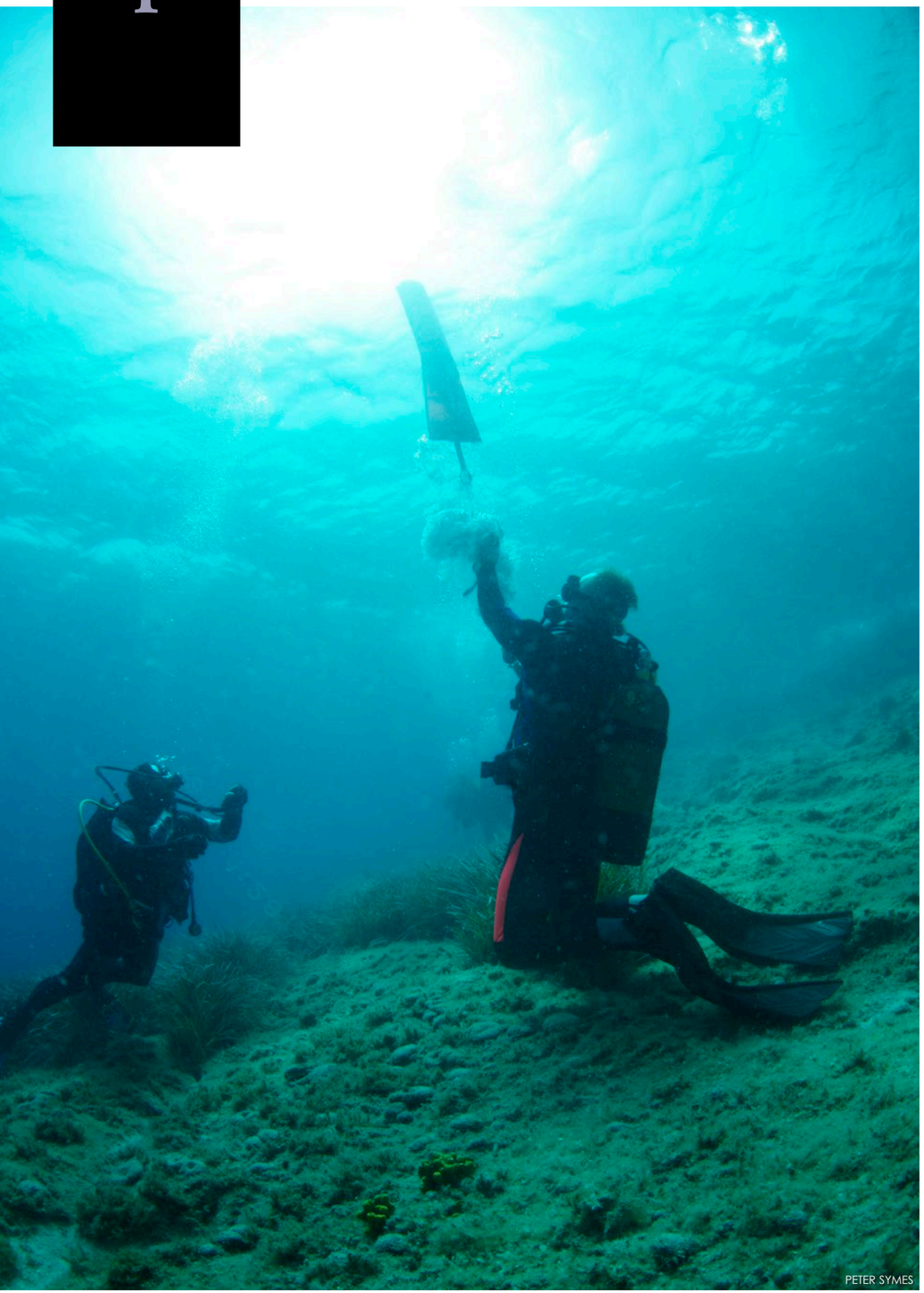
The guide signalled to the buddy pair on the reef that they should all ascend, making their way slowly up the reef, hand over hand if necessary, taking advantage of the shelter afforded by reef outcrops, and end the dive. He then signalled to the other three divers that this was what he was planning.

A dilemma

The three divers had a decision to make. They could swim across the sand towards the reef and against the current and re-join the guide, or they could just make a blue water ascent from where they were. The first option would be hard work and they would probably use a lot of their remaining air just to get back to the reef. The second option would separate the team, but all three of them were confident, experienced divers and the guide evidently had good control of the rest of the group.

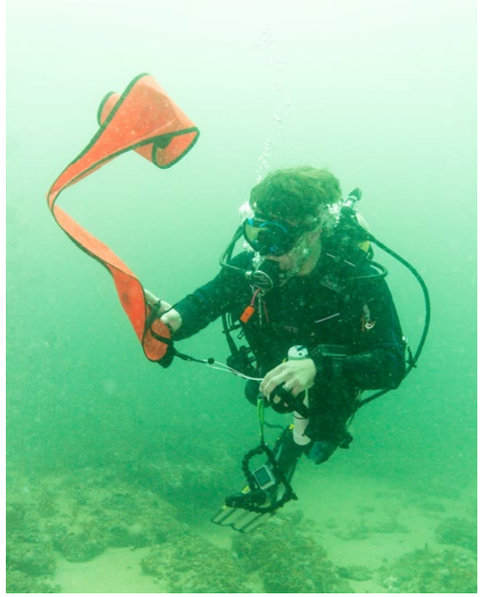
They looked at each other. One diver raised a thumb and the other two immediately agreed. Three thumbs up. Blue water was the call. They quickly made sure the guide had seen them, let go simultaneously and were immediately carried off. They watched as the reef quickly disappeared behind them, assumed the ascent posture—head up, fins down—glanced up and started kicking gently towards the surface, forming a loose triangle, each keeping the other two in view and just beyond arm's length.

It soon became clear that the current was not just sweeping them laterally, it was carrying them down. They stayed calm and started using a more powerful kick, watching the depth reading on their computers closely. At first, they continued to sink but after a minute or so they could see that they were now making progress and gradually getting shallower. It was still slow going, but they were in no hurry.


PETER SYMES

When deploying an SMB, look up to make sure the path is clear of boats and divers.

Diver deploying a surface marker buoy (SMB) (right).


ERIC HEUPEL / FLICKR / CC BY-NC 2.0 DEED

A quick air check showed that they were all at around 60 bar and moving in the right direction.

At 15m one of the divers pulled out a surface marker buoy and attached a reel and line. The other two moved away a little but stayed level to give the diver with the reel a steady depth reference. The diver looked up to make sure the path was clear of boats and divers, then shot the buoy to the surface.

Hailing a tender boat

The three of them ascended together, made a safety stop and surfaced. They were a long way from Mioskon. Rain was falling and there was mist on the water.

Now they had two important tasks. One was to attract the attention of a tender boat. But the second task took priority, and that was to make sure they were not run over by a tender boat, or a big dive boat for that matter. They were well aware of how much traffic there was around them.

So, the other two divers inflated their surface marker buoys and they all started blowing their whistles. After a few minutes a tender came towards them. It was not theirs, but that was irrelevant. They waved it over and told the crew what boat they were from.

Soon they were picked up and rejoined the rest of the group—who had made an uneventful ascent up the reef with the guide—on the main dive boat.

When the three divers noticed how much air they had left, they found they each had just under 30 bar.

"Just enough!" one said. They all laughed.

Good decisions

They had just enough air because they had made some very good decisions.

1. They decided to end the dive prematurely. They lived to dive another day.
2. They did not hesitate when it was obvious that there was no point in continuing.
3. They decided to ascend directly, rather than risk wasting air by trying to get back to the reef against the current.
4. When one decided to go up, the others did not argue, nor did they delay. They followed the golden rule, one up—all up.
5. They did not panic or get stressed when the current started taking

PETER SYMES

Once divers are at the surface, deploying more buoys makes it easier for searchers on the dive boat to find the divers (file photo)

them down.

6. They watched their computers to make sure they were heading up, rather than relying on instinct or feeling.
7. They raised only one surface marker buoy up from their depth, as they were close together and they wanted to avoid the risk of multiple lines becoming entangled.
8. They put the buoy up early to show where they were and to give themselves an ascent reference.
9. Once at the surface, they put up three buoys to give searchers a larger target to see.
10. They used their whistles because in low-visibility situations, sound can alert watchers to the direction they should be looking in.

Lessons learned

Having less than 100 bar in your cylinder at 20-plus metres in a raging current that is carrying you along is very different from having less than 100 bar when you are in complete control in calm water.

- Air is time and wasting time by delaying decisions is wasting air.
- Air is time and getting stressed wastes air.
- Acting as a team and trusting your team members is key.

The dive is not over when you start your ascent. It is not even over when you reach the surface. It is only over once you are back on the dive boat.

Until you are back on the dive boat, you need to stay alert. At no point can you stop concentrating and thinking about where you are and what dangers you may face—such as an unexpectedly strong current or a speeding dive tender in low visibility. ■

Simon Pridmore is the author of the international bestsellers Scuba Fundamental: Start Diving the Right Way, Scuba Confidential: An Insider's Guide to Becoming a Better Diver, Scuba Exceptional: Become the Best Diver You Can Be, *and* Scuba Professional: Insights into Sport Diver Training & Operations, *which are now available in a compendium. He is also the co-author of the* Diving & Snorkeling Guide to Bali *and the* Diving & Snorkeling Guide to Raja Ampat & Northeast Indonesia. *His recent published books include* The Diver Who Fell From The Sky, Dive into Taiwan, Scuba Physiological: Think You Know All About Scuba Medicine? Think Again! *and the* Dining with Divers *series of cookbooks. For more information, please visit his website at:* ***SimonPridmore.com***.

NEW 4 in 1!

Simon Pridmore has released a new single-volume e-book, bringing together four books in his bestselling *Scuba* series:

- ***Scuba Fundamental – Start Diving the Right Way***
- ***Scuba Confidential – An Insider's Guide to Becoming a Better Diver***
- ***Scuba Exceptional – Become the Best Diver You Can Be, and***
- ***Scuba Professional – Insights into Sport Diver Training & Operations***

As Simon puts it, this is "a remastering and repackaging of the original albums rather than a greatest hits." Nothing is missing. *Scuba Compendium* gives e-book readers the advantage of being able to access all the knowledge contained in the four books in one place, making this a unique and easily searchable work of reference for divers at every level.

Simon has always promoted the idea of safer diving through the acquisition of knowledge, which is why he has chosen to release this highly accessible version. If you have read his work before, you will know that he provides divers with extremely useful advice and information, much of it unavailable elsewhere; his points often illustrated by real life experiences and cautionary tales. He examines familiar issues from new angles, looks at the wider picture and borrows techniques and procedures from other areas of human activity.

E-book File Size: 5298 KB
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Sold by: **Amazon**, **Kobo**, Tolino & others
ASIN: B09DBGHJSC

simonpridmore.com

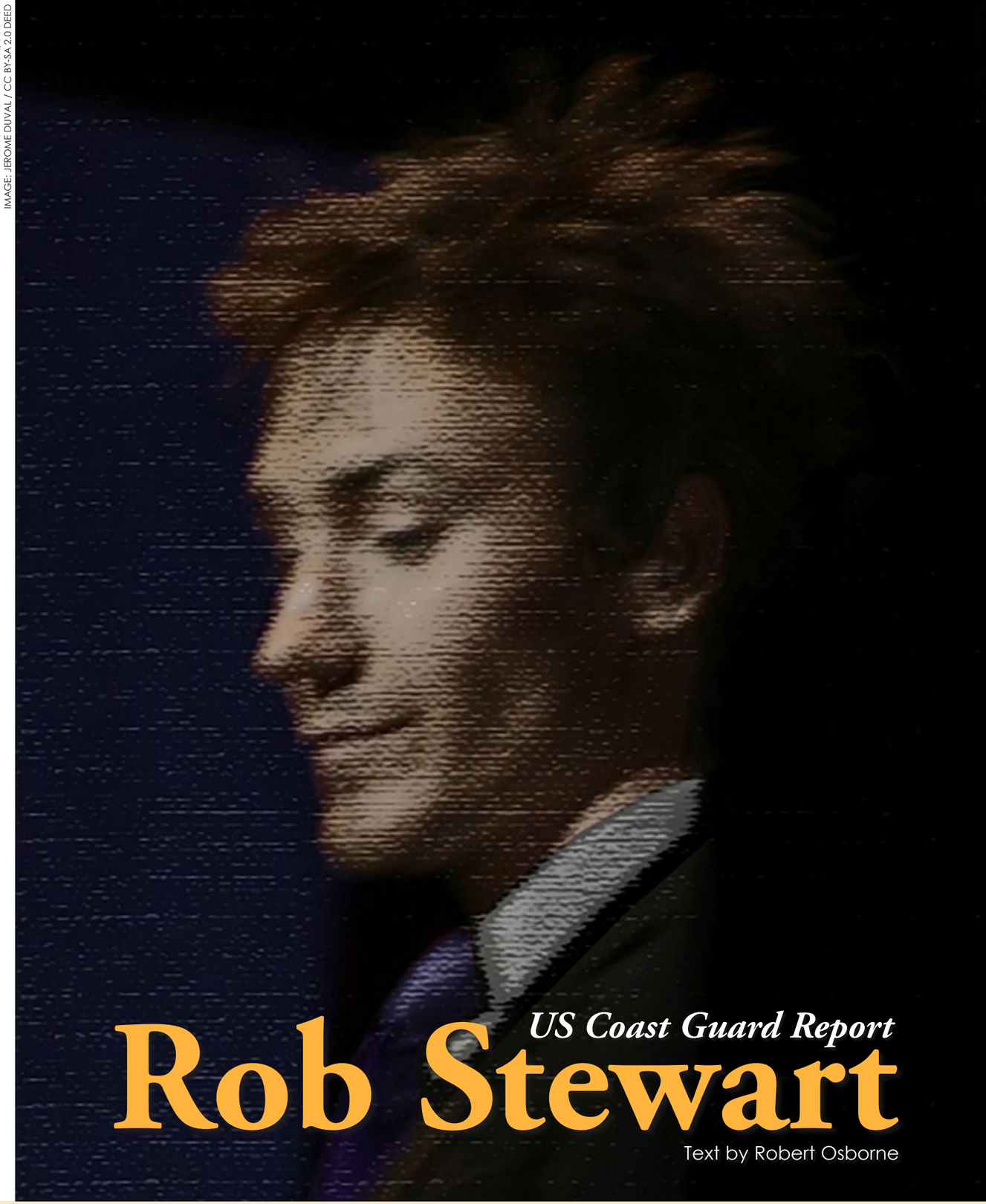

ILLUSTRATION: G. SYMES; SOURCE IMAGE: JEROME DUVAL / CC BY-SA 2.0 DEED

US Coast Guard Report Rob Stewart

Text by Robert Osborne

The US Coast Guard report on the drowning of Canadian filmmaker and technical diver Rob Stewart in Florida was released in 2022. Journalist Robert Osborne, who wrote a book about the case, responds to the report.

It seemed a senseless death—environmentalist and filmmaker Rob Stewart drowning off the coast of the Florida Keys during a dive to retrieve a $25 anchor. A great many people were focused on trying to make sense of what had happened: his family, his friends, members of the dive community, countless lawyers and the local police. There was even a documentary film crew that spent years delving into the story. Definite answers were hard to come by.

Many hoped that an investigation launched almost immediately by the United States Coast Guard (USCG) would provide those answers. But year after year went by, and the report kept being delayed. I filed half a dozen Freedom of Information Act requests and was turned down multiple times because the report was "still in process".

It was with great anticipation that I began to read the report. A couple of hours later, I was staring at the document in disbelief.

It was finally released in March of 2022—more than five years after the accident. It was released very quietly. In fact, despite my repeated contacts with the USCG, I did not receive a copy until the fall of 2023. It was with great anticipation that I began to read the report. A couple of hours later, I was staring at the document in disbelief.

Five years of investigation, with the full resources of the USCG and from every government and private authority remotely connected to the incident, and this was what they had accomplished? There was nothing I could see that was new in the report that could not have been completed within a few weeks of the accident.

All in all, there just seemed to be a lack of effort in getting answers to some very pressing questions. It had all the earmarks of an investigation that had just gone through the motions. When I asked attorney David Concannon, who specialises in dive accident legal matters and is representing rEVO rebreathers in the ongoing civil lawsuit over Stewart's death, what he thought of the report, he described it as, "Feckless."

Under-investigated elements

To really detail how much the report did not cover might be an exercise in tedium, so I thought that I would focus on what I consider to be some of the more important missing or under-investigated elements.

Certifications. For a start, the USCG made a great deal about their belief that Stewart did not have the credentials to make these kinds of deep dives—below 70m (200ft). But this is not entirely true. They did not really take into account a number of TDI technical certifications that Stewart held.

They did ask TDI about any certifications held by Stewart: "Following the subsequent diving accident on January 31, 2017, the U.S. Coast Guard contacted Mr. Brian Camey of TDI. Mr. Camey was unable to locate anyone having the certification number provided by Mr. Stewart and was unable to locate any certifications for Mr. Stewart with TDI by conducting a name search."

But the problem with this line of inquiry is that the USCG gave TDI Stewart's PADI certification number. This is what Stewart had put on his waiver for the dives in Florida when the accident occurred. No wonder TDI didn't find anything. Ultimately, I provided

ILLUSTRATION: G. SYMES / MIDJOURNEY

the USCG with a copy of his TDI certification number and a list of his instructor certifications—which included multiple deep-diving courses. Why TDI said they could not find Stewart's certification by searching for his name remains a mystery—possibly TDI's records in the United States do not include Canada.

Once I provided the list to the USCG, I asked if it would make a difference to their conclusions. They finally acknowledged: "If the Coast Guard confirms Mr. Stewart had the requisite TDI certifications, the Coast Headquarters Office of Investigations and Casualty Analysis (CG-INV) may reopen the investigation and make the appropriate revisions to the Report of Investigation." I am still waiting to hear back.

So, why is this detail important? Two reasons. First, the Coast Guard concluded that "diving at levels beyond certification is a contributing casual factor". And secondly, if they missed this detail, it raises questions about what else they missed after five years of investigation.

Stewart's video. It did not take too much searching to find another missed piece of information. The USCG Investigators had not watched the video that Stewart shot the day before the accident. This is important for a number of reasons.

First, it shows Stewart and Peter Sotis setting up their dive computers. This is critical information when trying to determine if they were diving a safe profile. Secondly, the day was virtually a mirror image of what would happen the following day when the accident occurred.

I found all kinds of critical information by watching this video, such as the fact that Stewart did not bother to inflate his wing when he surfaced. He was relying on the buoyancy of his drysuit. This could have been a huge issue when he passed out in the water. If his wing had been inflated, he might have stayed on the surface.

Tunnel vision. Another crucial piece of information is a conversation that Stewart had with Sotis and his wife, Claudia (a physician). He complained of suffering from tunnel vision during the dive. Sotis concluded that this was because he was breathing too hard on the loop and starting to hyperventilate. Maybe so, or maybe it was something else, given that Stewart acknowledged in his book, *Save the Humans*, "I have low blood pressure and often ride the line between being here, and fainting." (p. 183)

So, I asked the USCG about this tunnel vision. All they had to say was, "Mr. Stewart having 'tunnel vision' is not a finding of fact within the Report of Investigation." Translation: We either did not know about it or just did not bother to include it in our report.

There are several more of these glaring omissions throughout the report. But I will add one final note.

The Wilkerson deposition. When I raised a point with the USCG about something Dave Wilkerson, the skipper of the boat, said during a sworn deposition, the USCG did not seem to be aware the information existed.

My question: "During his deposition, Dave Wilkerson stated that he asked Brock Cahill to keep an eye on Stewart while he was repositioning the boat. No mention of that in the report. Why?"

USCG Response: "The Coast Guard has no comment on why that statement wasn't referenced in the report. However, Coast Guard investigators will often require more than one source to corroborate that a statement was made and heard by the intended recipient."

This is a bit of a cop-out of an answer in my opinion. Wilkerson did not make this statement sitting in a bar with friends, he made the statement while giving a sworn deposition to a room full of lawyers. That should have carried a lot of weight—it can be introduced in court as evidence, so why the USCG did not see fit to include it raises yet more questions about the thoroughness of their work.

The "recovery team". But all of these examples are trivial compared to the one that most dramatically affects the validity of the USCG report. The most glaring problem is the fact that they accepted the so-called "recovery team" who found Stewart's body as some kind of legitimate group working on behalf of some local authority.

They described them as follows: "On February 3, 2017, members of the Florida Keys Water Emergency Team (WET) and additional recovery support personnel were on board the SPY PISCES, including..." Where they got that very official-sounding title remains a mystery.

The local volunteer fire department had their lawyer go public to clearly state that this group had no official standing with them. They were not officially affiliated with the USCG or the local police. So, how did they become the "Florida Keys Water Emergency Team"?

When I asked, the USCG simply said, "The investigating

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ILLUSTRATION: G. SYMES; SOURCE IMAGES: PIXABAY

officer used the name the 'recovery team' provided." I am not certain what that means, but it could be viewed as evasive.

Conflict of interest. Their title was not the only issue. Almost everyone on that "recovery" boat was in a potential conflict of interest position. Dan Dawson owned the boat that lost Stewart, Craig Jenni worked for the insurance company that held Dawson's policy, Kelly Levendorf worked for Jenni, Dave Wilkerson was the skipper on the boat that lost Stewart, and Jeff Knapp worked for the Dawson's dive shop. Each one of these people had a vested interest in the outcome of any accident investigation and should have been nowhere near this body recovery.

That is not my opinion. It is the opinion of the medical examiner, Dr Tom Beaver, who hit the proverbial roof when he found out who was out looking for the body without any supervision.

I asked the USCG why this conflict of interest was not factored into the report, and all they had to say was: "The Coast Guard allows dive vessels to participate in the search and recovery of missing divers from their vessels. The Coast Guard coordinates and oversees these efforts."

So, the USCG investigators completely ignored the possibility that this group might have tainted evidence.

In the documentary, *The Third Dive: The Death of Rob Stewart*, the producers obtained copies of radio transmissions between the boat with the alleged recovery team and the police department. At one point, when they tell the department they have the body on the boat, the captain of the vessel, Rob Bleser, stated: "We're about a mile west of [the] Islamorada Coast Guard small boat ... and we're going to be transferring the victim onto that boat as soon as we do some forensics."

Forensics? Nobody on board that boat had any authority to start any forensic examination. And any "forensic" work done by them may have contaminated evidence that was critical to the medical examiner. This whole "forensic" process by a group of self-interested locals seems to have been completely ignored by the USCG investigators.

Almost everyone on that "recovery" boat was in a potential conflict of interest position ... Each one of these people had a vested interest in the outcome of any accident investigation and should have been nowhere near this body recovery.

I pressed the USCG on this, and they brushed it off by saying, "The Coast Guard relied on the medical examiner's postmortem examination report. The medical examiner's report did not note any anomalies or potential spoilage prior to their autopsy."

But this is a disingenuous statement. The medical examiner, Beaver, may not have put any objections in his written report, but he had strenuously objected to the fact that this so-called "recovery team" had a conflict of interest and may have contaminated any evidence. He wrote to the fire chief and expressed his misgivings. He went public and loudly objected to what had occurred. Beaver stated:

"I complained about this to everyone that would listen and … certainly the sheriff's detectives, and the sheriff's office was part of that. I complained to anyone that would listen, that this was, you know, that this was just outrageous.

Interviewer: "What were their responses?"

Beaver: "Well, the sheriff said we're not involved, it's a Coast Guard matter ... the sheriff wasn't willing to get involved at all in the case."

In fact, Beaver went further. He accused the "recovery team" of shutting him out of the process, Beaver said in an interview: "I wanted to be present when they were doing it, that way I could oversee what they were doing and make sure that they weren't destroying evidence, that there wasn't an alteration of evidence, either intentional or accidental ... that we collected all the evidence but ... I was excluded. They intentionally excluded me from any of the ... planning for the recovery or any of the recovery operations ... Once the body had been located, there was ample opportunity for them to contact me and have me come out."

Once again, I asked the USCG why this clear conflict of interest and potential contamination of evidence had not been factored into their report. They promised to follow up with more information. So far, nothing. That was several weeks ago.

Cause of death. Finally, what makes the report of limited value is that after five years, the USCG was unable to come to any conclusion about the cause of death. Many now believe that the excessively fast surfacing protocols and aggressive decompression times led to a DCS hit of some kind—possibly one that affected the brain.

Dr Neal Pollock, research chair in hyperbaric and diving medicine at LaValle University, suggested that such a hit was most likely; it would

cause a blackout and would dissipate quickly with O_2 use—the possible reason why a chamber session was not required for Sotis. If Stewart did not have his wing inflated and blacked out, he would drop the rebreather loop from his mouth, his rebreather would flood, and he would sink.

The USCG acknowledged that DCS might have been one cause, but they muddied up the report by naming several other possible causes. They also suggested that it might have been hypoxia. This is based on Beaver's analysis. But Beaver told me in an interview that he had reconsidered that conclusion and now thought it might also be DCS.

The problem with hypoxia is that Stewart's computer logs do not really reflect this possibility. I have a copy of the logs from his Shearwater dive computer. He did skate close to some very low $PP0_2$ levels (around .07), but for no more than a minute or two when he first reached depth and at the end of the dive when he hit his final deco stop at 10ft. Other than that, he was good. He stayed at a pretty steady 1.1 to 1.3.

The USCG also concluded that it could possibly be oxygen toxicity. But most of the experts I spoke to said that this problem was most likely to occur at depth, not at the surface, and that it was very rare indeed. Again, Stewart's computer showed that by the end of his third dive on that day, he was skating up around 90%.

So, five years of investigation and all the USCG could come up with was it could have been this, it could have been that. Ultimately, they blamed the aggressive dive profiles that Stewart and Sotis were diving, "The primary causal factors that led to this marine casualty include: dive planning with aggressive gradient factors; failure to input the actual diluent gas mixtures into the computer to ensure safe decompression schedules; and modifications to rebreather equipment that deviated from manufacturer's recommendations. Additional contributing or causal factors include: diving at levels beyond certification, not adjusting dive profiles based on the dive computer, and the combination of three technical dives to depths in excess of 200 fsw over the course of a limited time span."

Five years of investigation, evidence missing or ignored, no real conclusion, a lot of "might have been" and "maybe was." Stewart deserved better.

At the end of the process, they slapped a few wrists about procedures for certification and checking up on waivers: "It is recommended that diving vessel marine employers require dive customers, who are passengers for hire, to present proof of diving certification to at least the level/type of diving trip or excursion being planned." But nobody really took a serious hit in the report, particularly nobody in the dive industry in the Florida Keys.

A complex investigation

I cannot help but keep coming back to the fact that all of this information was available to them within a few months of the accident. So, why did it take them so long? Well, according to the USCG, it is complicated: "Coast Guard policy requires multiple levels of review for marine casualty investigations that involve a fatality on a commercial vessel. In this instance, the complexity of the diving fatality, combined with the high volume of investigations under review at Coast Guard Headquarters, contributed to the delayed release." Translation: We like to take our time when the situation is complex.

ILLUSTRATION: G. SYMES / MIDJOURNEY

And yet, for all the time they have taken, they have turned out a report that can only be described as substandard. Concannon summed it up by saying, "The investigatory techniques used were severely lacking—indeed, amateurish, incomplete and preordained. The investigators failed to follow established USCG protocols for commercial diving accident investigations, they overlooked or ignored evidence provided to them by the US Navy, they allowed themselves to be misled by subjects of the investigation, and, finally, they appeared to be covering up mistakes made by the US Coast Guard in the search and recovery of Rob Stewart's body. That is, they allowed the primarily responsible parties (representatives of the vessel that lost Stewart and the production company that failed to follow safety protocols) to search for and recover the body while ignoring the law and established investigative protocols. The US Coast Guard has no business leading *any* underwater search, recovery or fatality investigation. They lack the knowledge, equipment and expertise to do so, with predictable and unsatisfactory results. This is particularly true when they start their investigation with a conclusion and only look for and at evidence to support it."

Five years of investigation, evidence missing or ignored, no real conclusion, a lot of "might have been" and "maybe was." Stewart deserved better. ■

Robert Osborne is an internationally published dive writer, television producer, reporter and author based in Toronto, Canada. His book, The Third Dive: An Investigation into the Death of Rob Stewart, *is available on* ***Amazon***.

Orca Attack

on a Humpback Whale in South Africa

Orca breaches and pounces on a humpback whale that has become separated from its super-pod in South Africa.

Text by Silke Schimpf
Photos by Heinz Toperczer

During the past 24 years of going out to sea as tour operators in South Africa, Silke Schimpf and her husband, Rainer, have encountered orcas hunting several times, killing animals such as seals, dolphins and sharks. But never in their wildest dreams could they have imagined that they and their crew would witness an attack on a humpback whale like the one that took place on 1 December 2023.

It all started on a normal ocean safari day out in Langebaan Lagoon. The aim of the tour was the seal colony at Cape Columbine near Santa Helena Bay, on the western side of the Cape of South Africa, about an hour's drive north of Cape Town.

The sea was flat, there was no wind, and all had gone well for the tourists and crew. En route, we had spotted the usual ocean sunfish (*Mola mola*) and a few dusky dolphins. Upon arriving at the seal colony, some of the guests snorkelled with the friendly seals.

About an hour later, Rainer saw a couple of vessels to the north of us and decided to get closer to find out what they were looking at. It was a research vessel and another tour operator observing a superpod of humpback whales. At a safe distance, he stopped the boat so we could watch the amazing sight of humpback whales feeding.

On the hunt

After observing this action for about an hour, I suddenly saw them and shouted, "Orcas!" Out of nowhere, a pod of about 15 orcas had appeared, heading straight for a pair of fully-grown humpback whales, which had been separated from the rest of the superpod.

We soon realised that this was no game. The orcas were serious and hungry and were trying to feed on one of the humpback whales. Rainer launched a drone and filmed the action for the next 50 minutes.

It appeared that the lead orcas

A pod of orcas made what appeared to be a coordinated attack on a humpback whale that was separated from a superpod of humpbacks near Santa Helena Bay in the Western Cape province of South Africa. Over and over again, the attacks came in waves. Orcas would pounce on top of the humpback whale, pushing it down underwater, as other orcas rammed the humpback's throat and mouth so it eventually suffocated and drowned.

had selected one of the humpback whales as their prey and were attacking it in continuous waves coordinated from within the pod. It looked very organised and practised. Surely, this was not the first time this pod had hunted, killed and feasted on a humpback whale.

A first

However, it was the first time ever such an event had been witnessed and documented in South African waters. Prior to this event, it was known that orcas hunted whales, but it had never been observed in South Africa. It had also never been filmed from a drone—until now.

Coordinated attack

Again and again, the orcas came in waves to attack, breaching and pouncing on the humpback whale, pushing it underwater and suffocating it by ramming it simultaneously underwater in the throat and mouth. The poor humpback whale had no chance.

For about 45 minutes, the relentless killing blows of the organised orca troop forced the humpback down underwater to the point where it simply ran out of air. It drowned. The orcas then followed the falling humpback down into the depths of the Atlantic Ocean, where we knew they would take its tongue and the soft part of its throat and eat it.

The only evidence we could see of this was the floating blubber, which had come to the surface and was quickly scavenged by various seabirds, such as seagulls, terns and petrels, that had arrived on the scene to take their share of the pickings.

For the next 20 minutes or so, we watched as the orcas surfaced again and again. Once they had had their fill of the humpback whale, they moved as a group in a northerly direction and disappeared as mysteriously as they had arrived.

We were all left in awe.

Several orcas coordinated their attack on the humpback.

Orca climbing on top of the humpback to push it down underwater with its weight.

Grief

Then, a pod of humpback whales came back to the scene. Unable to assist and fight the orcas during the attack, it appeared as if they had all come back to pay tribute to their fallen friend, which had saved the rest of the pod of humpback whales by sacrificing itself, so it seemed.

Silently, the humpback whales swam around the kill zone and then finally moved on.

Previous find

Interestingly enough, about four days before this event, we had found a dead humpback whale that was missing its tongue and the lower part of its throat. Already then, we suspected that the orcas were responsible. And now we knew we were right.

Rainer and our company, Expert-Tours, will be on the lookout and will report any further sightings of orcas in the area. In conjunction with Fairy Connections, the legal permit holder for whale watching, Langebaan Divers and Rainer's dive boats, *Expert-Tours 2* and *Spartan*, are legally certified whale- and dolphin-watching vessels in the area. Ocean safaris with diving and snorkelling are conducted properly in accordance with regulations. The tour described in this article was a combination of all these activities. ■

Expedition leaders and guides Silke and Rainer Schimpf run Expert-Tours in South Africa. For more information, please visit: ***expert-tours.de***.

Edited by
Peter Symes

New research reveals how some whales can sing while holding their breath under-water.

PETER SYMES/MIDJOURNEY

How Whales Can Sing Underwater

Scientists have unlocked the mystery of how some whale species are capable of singing complex songs while submerged and holding their breath, a recent study published in *Nature* reveals.

This discovery sheds light on the unique physiological adaptations that allow these marine giants to perform such vocal feats.

The research's primary focus involved examining humpback whales' laryngeal anatomy. Researchers found that specific adaptations in the whale's larynx enable it to produce song even without the continuous passage of air, contrary to what is typically required for sound production in most mammals, including humans.

Breath control and vocalization

The study highlights that whales utilize a unique mechanism that recycles air within their bodies to sustain long, melodious calls. This process allows whales to sing for extended periods—up to 30 minutes at a time—without resurfacing for air. The ability to sing while submerged is crucial for communication, mating and possibly navigation across the dark oceanic depths.

Biological significance

Understanding how whales sing is more than a curiosity. It has significant implications for studying whale populations and their health. Song patterns can indicate the presence, density and behaviour of whales, serving as a crucial tool for conservation efforts. The complexity of whale songs also underscores the cognitive sophistication of these creatures, hinting at a rich social structure and communication system.

The research also addresses environmental concerns, such as noise pollution, which can interfere with whale songs and disrupt their natural behaviours. By understanding the mechanics of how whales sing, scientists can better advocate for marine environments that support healthy whale populations. ■

SOURCE: NATURE

Deciphering the Language of Whales

Research suggests sperm whale clicks may represent a complex language system.

In a pioneering study published in *Nature Communications*, researchers have made significant progress in decoding the communication system of sperm whales, suggesting that their patterns of clicks—known as codas—may be the closest animal equivalent to human language.

The study delves into the sophisticated structure of sperm whale codas, consisting of a series of clicks used by whales to communicate with each other across the vast ocean expanses. By employing artificial intelligence and machine learning techniques, scientists have started to identify specific patterns that could correspond to distinct phrases and sentences, offering unprecedented insights into how these majestic creatures interact.

Complex communication

According to the research, each coda represents a potentially unique piece of information, which might be used to convey complex messages between individuals. These findings highlight the complexity of sperm whale social structures and their communication abilities, which appear far more intricate than previously understood.

The team used advanced algorithms to analyse thousands of recorded codas, seeking patterns and repetitions that might indicate a structured form of communication. This method mirrors techniques used in human linguistics, adapted to handle the unique acoustic characteristics of whale sounds.

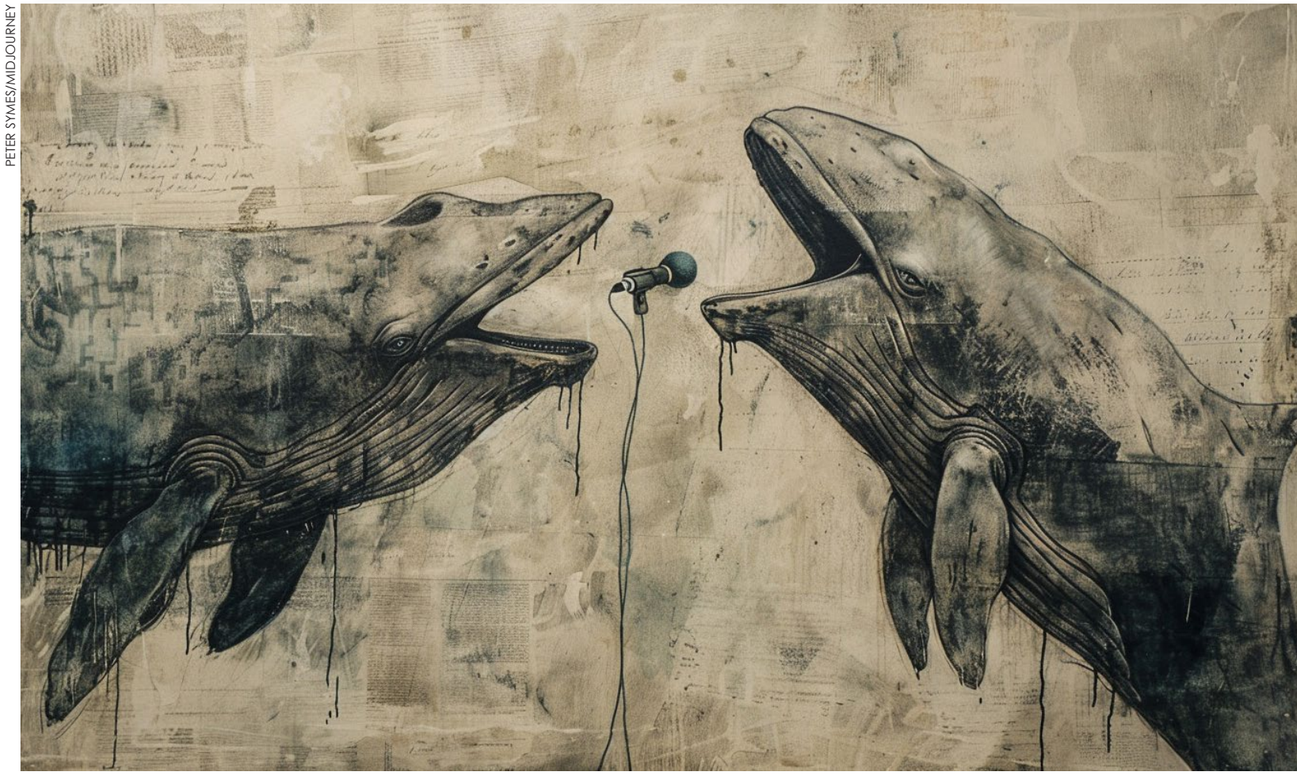
The study's authors are optimistic about the future of this research. They anticipate that ongoing advancements in technology and data analysis will allow for even deeper insights into the communication systems of sperm whales and other cetaceans. This could eventually lead to more effective protection measures and policies to support the thriving of these complex marine societies.

Implications for conservation

Understanding whale communication is not just an academic pursuit. It significantly impacts conservation efforts and our broader understanding of marine life intelligence. By deciphering whale languages, researchers can better predict and mitigate human impacts on whale populations, such as those from shipping routes and underwater noise pollution. ■

SOURCE: NATURE COMMUNICATIONS

PETER SYMES/MIDJOURNEY



Groundbreaking research suggests sperm whale clicks may represent a complex language system.

Curious beluga whale peers into the photographer's camera (right and below).

Belugas

The World's Friendliest Whales?

Text and photos by Malcolm Nobbs

Are belugas the world's friendliest whales? They are known to be extremely playful and curious. Malcolm Nobbs was keen to observe those qualities first-hand. So, he flew to Churchill in the Canadian subarctic—the "Beluga Capital of the World."

There are estimated to be around 3,000 belugas in the icy waters of the Churchill River estuary. Their presence is a testament to the region's importance as a sanctuary for the world's most substantial beluga population. However, poor water clarity can make it challenging to estimate their actual numbers. This factor also makes it difficult to get good images of them.

Belugas, with their impressive stature reaching up to 4.5 metres in length and a mass nearing 1,900kg, navigate their chilly domain with grace. Their longevity, speculated to span between 50 and 80 years, is a subject of scientific contemplation. The method of determining the age of these cetaceans, by taking a small sliver of one of their teeth and counting the rings in it, is mired in debate over whether a ring equals one year or two!

Since Canada has banned swimming with cetaceans, I photographed them by lying on a foam board towed behind a zodiac, a technique known locally as "beluga boarding." As my photos show, they posed for me repeatedly, sometimes swimming directly in front of me for

Beluga whales can grow up to 4.5m in length and weigh nearly 1,900kg, yet they move gracefully through the frigid waters of Canada's subarctic (above and top right). They posed for the camera repeatedly (left). "Beluga boarding" on a foam board towed behind a zodiac (right).

minutes at a time.

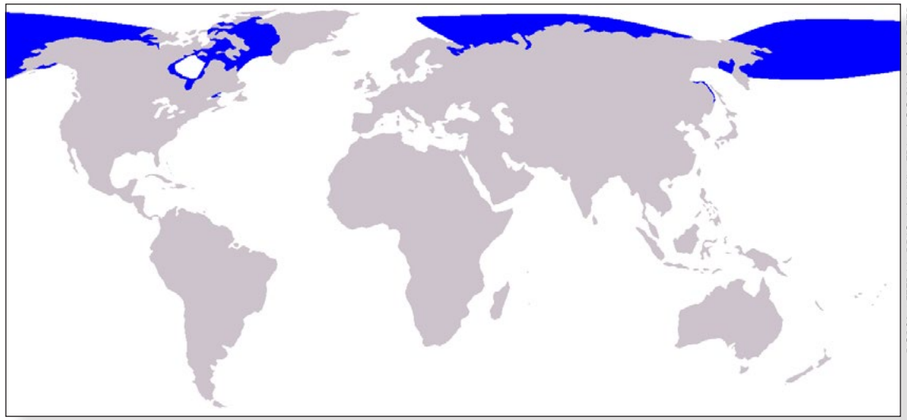
So, are belugas the world's friendliest whale? Based on my experience, I think they possibly are. ■

The author's trip was organised by Big Fish Expeditions.

Based in Nelson Bay in New South Wales, Australia, UK native Malcolm Nobbs is a widely published underwater photographer and regular contributor to both Australian and dive magazines around the world. Formerly an active member of the British Society of Underwater Photographers (BSoUP), he moved to Australia in 2009, after penning his first underwater magazine article. Teaming up with Jamie Watts in 2013, the pair have produced a constant stream of articles. Over the years, Nobbs has steadily expanded his website into one of the world's largest scuba-related websites, with over 10,000 categorised and searchable marine life images, numerous dive site location reports, published works and videos. Visit: **malcolmnobbs.com**

marine mammals

Edited by
G. Symes



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Beluga whale range on global map

BELUGA WHALE FACTS

The beluga whale (*Delphinapterus leucas*), often referred to as the white whale, sea canary (due to its high-pitched calls), or melonhead, is a notable Arctic and sub-Arctic cetacean. Alongside the narwhal, it is one of two members of the Monodontidae family and the sole representative of the *Delphinapterus* genus.

Belugas are uniquely adapted to Arctic life. Their all-white colour and lack of a dorsal fin facilitate smooth swimming under ice. Males can reach up to 5.5m (18ft) in length and weigh around 1,600kg (3,530 lbs), with a significant portion of this weight being blubber. They have a robust stocky body with a prominent protuberance on their head that houses a large echolocation organ known as the melon. This echolocation ability, along with their highly developed sense of hearing, allows them to navigate and locate breathing holes beneath the ice.

Social creatures, belugas typically form groups of around 10 but can gather in the hundreds or even thousands during summer in estuaries and coastal regions. Though slow swimmers, they can dive to depths of 700m (2,300ft). Their diet is diverse and changes with location and season, including fish such as cod, salmon and halibut, and invertebrates such as shrimp, squid, clams and crabs.

Most belugas inhabit the Arctic Ocean and surrounding seas near North America, Russia and Greenland, with a global population estimated at around 200,000. They are migratory, spending winters near the Arctic ice cap and moving to warmer estuaries and coastal areas in summer. However, some populations remain in one area throughout the year.

Belugas swim more slowly than other toothed whales like the killer whale and common bottlenose dolphin due to their less hydrodynamic shape and limited tailfin movement. Their typical swimming speeds range from 3 to 9km/h (1.9 to 5.6mph), but they can sustain speeds of 22km/h for up to 15 minutes. Unlike most cetaceans, belugas can swim backwards, although they do not leap out of the water like dolphins or killer whales.

While they usually dive to depths of around 20m (66ft), belugas are capable of much deeper dives. Captive individuals have been recorded diving between 400 and 647m, while wild belugas have reached depths exceeding 700m, with the deepest recorded dive being over 900m. Dives typically last 3 to 5 minutes but can extend beyond 20 minutes. ■

SOURCE: WIKIPEDIA

Whitespotted bamboo shark, *Chiloscyllium plagiosum*, in Kannoura Bay, Kōchi Prefecture, Japan

MALCOLM NOBBS

The Elusive Whitespotted

Bamboo Shark

Text by Malcolm Nobbs
Photos by Malcolm Nobbs and Norihiro Fukui

Whitespotted bamboo sharks, the elusive dwellers of southeast Asia's marine realm, are not easy to find. Maybe it is just that they are relatively scarce. Or maybe it is simply because during the daytime, they rest in deep crevices. Either way, they are rarely seen. Malcolm Nobbs takes us to Kannoura Bay in Japan in search of this rare shark.

In the tapestry of the ocean, the whitespotted bamboo shark is a study in elegance and adaptation. They are nocturnal phantoms with elongated silhouettes. With their finery of lobed fins, rounded snouts and skin adorned with a constellation of white and black spots, they glide the reef in search of bony fishes and crustaceans. Reaching lengths of almost one metre, they are thought to live for up to a quarter of a century.

Where to see them

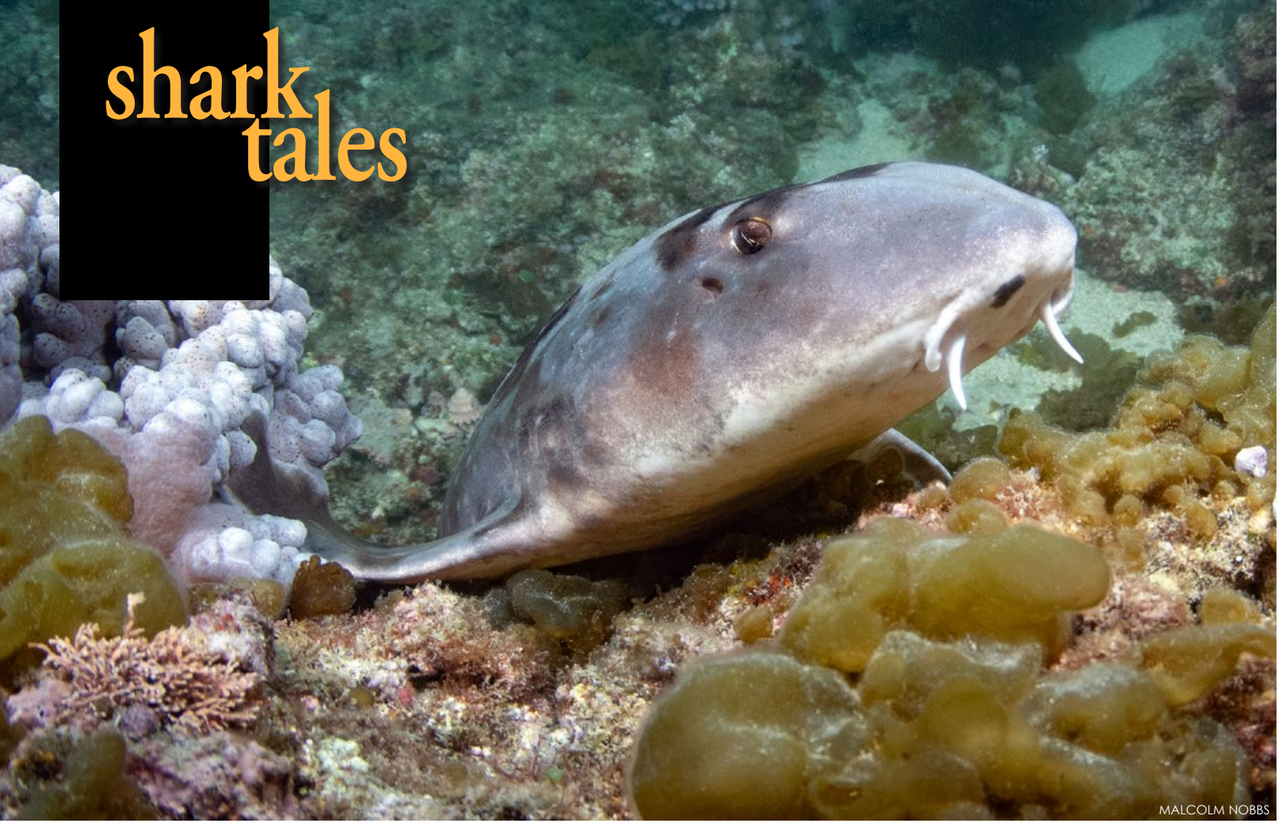
In the waters off Malapascua Island in the Philippines, they have occasionally been sighted in depths of 10 to 20m. Another possible haven for these enigmatic creatures is thought to be Kannoura Bay in the eastern reaches of Kōchi Prefecture, Japan. Here, from July until the following March, they are said to reside offshore in depths of 50 to 70m and come to shallower waters to mate from April to July, with this mating aggregation peaking in May and June each year.

Off to Japan

Together with Andy Murch of Big Fish Expeditions, I travelled to Kannoura Bay in May, hoping that these stories were true. We met up with Norihiro Fukui, the owner of Kannoura Bay's dive centre, Oranku Divers. Norihiro told us that the rumours were spot on, and that he had even seen between 30 and 40 whitespotted bamboo sharks on a single dive there.

He believes that this bay, with its tranquil waters and gentle undula-

shark tales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MALCOLM NOBBS

Harmless to humans, whitespotted bamboo sharks are nocturnal, resting in crevices during the day and hunting at night (top left). From May to June, these sharks can be seen in Kannoura Bay, Kōchi Prefecture, Japan (top right). As benthic predators, hunting near the sea-bottom, they prey on small fishes and invertebrates (right). Andy Murch of Big Fish Expeditions photographs a whitespotted bamboo shark in Kannoura Bay (left).

tions, offers a unique sanctuary for these sharks. It is a cradle of new life where predators dare not venture. The sharks' eggs find a place to thrive here, caressed by the nurturing waves and moderate seawater circulation. After 110 to 135 days, the hatchlings emerge from their capsules, a new generation ready to glide through the waters of the sea.

Keeping our fingers crossed, Andy and I hit the water and within a few minutes, we spotted our first whitespotted bamboo shark. Then another, then another. Elsewhere they are rarely seen by scuba divers, but it turns out that in Kannoura Bay, from May to June, they are easy to find. ■

For more information, visit: **orankudivers.com**

Based in Nelson Bay, New South Wales, Australia, UK native Malcolm Nobbs is a widely published underwater photographer and regular contributor to both Australian and dive magazines around the world. Formerly an active member of the British Society of Underwater Photographers (BSoUP), he moved to Australia in 2009, after penning his first underwater magazine article. Teaming up with Jamie Watts in 2013, the pair have produced a steady stream of articles. Over the years, Nobbs has steadily expanded his website into one of the world's largest scuba-related websites, with over 10,000 categorised and searchable marine life images, numerous dive site location reports, published works and videos. Visit: **malcolmnobbs.com**

shark tales


MALCOLM NOBBS

NORIHIRO FUKUI

These sharks are found on coral reefs in the Pacific, from Japan to India (above). A backlit whitespotted bamboo shark egg (right).

FACTS ABOUT THE WHITESPOTTED BAMBOO SHARK

Edited by G. Symes

The whitespotted bamboo shark (*Chiloscyllium plagiosum*) is a nocturnal species of carpet shark that is harmless to humans and can grow up to 93cm in length. Notable for its dorsal fins with convex posterior margins, the shark is easily identified by its distinct colour pattern of purple and pink spots on a white body with dark bands. They typically rest on the seabed, supported by their bent pectoral fins, and have a distinct dorsal fin that influences their habitat choice and movement.

Whitespotted bamboo sharks are found across the coral reefs of the Pacific Ocean, from Japan to India, including the coastal areas of Indonesia. They are primarily nocturnal feeders, preying on small fish and invertebrates.

These sharks are equipped with relatively undifferentiated teeth, which are adapted for both grasping soft prey, allowing the teeth to sink into the flesh, and crushing hard prey by pivoting backwards to protect the tips and form a plate for crushing crabs.

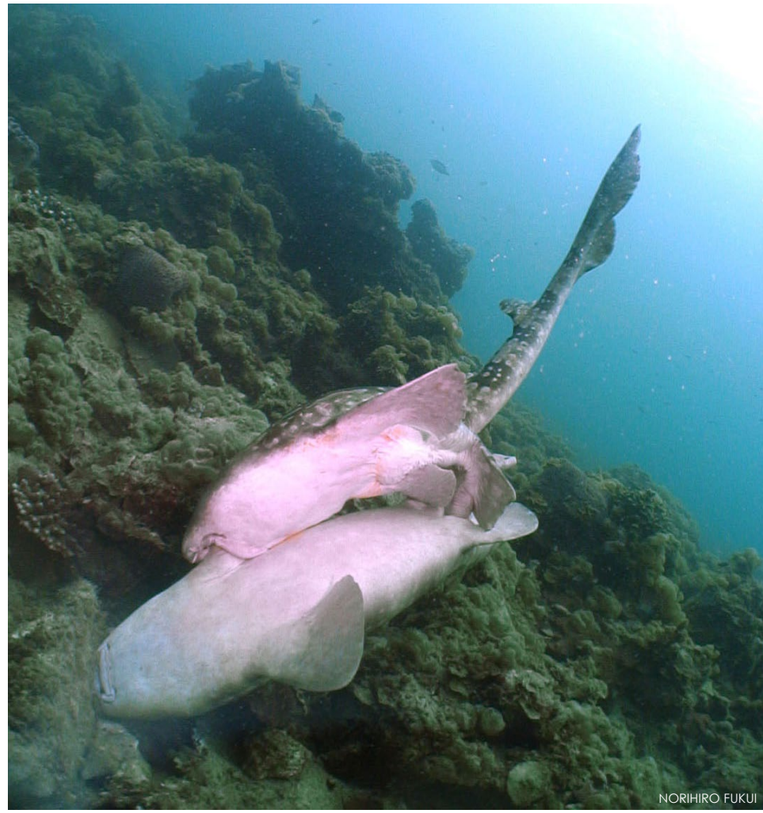
As benthic predators, they hunt near the sea-bottom, unlike pelagic sharks, and employ electroreceptors on their snout to detect prey hidden in sand and mud. During the wet seasons, the juveniles require a higher intake of carbon than the adults.


NORIHIRO FUKUI

Reproduction in whitespotted bamboo sharks is through egg-laying, with eggs measuring about five inches (~13cm) and hatching within 14 to 15 weeks.

The hatchlings emerge at around six inches (~15cm) long, showcasing the shark's unique reproductive capabilities. ■

SOURCE: WIKIPEDIA


NORIHIRO FUKUI

Mating pair of whitespotted bamboo sharks (above and top right)

By Ila France Porcher

Smooth hammerhead shark

SHAUN LEE / WIKIMEDIA / CC BY 4.0 DEED

Smooth Hammerhead Shark Nursery Found in Galápagos

The Galápagos National Park Directorate (GNPD) has unveiled the existence of a nursery site for smooth hammerhead sharks nestled in a secluded bay off Isabela Island.

This remarkable finding, uncovered during a recent expedition led by Greenpeace, has piqued considerable intrigue among scientists owing to the rarity of smooth hammerhead shark sightings during their early developmental stages.

Smooth hammerhead sharks (*Sphyrna zygaena*), were listed as vulnerable on the IUCN Red List in 2018, so their conservation is vital. They inhabit tropical and subtropical waters across the globe. Distinguished by the absence of the characteristic heart-shaped notch found in other hammerhead sharks, these elusive creatures have long fascinated researchers.

Already depleted, not studied

Smooth hammerhead sharks have faced numerous threats and challenges. Before scientists began studying them, they had been subjected to overfishing by commercial fishing operations around the globe, targeting them, mostly for their fins. They are particularly vulnerable to overfishing due to their slow reproductive rates and late maturity, characteristics shared by many shark species. Additionally, their habitat, which includes coastal areas and open oceans, has been impacted by human activities such as pollution, coastal development and climate change.

With the backing of scientists and strategic partners, the GNPD will delve deeper into this newfound shark nursery, in hopes of gaining more valuable insights into its ecology and its significance for the hammerheads roaming the waters around these islands.

A local hammerhead tagged

Amidst this discovery, a pivotal milestone was achieved as a satellite tag was successfully affixed to a sub-adult female smooth hammerhead shark. Monitoring her movements in the ensuing months promises to furnish crucial data on the efficacy of the Galápagos Marine Protected Areas, where this species enjoys legal safeguards.

Importance for conservation

Dr Jorge Carrión, Director of Conservation, underscores the pivotal role played by smooth hammerhead sharks as apex predators in preserving the overall marine ecosystem's health. The identification of this nursery area marks a monumental stride forward in the conservation efforts aimed at safeguarding this species across the archipelago.

The Galápagos Conservancy, a key patron of research initiatives concerning shark behaviour, migratory patterns, and habitats in the Galápagos, provides vital support. By furnishing essential data, these endeavours bolster the implementation of effective conservation strategies and foster close collaboration with the GNPD to ensure the protection of these awe-inspiring marine predators.

Efforts such as establishing marine protected areas, implementing fishing regulations, and raising awareness about the importance of sharks in marine ecosystems have been crucial in supporting the conservation of smooth hammerhead shark populations. But despite conservation efforts, they continue to face significant threats, and their populations remain vulnerable. Continued research, conservation measures and international collaboration are essential to ensure the long-term survival of this species and to maintain the health of marine ecosystems in which they play a vital role. ■

SOURCE: GALÁPAGOS CONSERVANCY

By Ila France Porcher

A Closer Look at Human-Shark Encounters

Great white shark

ELIAS LEVY / WIKIMEDIA / CC BY 2.0 DEED

Researchers at the University of California Shark Lab have found that swimmers, surfers, and great white sharks are often in close proximity in Southern Californian waters, much more so than had been assumed. Yet in spite of this, shark bites are rare. Shark Lab Director Chris Lowe emphasizes that white sharks generally ignore humans. They just do not see them as prey.

A recent **article** by Sam Fletcher begins with the gripping account of a wildlife videographer, Scott Fairchild. Using a drone, he captures a heart-stopping moment when a great white shark repeatedly approaches a lone swimmer off the coast of San Diego. Yet suddenly the shark veers away and disappears. Fairchild states that he has seen countless such encounters between swimmers and white sharks off the Californian coast.

We are not shark food

Shark Lab Director Chris Lowe has stated that people are around white sharks more than they are aware, making shark bites even rarer than previously thought. Lowe is studying these interactions and the circumstances surrounding various shark reactions. His work shows that white sharks, at least around San Diego, generally ignore people.

Shark mitigation measures

California stands out among regions where humans and sharks mingle along the shorelines. Unlike Australia and South Africa, where deadly measures such as culling have been used for over five decades, California refrains from using lethal measure to prevent shark attacks. In contrast, both Queensland and New South Wales in Australia use shark nets and baited hooks, as reported by the Australian Marine Conservation Society (AMCS).

But in the past ten years, California has recorded only two deaths caused by white sharks, while South Africa recorded three fatalities and Australia documented 13. Despite having a smaller population than Southern California, Australia sees three to four attacks per year, while California experiences one every four years, Fairchild noted. Although shark attacks remain extremely rare, they are more frequent in Australia and South Africa, he said.

Fear instead of science

Critics like Fairchild vehemently oppose Australia's approach, labelling it as "moronic". He points out the negative effects of these methods, especially the deaths of turtles and whales. Moreover, culling makes the situation worse by using bait to attract sharks in the first place.

Since 2001, Queensland's culling efforts have resulted in the capture of 413 whales and dolphins, 907 turtles, 1,766 rays, and the culling of 13,167 sharks, according to AMCS reports, though there is no reliable data to justify it. Fairchild underscores the reluctance to change these practices, driven in part by the fear of being held accountable for future shark attacks.

Shark behaviour is variable

Lowe acknowledges the ongoing challenge of predicting shark behaviour, especially globally. He points out the geographical variability in shark behaviour, using the unique phenomenon of white sharks breaching fully out of the water, as an example. This behaviour is primarily observed in South Africa.

Fairchild emphasizes the individual nature of shark behaviour, drawing parallels between regional variations and human cultural differences. Lowe stresses how important it is to predict shark behaviour, stressing that while shark attacks may occur more frequently in certain areas, interactions resulting in bites remain extremely low compared to peaceful encounters.

Education and conservation are needed

While shark attacks receive significant attention, the article underscores that the ocean poses greater dangers, with drowning being a far more common cause of death. The importance of sharks in maintaining marine ecosystems is highlighted, with researchers advocating for better public education and conservation efforts.

Fairchild's experiences as a videographer have led him to become an advocate for shark conservation, and he feels that accurate education is very important to dispel the misconceptions about white sharks, which are believed as if they are facts. Ultimately, the article stresses the importance of coexistence and understanding between humans and sharks, not only for their benefit, but also for the health of our oceans. ■

SOURCE: EARTH ISLAND JOURNAL

squid news

Edited by Catherine GS Lim

"Our study shows that even for a highly adaptable taxon like octopuses, they may not be able to survive future ocean changes."

— Dr Qiaz Hua, University of Adelaide

LINNAEA MALLETTE / PUBLIC DOMAIN PICTURES / PUBLIC DOMAIN

Octopuses Could Lose Eyesight if Ocean Temperatures Keep Rising

According to a study, heat stress brought about by rising temperatures may have detrimental effects on octopuses and their unborn young.

Heat stress brought about by rising temperatures may cause impaired eyesight and more deaths of pregnant mothers and their unborn young.

In a study by the University of Adelaide, unborn octopuses and their mothers were exposed to three different temperatures: a control temperature of 19°C, 22°C to mimic current summer temperatures, and 25°C to match projected summer temperatures in 2100.

Negative impact on eyesight

Compared to the other two groups, octopuses that were exposed to 25°C produced significantly fewer of some proteins responsible for vision.

Lead author Qiaz Hua, a PhD graduate from the University's School of Biological Sciences, elaborated, "One of them is a structural protein found in high abundance in animal eye lenses to preserve lens transparency and optical clarity, and another is responsible for the regeneration of visual pigments in the photoreceptors of the eyes."

The fact that the octopuses in the third group had less of these proteins suggested that the eyesight of octopuses would be impaired due to the higher temperature. This would make the octopus more vulnerable to attacks and also become a less effective predator.

In addition, higher temperatures were also found to lead to more unborn offspring and the premature deaths of pregnant mothers.

Higher mortality and stress

For two of the three octopus breeds kept at 25°C, the mothers had perished while the eggs were in the early development stages, subsequently leading to the deaths of the unborn offspring as well. As for the third brood at this temperature, less than half of the eggs hatched; with both the mothers and offspring showing visible signs of stress.

Co-author Bronwyn Gillanders, Head of Biological Sciences, said in *The Guardian* article that it was hard to tell whether the study's results would mimic the reality in 2100, as the octopuses in the lab had experienced a more rapid rate of temperature increase than what would occur in the coming decades.

Nonetheless, she said it was clear that rising temperatures would be bad for octopuses. "It's only a change of three or so degrees and you're starting to see the impairment of organisms," she said. ■

SOURCE: GLOBAL CHANGE BIOLOGY

squid news

Edited by Catherine GS Lim

"Our results showed that the hatching date determines the whole life trajectory in this species."

— Yoko Iwata, Associate Professor, University of Tokyo

The spear squid is native to the western Pacific Ocean along Asia's coast.

Birthdate Determines Mating Strategy for Spear Squid

Scientists from the University of Tokyo have discovered that a male spear squid's birthday is not just a date—rather, it determines their mating strategy for the rest of their lives.

According to their study, spear squid that are born early in the mating season (between early April and mid-July) grow to formidable sizes. Called "consorts", they actively fight off any rivals in order to mate and then stick close to their mate as she lays her eggs.

Alternatively, spear squid born between early June and mid-August, known as "sneakers", are smaller in size and would covertly deposit their sperm on the outside of a female near where she lays her eggs, in the hopes of getting them fertilised.

As for the spear squid that were born in mid-July, they had a fifty-fifty chance of adopting either strategy.

These mating strategies are locked in from the moment the squid are hatched and do not change during their lives, according to the findings of a study published in the journal *Proceedings of the Royal Society B Biological Sciences*.

Implications for commercial fishing

The study allows us a peek into the window of how climate shifts may shake up both the squid's love life and our fishing yields.

According to Associate Professor Yoko Iwata from the University's Atmosphere and Ocean Research Institute, "the difference in hatch date means that the squid experience different environmental conditions in early life, which may influence the growth trajectory."

"If an extreme environmental event, such as an ocean heat wave, happens during the hatching season, it could affect the squid's mature body size and subsequent mating tactic. This would also impact the amount that could be commercially caught enormously," she added.

Further study

The research team is turning their attention to the statolith, a structure inside the squid that grows daily, layer by layer. Besides using it to estimate the squid's age, the microelements within it can be used to determine the ocean conditions at the time that specific portion of the statolith was developed.

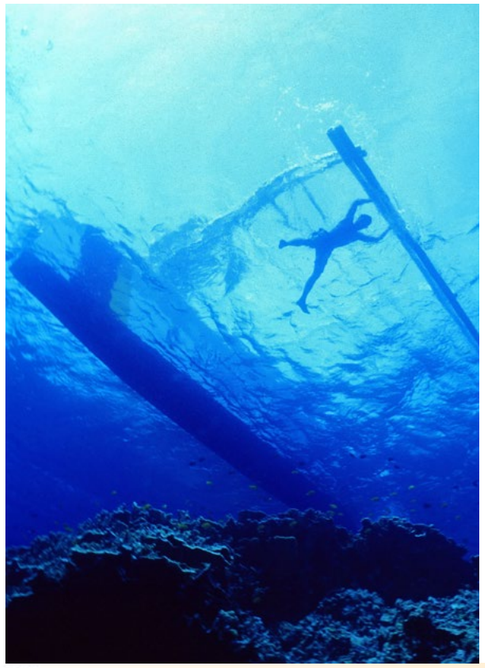
This would enable the researchers to work out the evolving conditions in which the squid developed, thus creating a clear picture of how this might have influenced their mating tactics. ■

SOURCE: PROCEEDINGS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES

Striped dolphins, southern Egypt (right); Diver and bangka, Moalboal, Cebu Island, Philippines (below)

Text by Claudio Ziraldo,
with Alessandro Ziraldo
Photos by Claudio Ziraldo

Photographing in ambient light can be a choice or a necessity. It is therefore important to develop an adequate sensitivity to ambient light in order to be able to judge whether it is the best option for shooting a particular scene. Claudio Ziraldo offers some insights and tips on how to improve your underwater images.



Pure Light

Shooting with Ambient Light in UW Photography

On a dive in the Philippines, I was descending along the outer wall of Pescador Island, a pinnacle that rises from the seabed to about six metres above the surface. I looked up and saw the silhouette of a dive boat crew member clinging to one of the outriggers of our "bangka" (traditional boat), silhouetted against the blue sea.

Instinctively, I switched on my hand-held strobe, which I held out to the opposite side, and shot a couple of frames. The sound of a steel rod tapping against an air tank was my dive guide's signal that I had fallen behind and needed to catch up with the other divers in our group.

At Menjangen Island in Bali, Indonesia, I had the opportunity to dive along the wall of the dive site

POS 2, which had one of the most spectacular colonies of gorgonian sea fans of all types and colours that I had ever seen. After exploring different views, I had fallen behind again. The rest of the group had already rounded the point where the dive boat was waiting for us, but I wanted to photograph two small overlapping gorgonians that were in pristine condition and fully backlit.

Looking through my camera, I saw that the dive guide, who had been waiting for me underwater, had re-entered the frame. He was not in an ideal position, but I photographed the scene anyway, using a fisheye lens and two strobes.

I then signalled for him to move behind the gorgonian. I switched off the strobes and shot the scene again. And here is the result: two pictures of the same subject, one in which the colour aspects of the image have been emphasised; and the other, with ambient light, in which the graphic aspects of the image have been enhanced instead.

Shooting in current

There are situations where it is difficult to decide whether to use a strobe or not, or where a strobe should not be used at all. In the case of currents, a strobe would illuminate the infinite number of suspended particles stirred up by the movement of the water, ruining the image irreparably.

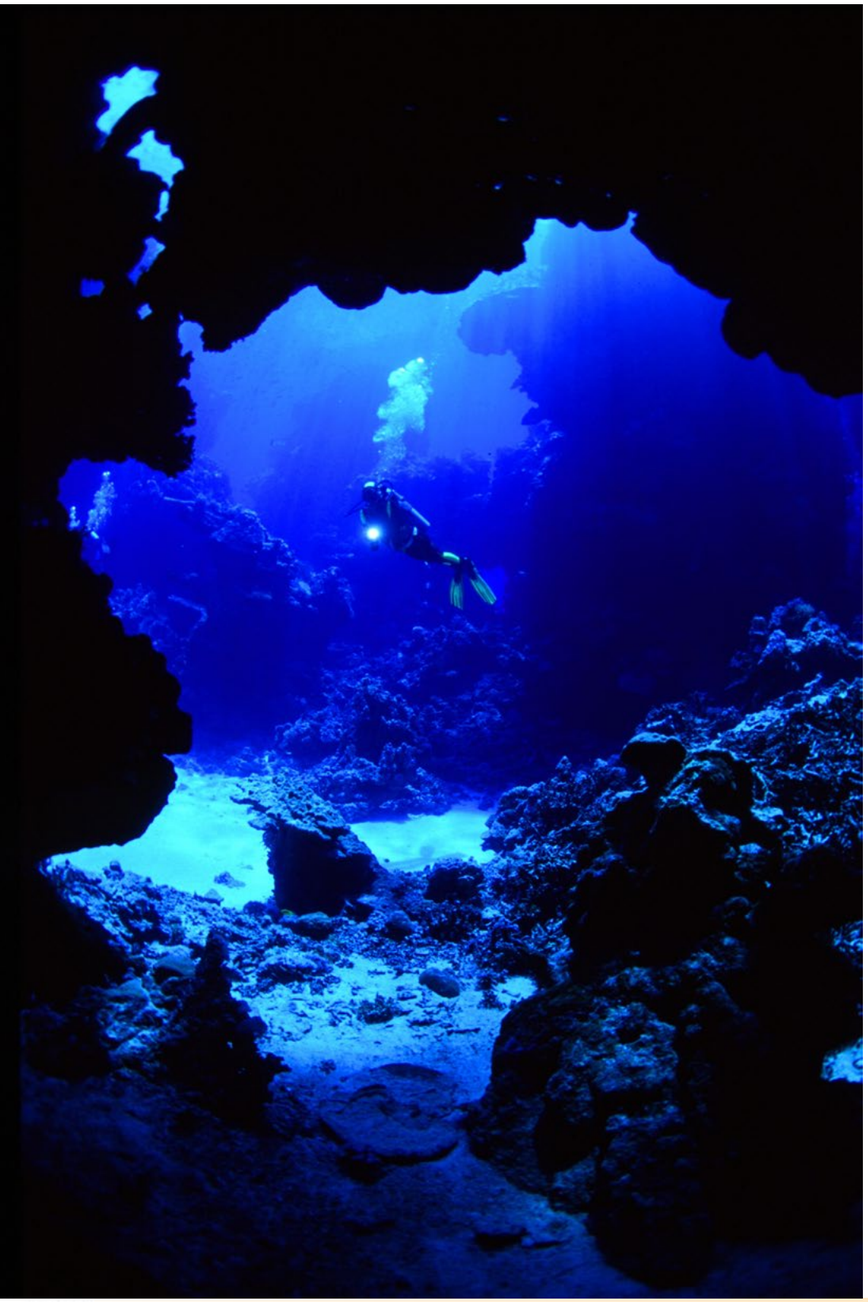
In this situation, not only is it essential to avoid getting caught in the current and risking injury, but also to use a fast shutter speed to “stop” the action, freezing the movement of the

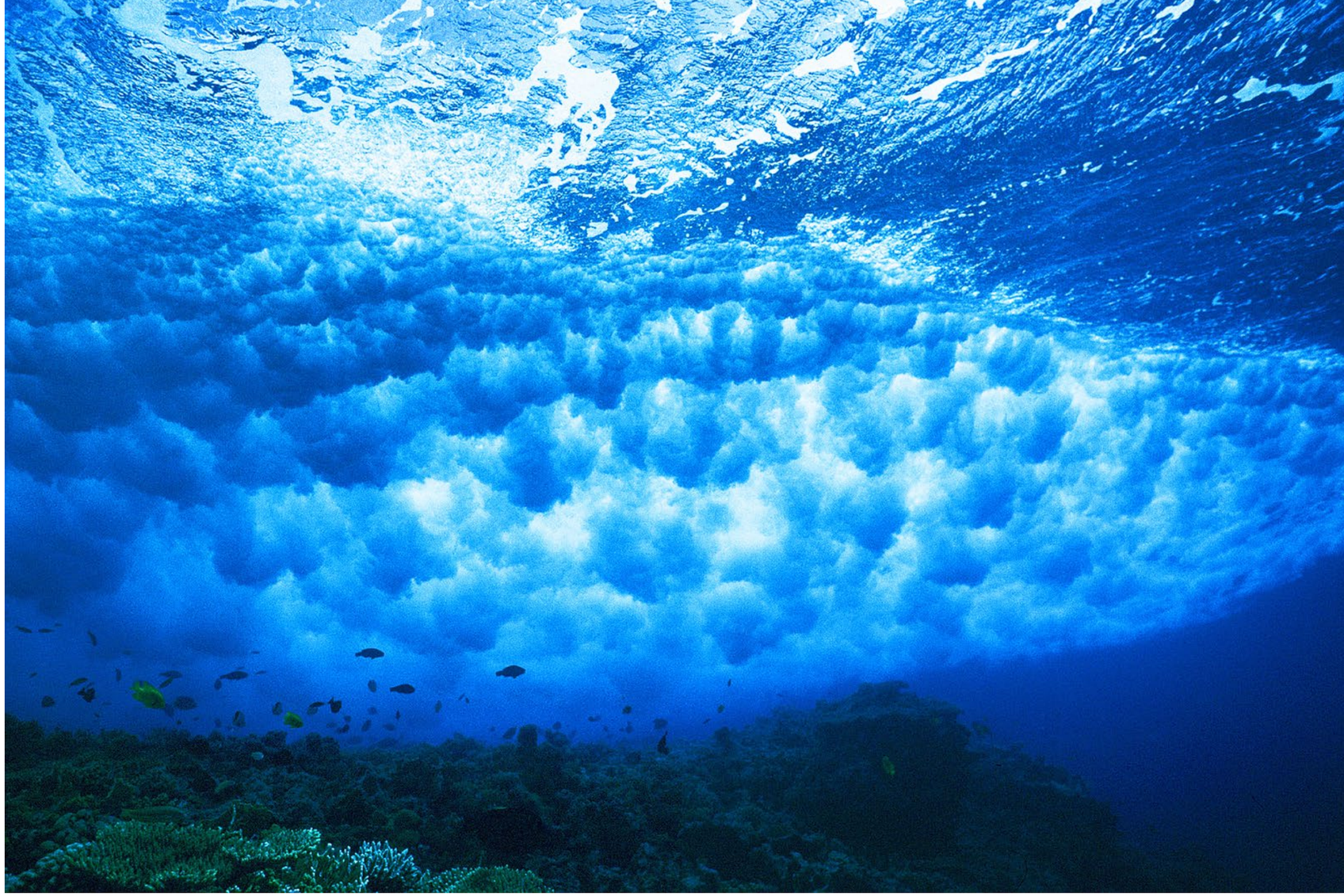
Large gorgonian, Menjangan, Bali, Indonesia, shot with a fisheye lens and two strobes.

Large gorgonian at Menjangan, Bali, Indonesia, photographed with ambient light.

For an image like this (right), one must avoid getting caught in the current but also use a fast shutter speed (no less than 1/250th of a second) to "freeze" the action.

A fisheye lens was used for this shot (below) taken from inside a cave at the dive site Umm Khararim in the southern Red Sea.





elements in the shot. I would advise you not to go below 1/250th of a second.

In southern Egypt, I managed to snorkel close to a pod of striped dolphins. There was a bit of a "swell," and the surface was rippled by the movement of the waves.

I decided from the start not to use a flash, because there was so much light under the surface and also because of the time of day. Moreover, using a speedlight flash would have eliminated the interesting patterns created by the water's reflections of light on the dolphins' bodies.

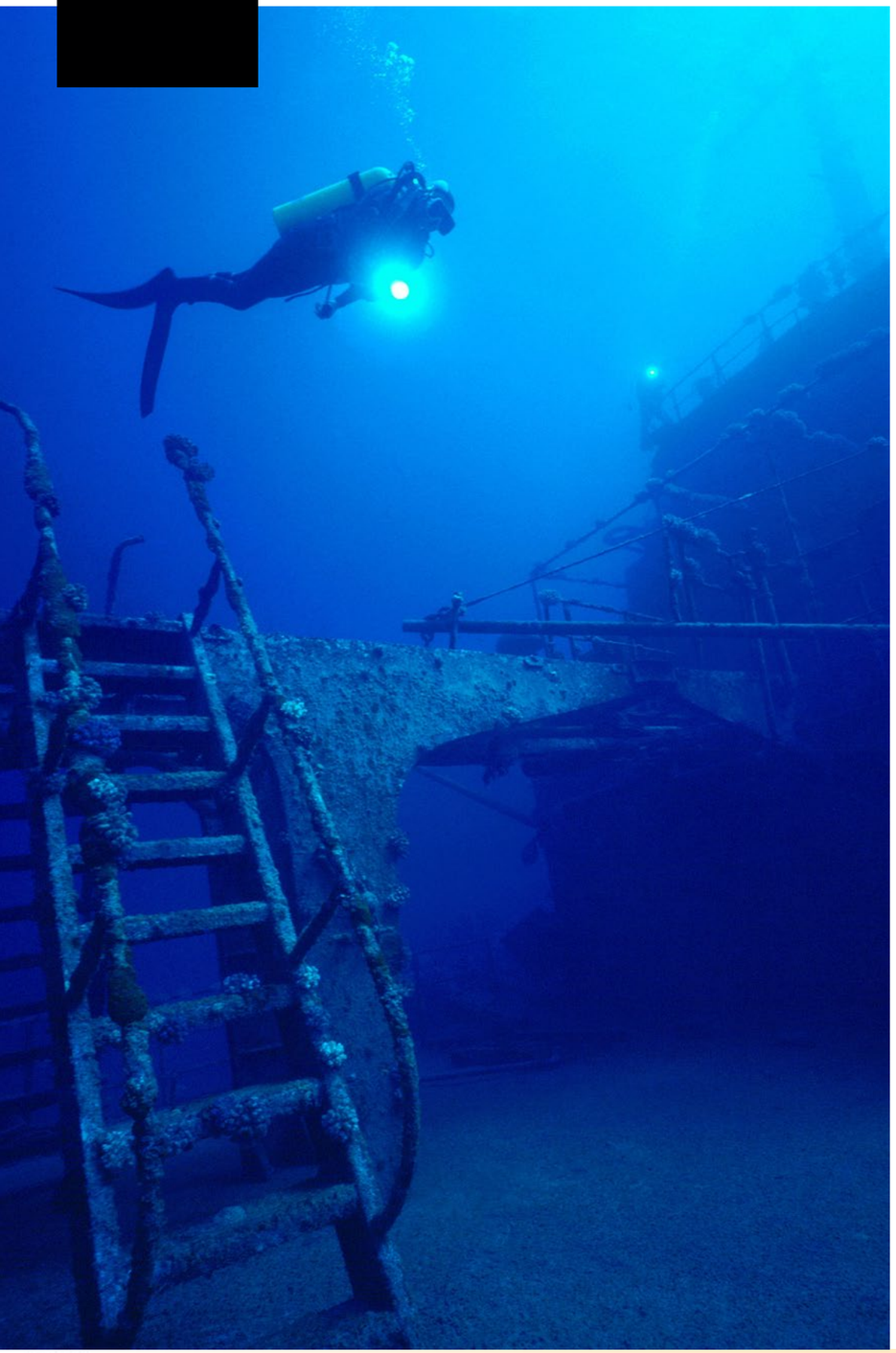
Again, by using a quick shutter speed to "freeze" the movement of the water on the surface, I was able to capture a special "ice" effect and, of course, avoid the problem of "blurring" in the group of dolphins.

In the cave at the Umm Khararim dive site in the southern Red Sea, I only used the strobe when there was an element in the foreground with a strong colour component (alcyonarians or fish, for example). Otherwise, I chose to keep the strobes off and, where possible, find an element of interest (diver with torch) to give vitality to the photo.

In these situations, an accurate balancing of the light is very important—more specifically, try to create a sort of "frame" effect, where the much brighter exterior "absorbs" the underexposed areas, while retaining its characteristics. The sun's rays, coming down from above, complete the picture. To get this kind of image, it is important to work in the middle of the day when the ambient light is at its peak.

Over-under shots

For over-under shots, a strobe may or may not be used, depending on the situation. It is indispensable when there is a



Khanka wreck at Zabargad Island in the southern Red Sea (below). A fisheye lens was used for this image.

Pure Light

A fisheye lens was used for this over-under shot of a dive boat and a diver (above), which was exposed for the sky to avoid over-exposure.

large degree of difference between the light on the surface and the light underwater, such as when taking backlit shots at sunset.

In this particular case, however, the photo was taken without using the speedlight flash. It was exposed for the external light in order to avoid overexposure. The underwater area is slightly darker than it was in reality, but still discernible, and the photo appears balanced.

Wrecks

When photographing underwater wrecks, there are situations where the use of a speedlight flash is necessary and others where it is better to work with ambient light. This was the case when photographing the Khanka wreck at Zabargad Island in the southern Red Sea.

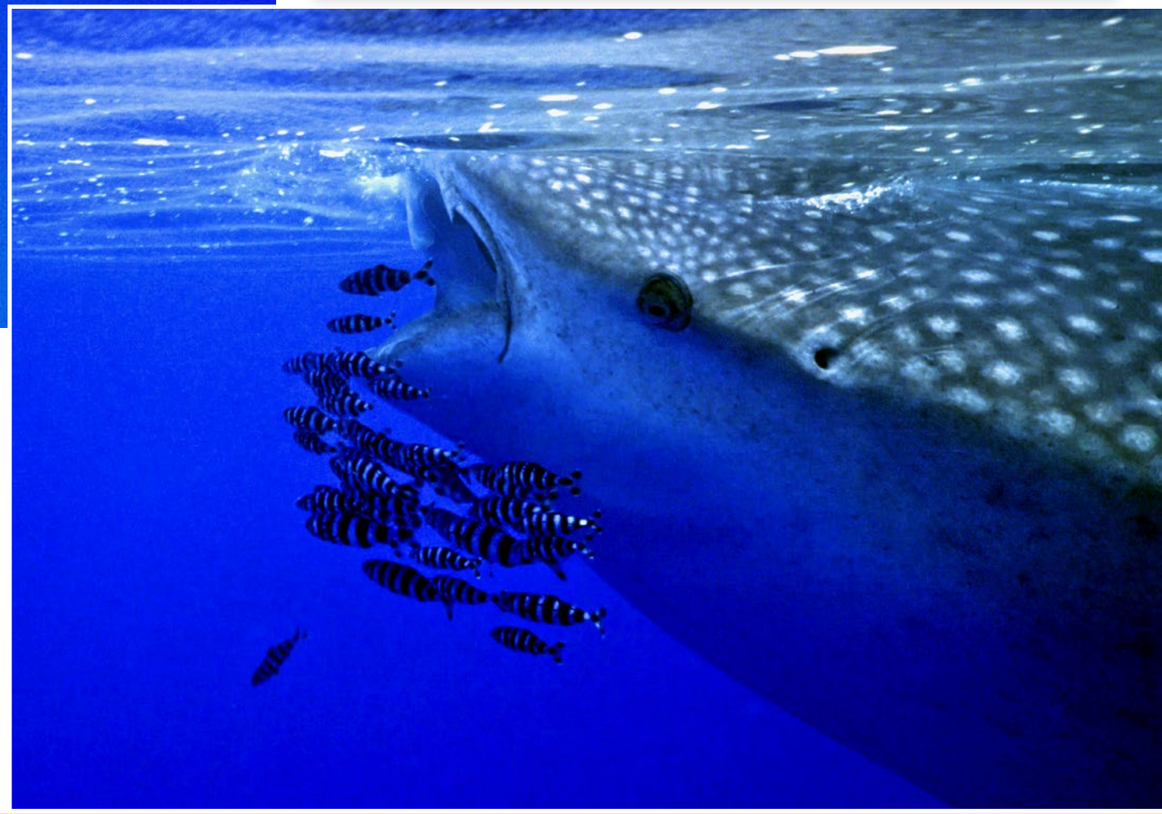
In this scene, I inserted two lights (torches). The first torch is held by a diver in the foreground, to make the image more dynamic, and the second torch is held by a diver in the background, to emphasise the sharp perspective and give a sense of scale to the whole scene. Coordinating two collaborators is not easy, but when the team works, the results are rewarding.

Backscatter

Here, I present two shots where the presence of large amounts of nutrients in the water made the use of flash virtually impossible.

The photo of the manta ray was taken at Mesharifa Bay in Sudan. These beautiful animals congregate here in October because the water temperature and the presence of particular surface currents cause large quantities of plankton to concentrate in the area.

The manta ray is reflected by the surface of the water, while the light passing through the rippled surface creates



Manta ray, Mesharifa Bay in Sudan (above); Whale shark, photographed in the Red Sea north of Hurghada, Egypt (right)

strange patterns on its wing. A similar effect can be seen in the picture of the whale shark, which was taken in the Red Sea, north of Hurghada, where I had the opportunity to capture a very special moment.

To sum up

The situations in which it is appropriate and/or necessary to photograph with ambient light are many and varied. In this article, I have mentioned just a few of them, and the subject is far from exhausted. ■

Claudio Ziraldo is an architect with a great passion for the sea and nature. He serves as president of the Bollate Sub Association, a sports club that promotes diving and the disciplines connected to it. He is a diving and marine biology instructor as well as a successful underwater photographer, who has achieved prestigious international recognitions. In 1987, he won the "Nikon Photo Contest International Grand Prize" for an underwater shot, while in 1991, he obtained the "Prix Mondial du Livre d'Image Sous Marine" at the Antibes Underwater Image World Festival for the realisation of the depths in "Dreams of Light." In 2004, his book, Il Tempo della Luce, *won awards in both Italy and Malaysia. For more information, visit:* **ziraldo.net**

photo news

Edited by
G & P Symes

PHOTOS COURTESY OF
THE MANUFACTURERS

AOI Cold Shoe Mount Base M67 Lens Holder

Attach your wet lenses to this holder when not in use. Keeping them nearby prevents loss and protects them from scratches or bumps. This holder is designed for a single wet lens and is mounted on the cold shoe mount atop your housing. Made of black hard-anodized aluminium alloy, it is compatible with 67mm-threaded lenses. Dimensions: 58.5mm x 19.3mm. Weight: 59.8g. **aoi-uw.com**

Marelux Lumilink Optical Transmitter

The Marelux Lumilink, which can be installed on the fiber optic port of your camera housing, both encrypts and amplifies the signal received from your housing's internal optical flash trigger. It then transmits it via optical signals. Capable of extending the range of optical signal transmission, the Lumilink has an effective transmission distance of 2m underwater and an optical signal emission angle of 160 degrees. Made of anodized aluminium alloy, it measures 82mm in width, 70mm in height, and 64mm in depth. Weighing 180g in air, it is depth-rated to 100m and uses a 10440 lithium battery. **marelux.co**

Nitecore Rechargeable 18650 Li-ion Battery (4000mAh)

The Nitecore NL1840HP is a high-performance 4000mAh rechargeable button-top battery that is designed to be used in high-drain devices, such as underwater flash units. It has a voltage of 3.6V (14.4Wh), a continuous discharge current of 10A, and can be recharged over 500 times, making it cost-effective and environmentally friendly. It has a built-in intelligent protective circuit and a pressure relief valve, which safeguards it against overcharging, over-discharging and short circuits. The battery is made of high-quality materials, such as nickel-plated stainless-steel protectors, which strengthen it against impacts, ensure efficient conductivity, and prevent oxidation. It is coated with a durable metallic film that increases its resistance to abrasion.
nitecorestore.com

Weefine Smart Focus 2500 Light

A true all-in-one unit, this 2500-lumen video light features a high-quality COB LED-style array and is compact at 120mm long. It also has a 100-lumen red beam and an 18W deep UV beam for fluorescence. In addition, each colour beam can be used as an AFO focus light, which automatically shuts off when the unit's electronic flash sensor detects a flash. With a wide 100-degree beam angle for greater illumination, the flood and red modes have adjustable brightness levels of 25%, 50% and 100%. When used in areas with ambient temperatures above 50°C, the brightness is automatically reduced to 20% to protect against overheating. For a more convenient way to monitor battery levels, there are four battery indicator lights (blue, green, red and flashing red) near the on/off button. It is easy to operate with one hand and is depth-rated to 100m (330ft). Weighing 420g on land and 195g underwater, it is powered by a high-capacity 18650 lithium battery, which has a high level of safety and lasts twice as long as a standard battery. **weefine.com**

Backscatter Hybrid Flash HF-1

The Backscatter Hybrid Flash HF1 is the "most powerful strobe and video light combination ever created," according to the manufacturer, and includes a 1,500-lumen spot light and a red light mode. The first strobe with Smart Control Automatic TTL Flash power for Sony, Olympus and OM System cameras, it comes in an easy-to-travel medium-sized strobe package and is suitable for both wide-angle and macro shooting. Easily illuminate subjects in high ambient light environments with its powerful guide number *f*40 flash beam. It is HSS compatible and can be used with the Mini Flash 2 for remote shooting. With its incredibly fast recycle times for a flash of its size and power, it is built for rapid-fire continuous shooting, so one can shoot 30 frames per second without flash dropout. Features include a built-in, 5,000-lumen, 90-degree wide-angle beam video light; selectable angle of coverage with included flat diffuser and optional dome diffuser (120°, 140°, 160°); selectable colour temperature with optional filters (6500K, 5500K, 4500K); SOS and emergency signalling modes; simple, easy-to-use manual mode; up to 90 minutes of video runtime; and a triple-sealed battery cap. Requires two 21700 lithium-ion batteries. **backscatter.com**

Transparent & Translucent

Contributors' Picks

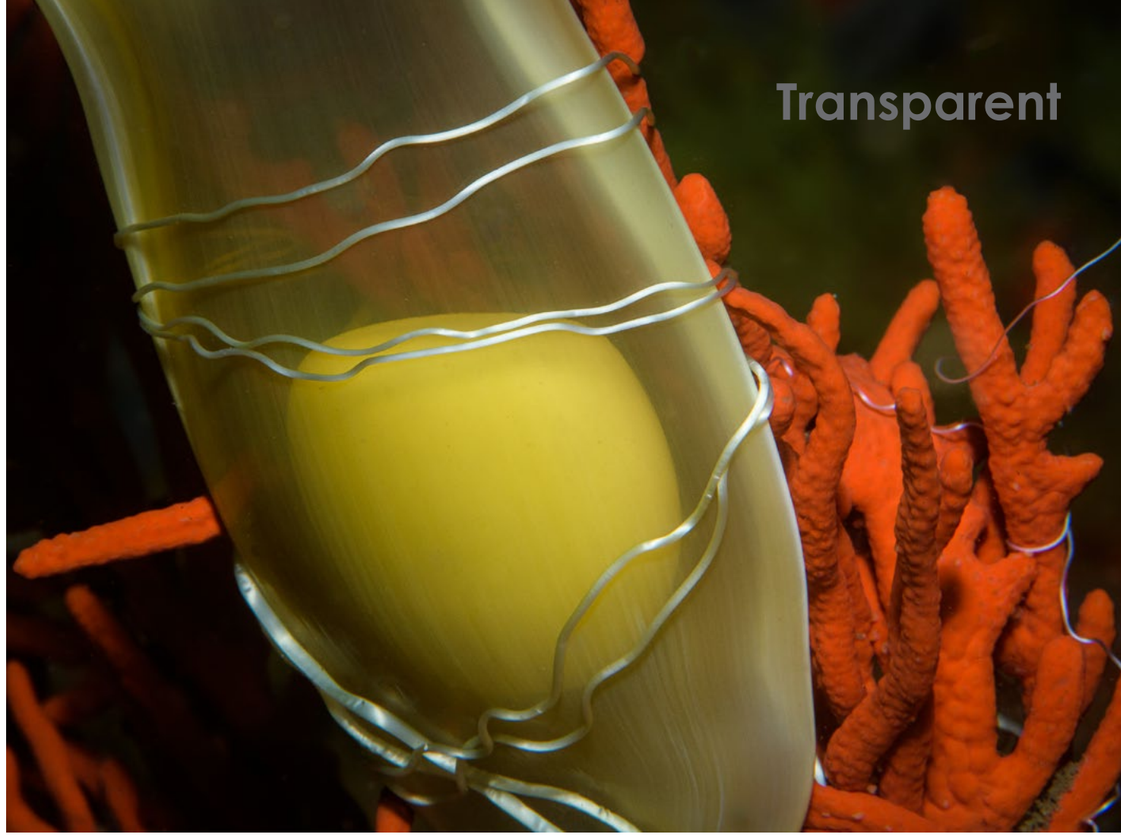
Text and photos by John A. Ares, Scott Bennett, Sheryl Checkman, Larry Cohen, Anita George-Ares, Kate Jonker, Matthew Meier, Brandi Mueller, Gary Rose, Michael Rothschild and Olga Torrey

We asked our contributors to share their favorite underwater photos showing the transparent and translucent qualities of underwater creatures, and they came back with a range of macro and wide-angle shots featuring a variety of marine life. Here, *X-Ray Mag* contributors share their selected images from the tropical waters of Palau, the Philippines, Indonesia, Malaysia and Hawaii to the subtropical and temperate waters of Costa Brava in Spain, New Zealand, South Africa, the US East Coast and British Columbia in Canada.

KATE JONKER

Choosing transparent subjects such as this ghost nudibranch, *Melibe engeli* (right), and using snoot lighting can highlight their transparent characteristics. Romblon, Philippines. Gear: Canon EOS R5 camera, Canon EF 100mm macro lens, Marelux housing, one Inon strobe with Marelux SOFT Pro snoot. Exposure: ISO 100, f/25, 1/250s

Translucent strawberry anemones, *Corynactis annulata* (previous page), can be made to glow by lighting with a snoot positioned above and slightly behind them. Simon's Town, South Africa. Gear: Canon EOS 7D Mark II camera, Canon EF 100mm macro lens, one Inon strobe with Marelux SOFT Pro snoot. Exposure: ISO 100, f/25, 1/250s



Exploring Transparency and Translucency in Underwater Photography

Text and photos by Kate Jonker

Photographing transparent and translucent subjects underwater, using deliberate and directional lighting techniques, can reveal the beautiful and unusual characteristics of subjects, creating compelling and distinctive images. Transparency, where light passes through a subject without scattering, and translucency, where some light passes through but is diffused in the process, provide underwater photographers with unique opportunities to depict the underwater world in all its mesmerizing glory.

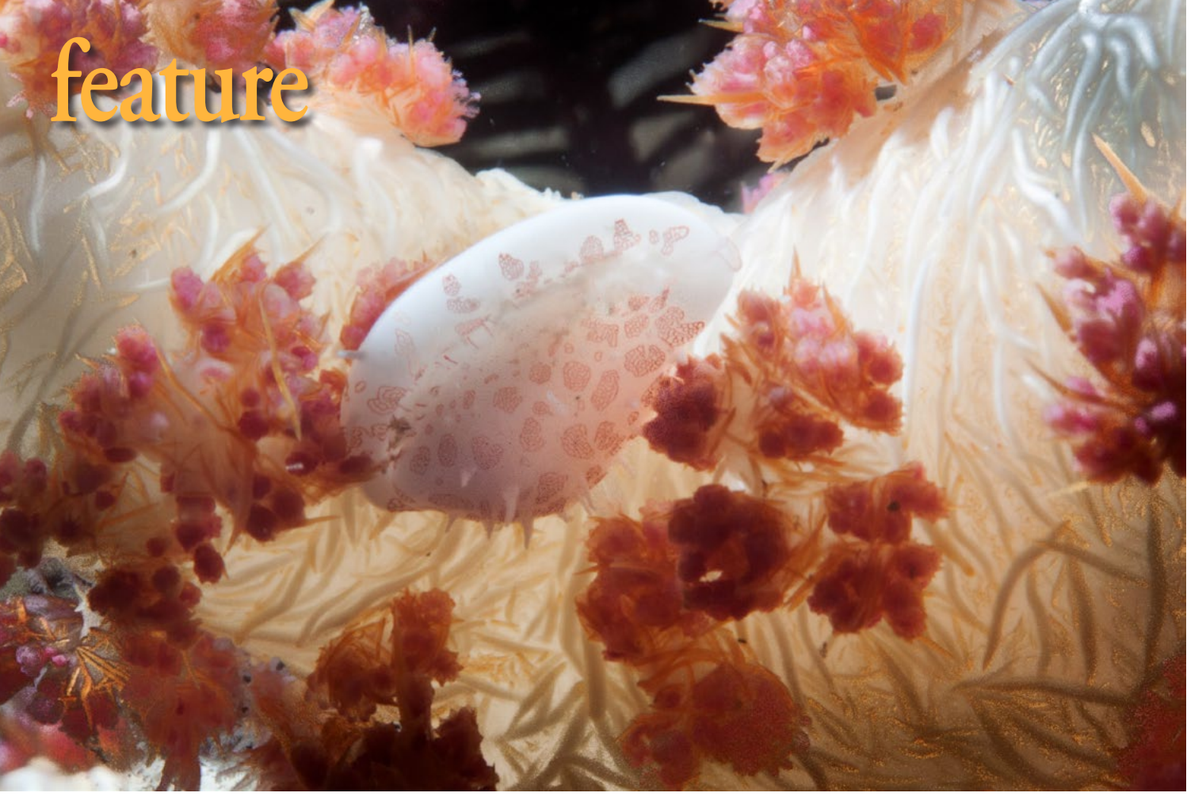
The transparency of subjects, such as the phantom nudibranch (*Melibe colemani*) and the ghost nudibranch (*Melibe engeli*), tiny cuttlefish eggs, and some butterfly sacoglossan sea slugs (*Cyerce* sp.), can be highlighted by careful light positioning.

Start by creating a black background with your camera settings. Then using inward strobe lighting (or a snoot positioned slightly behind your subjects and directed towards the camera) will allow light to pass through their bodies, rendering them transparent. Not only does this produce an intriguing effect, but it also enhances the detail of the subject against the black background of the water. On the other hand, translucent subjects such as the gasflame nudibranch (*Bonisa nakaza*) can be made to glow by using the same lighting technique.

Knowing which subjects to photograph in this way, and mastering these lighting techniques, empowers photographers to craft images that not only inspire wonder, but also evoke powerful emotions in the viewers of their underwater photos. Visit: **katejonker.com**

Careful inward lighting can cause what appear to be opaque subjects to become transparent, such as this egg purse of a pyjama catshark, *Poroderma africanum* (above), Gordon's Bay, South Africa. Gear: Canon EOS R5 camera, Marelux housing, two SUPE D-Pro strobes. Exposure: ISO 100, f/18, 1/250s

Choosing translucent subjects such as this gasflame nudibranch, *Bonisa nakaza* (left), and using snoot lighting can highlight their translucent characteristics, and make them appear to glow. Gordon's Bay, South Africa. Gear: Olympus TG-6 camera, Marelux housing, one Inon strobe with Marelux SOFT Pro snoot. Exposure: ISO 400, f/16, 1/160s



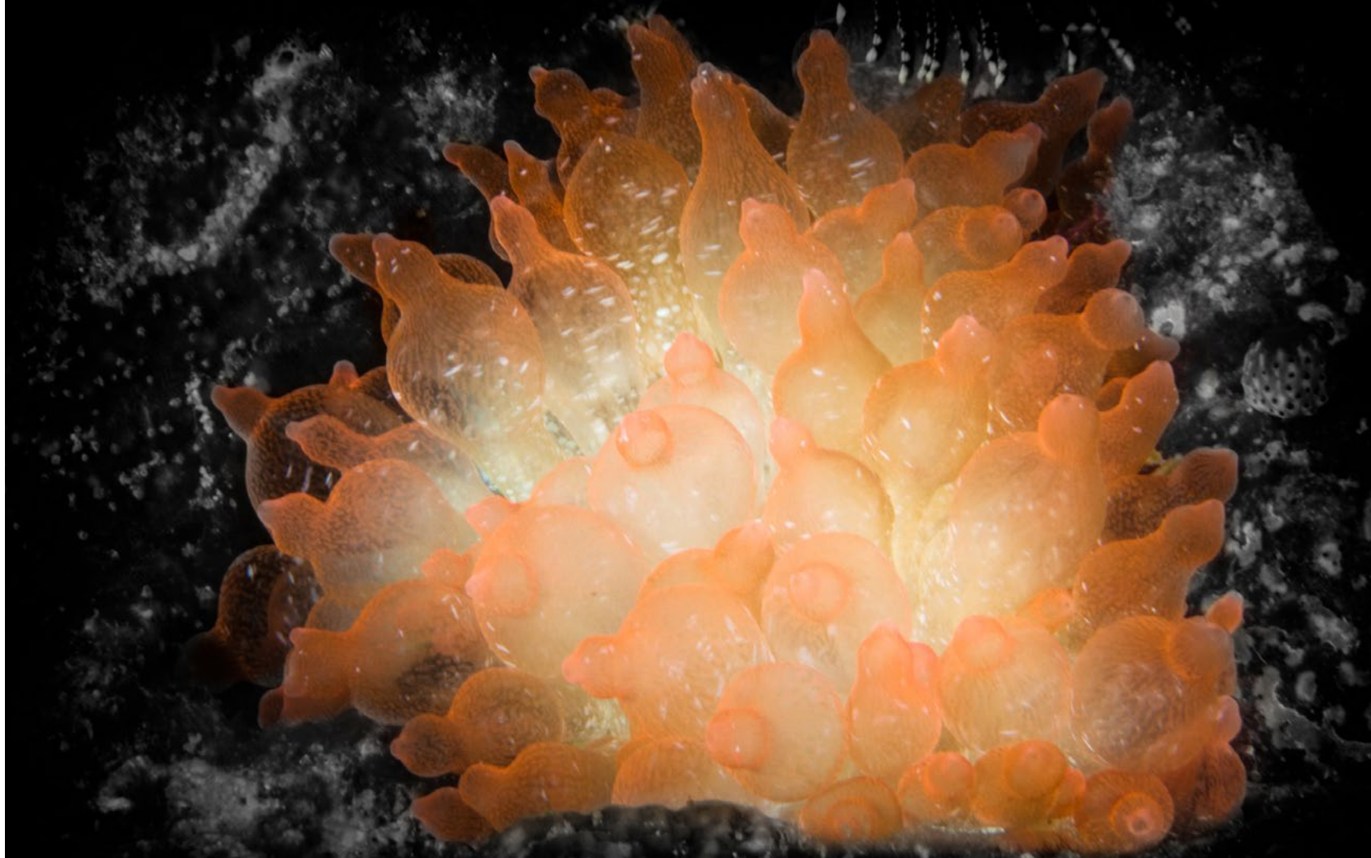


Photo 1. (above) Soft coral with soft coral cowry, Puerto Galera, Philippines. Gear: Canon EOS Rebel T1i camera, EF 100mm f/2.8 macro lens, twin Ikelite 161 strobes. Exposure: ISO 400, f/32, 1/160s; Photo 2. (top right) Bubble-tip anemone. Gear: Canon EOS Rebel T1i camera, Canon EF 100mm f/2.8 macro lens, twin Ikelite 161 strobes. Exposure: ISO 400, f/32, 1/60s; Photo 3. (right) Spotted jellyfish, Dumaguete, Philippines. Gear: Canon EOS Rebel SL1 camera, Canon EF-S 60mm Macro USM lens, twin Ikelite 161 strobes. Exposure: ISO 400, f/4.5, 1/160s; Photo 4. (left) Dark clavelina tunicate, Sequijor Island, Philippines. Gear: Canon EOS Rebel T1i camera, Canon EF 100mm f/2.8 macro lens, twin Ikelite 161 strobes. Exposure: ISO 400, f/32, 1/160s

The Glowing Effect of Translucence

Text and photos by John Ares

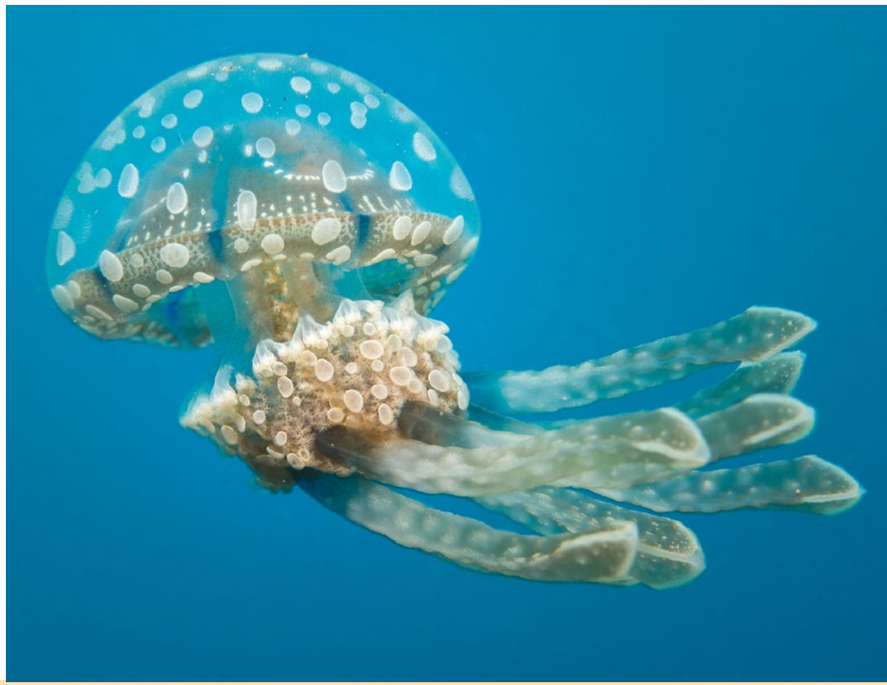
Many underwater creatures are transparent or translucent, adding to their appeal. While transparent creatures allow a complete view through the body, translucent creatures allow only some light to pass through, creating a glowing effect.

The translucent soft coral in Photo 1 features a tiny soft coral cowry. It was perhaps half an inch long. Positioning the light behind the coral allowed a nice glow to appear within the coral.

Sea anemones are perfect subjects for translucency. The bubble-tip anemone in Photo 2 was backlit with two strobes above and off to each side.

The spotted jellyfish in Photo 3 has a mild sting and is not considered hazardous to humans. Gorgeous and translucent, this jellyfish was easy to photograph. It did not swim fast and did not have long tentacles to avoid.

Tunicates are part of the reward for diving slowly and carefully (Photo 4). They are easy to miss when making a high-speed patrol over a reef. Tunicates can be found as individuals or in colonies. Many tunicates are translucent, making them ideal for backlighting. Visit: **JohnAres.com**



Hairy squat lobster, Anilao, Philippines (left). Gear: Nikon D200 camera, Sigma 105mm lens, Hugyfot housing, two Ikelite D125 strobes. Exposure: ISO 100, f/32, 1/60s

Transparent

Reef squid, Flores Island, Indonesia (left). Gear: Nikon D850 camera, Sigma 105mm lens, Seacam housing, two Inon Z-330 strobes. Exposure: ISO 80, f/18, 1/100s

Commensal shrimp, Lembeh Strait, Indonesia (below). Gear: Nikon D850 camera, Sigma 105mm lens, Seacam housing, two Inon Z-330 strobes. Exposure: ISO 100, f/36, 1/60s

Jewel anemone, Poor Knights Islands, New Zealand. Gear: Nikon D810 camera, Sigma 105mm lens, Seacam housing, two Ikelite D160 strobes. Exposure: ISO 100, f/25, 1/250s

A Treasure Trove

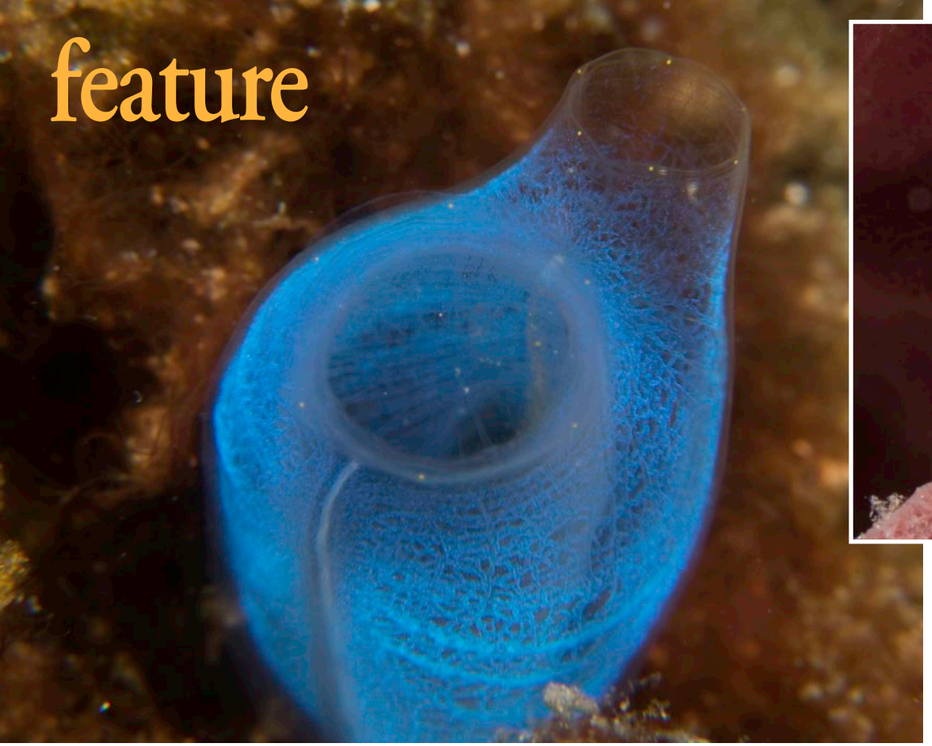
Text and photos by Scott Bennett

Across the Indo-Pacific, commensal shrimp are commonly encountered residing among the tentacles of their anemone hosts. During a dive at Indonesia's Lembeh Strait, I encountered a commensal shrimp uniquely draped over one of the tentacles. Advancing closer, I was able to photograph it straight on. Dotted with blue and white, its transparent body contrasted sharply with the muted tones of its host.

During a night dive on Indonesia's Flores Island, I encountered a reef squid suspended less than a metre below the surface. Utterly unfazed by my presence, it allowed a close approach. A small aperture rendered the background dark, while my strobes revealed a translucent kaleidoscope of orange, yellow, magenta, blue and green. I managed to capture a few images before it leisurely retreated into the darkness.

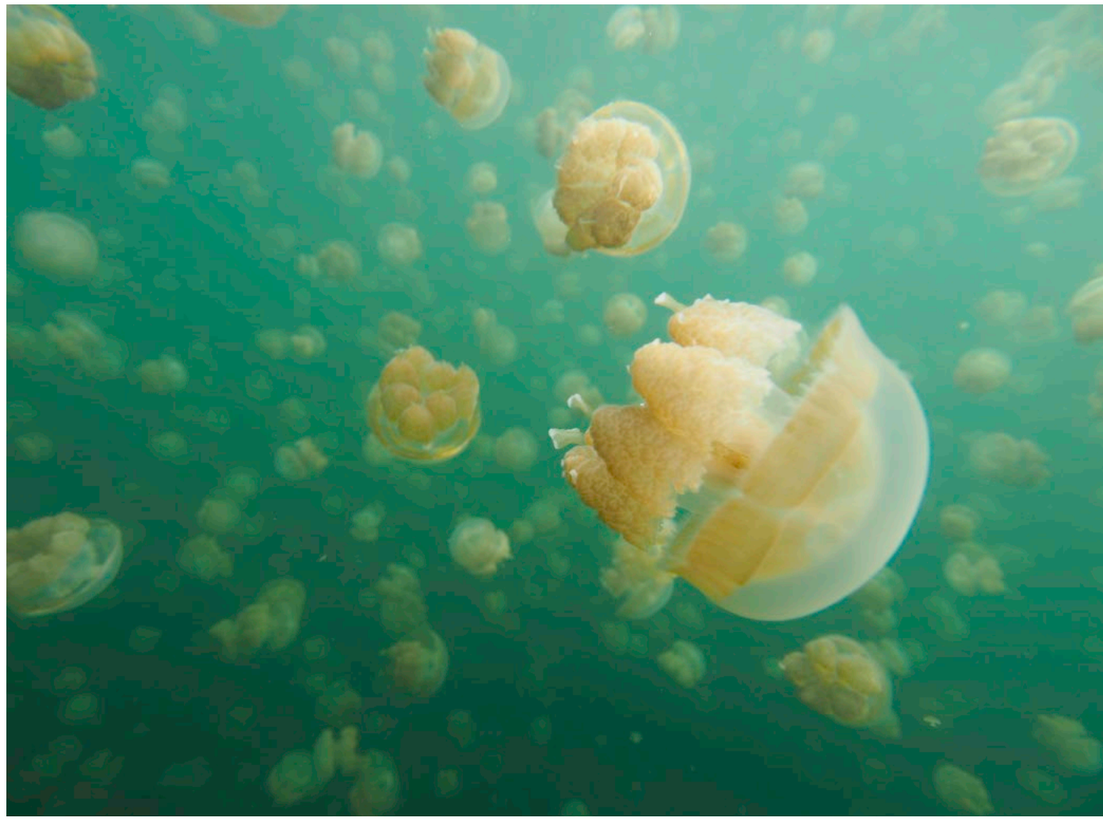
For macro enthusiasts, Anilao in the Philippines boasts a treasure trove of unique and colourful critters at every turn. Measuring no more than 1.5 centimetres, hairy squat lobsters are virtually translucent, with pinkish-purple legs, purple spots and an abundance of white hairs. Close inspection of a giant barrel sponge revealed a specimen hiding inside, just beneath the rim. A small aperture ensured maximum depth of field, while strobes were carefully positioned to accent the white hairs.

With its unique fusion of temperate and sub-tropical species, New Zealand's Poor Knights Islands features some of the best diving on the planet. Especially prolific are the tiny jewel anemones that adorn the walls with brilliant splashes of colour. Closer scrutiny reveals structures of extraordinary delicacy, with magenta patterns radiating out to the minute tentacles that encircle the rim. Visit: **xray-mag.com/Contributors/Scott-Bennett**



Blue club tunicate, Ampera, Alor, Indonesia (left). Gear: Olympus OM-D E-M5 Mark II camera, Olympus M.Zuiko 60mm 2.8 macro lens at 60mm, Olympus PT-EP13 housing, Sea&Sea YS-D1 strobe. Exposure: ISO 200, f/18, 1/125s

Hairy squat lobster, Pasir Hitam, Alor, Indonesia (above). Gear: Olympus OM-D E-M5 Mark II camera, Olympus M.Zuiko 60mm 2.8 Macro lens at 60mm, Olympus PT-EP13 housing, Sea&Sea YS-D1 strobe. Exposure: ISO 200, f/18, 1/125s



Golden jellyfish, Jellyfish Lake, Palau (above). Gear: Olympus OM-D E-M5 Mark II camera, Olympus M.Zuiko 9-18mm f/4.0-5.6 lens at 9mm, Olympus PT-EP13 housing, ambient light. Exposure: ISO 200, f/4.5, 1/100s

Sun coral, House Reef, Alor, Indonesia (above). Gear: Olympus OM-D E-M5 Mark II camera, Olympus M.Zuiko 60mm 2.8 macro lens at 60mm, Olympus PT-EP13 housing, Sea&Sea YS-D1 strobe. Exposure: ISO 200, f/11, 1/125s

Hiding in Plain Sight

Text and photos by Sheryl Checkman

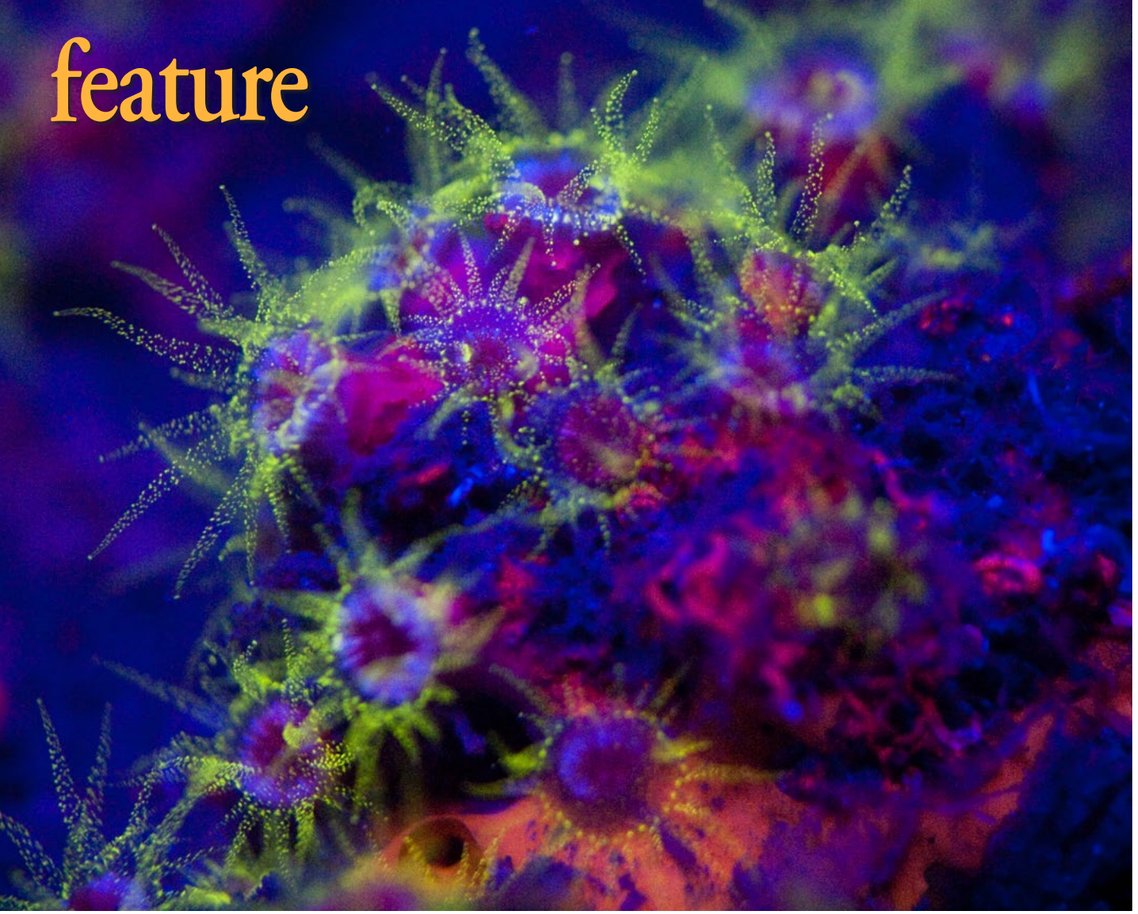
Transparency or translucency is when light passes through a subject, allowing you to see through it either clearly or with diffusion. Under the sea, there are many creatures that have one of these qualities. For some, this helps protect them from predators, by camouflaging them in their surroundings and allowing them to hide in plain sight. In all cases, however, this transparency or translucency adds just another dimension of beauty for us to behold.

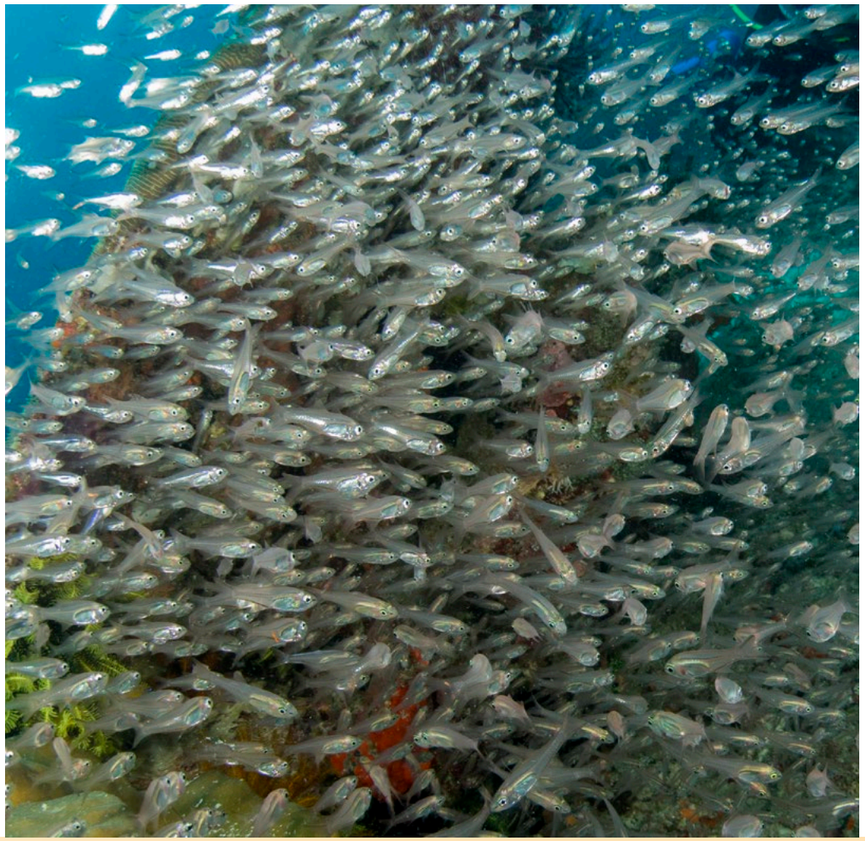
In Alor, Indonesia, I photographed a blue club tunicate (also known as a sea squirt) at the Ampera dive site. Its electric blue translucence and circular shape give it the appearance of a glass vase or sculpture. These marine invertebrates spend most of their lives attached to a solid surface, like a vase sitting on a table just waiting for a floral (or coral) arrangement.

Sun corals (*Tubastrea* spp.) are translucent corals. I photographed this spectacular looking yellow-orange coral in Alor on a night dive at the house reef just off of our resort. This coral has translucent arms that remind me of a sunflower.

Another colorful yet translucent creature that I found in Alor at the Pasir Hitam dive site was the pink hairy squat lobster, also known as the fairy crab. This tiny crab has ten translucent legs with purple spots and white hairs coming out of its body. It lives in close proximity to giant barrel sponges.

At Jellyfish Lake on Eil Malk Island in Palau, I snorkeled with the millions of golden jellyfish that inhabit it. These see-through invertebrates get their nutrition from a symbiotic relationship with the algae that live in the lake. There is so much beauty underwater, some easily visible, and others, like these creatures, that require a closer look. Visit: **Instagram.com/SherylCheckman**





Fluorescent sunset cup coral photographed in Costa Brava, Spain (top left). Gear: Olympus E-330 camera, Olympus 50mm macro lens, Olympus housing, LED lights with fluorescent filter. Exposure: ISO 400, f/4.0, 1/15s

Shrimp photographed in British Columbia, Canada (top center). Gear: Olympus E-330 camera, Olympus 50mm macro lens, Olympus housing, Olympus UFL-3 strobe. Exposure: ISO 400, f/8.0, 1/120s

Opalescent nudibranch photographed in British Columbia, Canada (top right). Gear: Olympus E-330 camera, Olympus 50mm macro lens, Olympus housing, Olympus UFL-3 strobe. Exposure: ISO 400, f/11.0, 1/120s

Large school of silversides on a unnamed wreck off Pom Pom Island, Malaysia (left). Gear: Olympus OM-D E-M1 camera, Olympus 9-18mm lens, Aquatica housing, Sea&Sea YS-D1 strobes. Exposure: ISO 400, f/5.6, 1/60s

Fluorescence and Translucence

Text and photos by Larry Cohen

While diving in Costa Brava, Spain, I decided to try fluorescence photography. Some marine life emits light at a lower wavelength that is invisible to the human eye. This is known as fluorescence. To observe fluorescence, you need to work in the dark and use a blue light that will act as an excitation source. You must also have a yellow barrier filter over your lens and eyes. On this dive, I had special LED lights designed to see fluorescent light, and I had barrier filter sheets that I had cut to size and put inside my macro lens port. I also taped the barrier filter to a welding mask that I wore over my dive mask.

There were many dark overhangs at Costa Brava, so I did not need to do the dive at night. I observed a sunset cup coral that was fluorescing in a variety of colors. The blue LED lights were not very bright, and the barrier filter cut out even more light. So I had to hold steady and shoot at a slow 1/15th of a second shutter speed. The resulting image captured the fluorescent colors and enhanced the sunset cup coral's translucent appearance.

In British Columbia, Canada, there is an abundance of marine life at every dive site. One creature I saw there was the opalescent nudibranch, which has a translucent body with orange tips. On the same dive, I spotted a cleaner shrimp that took on the orange color of its surroundings because the shrimp is translucent.

While diving an unnamed shipwreck off Pom Pom Island, Malaysia, I encountered a large school of silversides. Seeing so many of these tiny translucent fish made the wreck come alive with brilliance and movement. Visit: **liquidimages.com**


ANITA GEORGE-ARES


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Photo 4. (above) Magnificent anemone shrimp, North Sulawesi, Indonesia. Gear: Canon EOS Rebel SL1 camera, Canon EF-S 60mm f/2.8 Macro USM lens, Ikelite housing, twin Ikelite DS161 strobes. Exposure ISO 100, f/8, 1/200s

Jellyfish, Tunicates and Shrimp

Text and photos by
Anita George-Ares, PhD

The tomato jellyfish in Photo 1 has a translucent bell. The image reminds me of a spaceship traveling against a backdrop of distant stars. Adult tomato jellyfish are typically red. The yellow color of this individual may reflect differences between juveniles and adults or may be a variation within the species. While diving in Raja Ampat, I came upon a hawksbill sea turtle near the surface eating tomato jellyfish.

The blue bell tunicates in Photo 2 are translucent. The blue club tunicates in Photo 3 are also translucent except for their transparent siphons. Other tunicate species can be completely transparent or opaque. Tunicates come in a variety of forms and colors and can be solitary or colonial. I enjoy photographing tunicates and find them interesting, especially since tunicates play an important role in medical research and drug screening (Dumollard et al., 2017).

A partially transparent magnificent anemone shrimp rests on an anemone in Photo 4. This cleaner shrimp species is common in the western Pacific and resides on both anemones and hard corals. Visit: **facebook.com/profile.php?id=100016947967639**

REFERENCE: DUMOLLARD R, ET AL. 2017. ASCIDIANS: AN EMERGING MARINE MODEL FOR DRUG DISCOVERY AND SCREENING. CURR TOP MED CHEM 17(18) 2056-2066. HTTPS://PUBMED.NCBI.NLM.NIH.GOV/28137240/

Photo 1. (top left) Tomato jellyfish, Raja Ampat, Indonesia. Gear: Canon EOS Rebel SL1 camera, Canon EF-S 18-55mm f/3.5-5.6 IS STM lens (at 18mm), Ikelite housing, Ikelite DS161 strobe, Bigblue VL4200P video light. Exposure ISO 200, f/11, 1/160s

Photo 2. (top center) Blue bell tunicates, Apo Island, Philippines. Gear: Canon EOS Rebel XTi camera, Canon EF 50mm f/2.5 compact macro lens, Ikelite housing, twin Ikelite DS161 strobes. Exposure ISO 100, f/11, 1/200s

Photo 3. (top right) Blue club tunicates, North Sulawesi, Indonesia. Gear: EOS Rebel SL1 camera, Canon EF-S 60mm f/2.8 Macro USM lens, Ikelite housing, twin Ikelite DS161 strobes. Exposure ISO 200, f/11, 1/200s

All photos were taken with a Nikon D810 camera with 105mm macro lens in a Subal housing with Sea&Sea YS-250 strobes.

Peacock mantis shrimp carrying eggs (left), emerges from its burrow on the sea floor, Lembeh Strait, Indonesia. Exposure: ISO 200, f/20, 1/125s

Patch of saddleback anemonefish eggs (below) attached to a rock at the base of a large carpet anemone, Lembeh Strait, Indonesia. Exposure: ISO 200, f/32, 1/125s

Cuttlefish in its egg casing (top right), tucked into the roots of a fallen palm tree, Dumaguete, Philippines. Exposure: ISO 100, f/16, 1/250s

Seven flamboyant cuttlefish eggs (center right) attached to underside of a coconut shell, Lembeh Strait, Indonesia. Exposure: ISO 200, f/20, 1/125s

Bigfin reef squid egg casing (bottom right) with an almost fully developed baby squid inside, ready to hatch, Lembeh Strait, Indonesia. Exposure: ISO 200, f/32, 1/125s

Egg Casings

Text and photos by Matthew Meier

Egg casings are one of the more prevalent examples of transparency in the underwater world. Multiple species of cephalopods and fish lay clear eggs that allow us voyeurs to observe and document the development of their young. On several occasions, I have been fortunate enough to witness baby squid and cuttlefish break through their protective cocoons and emerge for the first time into their new ocean home. Flamboyant cuttlefish are notorious for placing their eggs on the underside of discarded coconut husks, so I always look underneath when on a muck dive. Just remember to flip the husk back over so that predators cannot get to the eggs.

Photographing a shiny, spherical object can be a challenge. I highly recommend using side lighting, or even back lighting, if possible, to best illuminate the contents of the egg while minimizing any distracting glare or reflections from the lights. Cameras can also struggle to focus on the subject through the egg casing, so it may be best to lock focus on a nearby object at the same distance and then recompose. Clownfish are very protective of their eggs and will not be happy with your intrusion, so do your best to get in and out quickly, so as not to stress out the parents. Visit: **MathewMeierPhoto.com**

All photos were taken in the Philippines with a Nikon D850 camera, 105mm lens, Ikelite housing, dual Ikelite DS230 strobes.

Several cleaner shrimp on a pufferfish's face (above). Exposure: f/13, 1/200s ISO 200

Large cleaner shrimp on the head of a goatfish (top right). Exposure: ISO 200, f/18, 1/200s

Cleaner shrimp at the gills of a pufferfish (far right). Exposure: ISO 200, f/16, 1/200s

Cleaner shrimp at a pufferfish's pectoral fin (right). Exposure: ISO 200, f/18, 1/200s

Cleaner Shrimp

Text and photos by Brandi Mueller

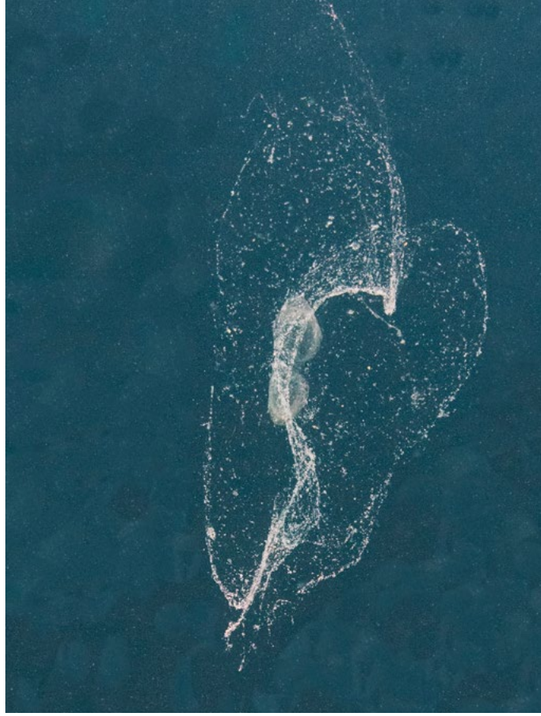
On a recent trip to the Philippines, I was thrilled to find cleaning behavior almost everywhere I looked. It is one of my favorite behaviors to observe underwater. I loved watching the mostly transparent shrimp crawl all over various fish to pick them clean of parasites and dead skin. The act is mutualism at its finest. The fish get a bath and spa treatment and the shrimp get a meal (plus, they don't become a meal).

Most of the shrimp were very tiny, but a few were quite large, including one that was almost as big as the head of the goatfish it was cleaning. One pufferfish looked like it was lying down in the sand and was covered with at least eight see-through shrimp. The fish were being cleaned all over, from the inside of their mouths to their gills and all over their bodies. It is nice that the shrimp can get to those hard-to-reach places! Visit: **brandiunderwater.com**

Photo 1. (right) Pyrosome, Jupiter, Florida, USA. Gear: Nikon D500 camera, Tokina 10-17mm lens, Nauticam housing, Inon Z-330 strobes. Exposure: ISO 100, f/11, 1/125s, FL 11

Photo 2a and 2b. (far right) Larvacean, Jupiter, Florida, USA. Gear: Nikon D500 camera, Tokina 10-17mm lens, Nauticam housing, Inon Z-330 strobes. Exposure: ISO 200, f/11, 1/125s, FL 14

Photo 3. (below) Octomom, Blue Heron Bridge, Riviera Beach, Florida, USA. Gear: Nikon D500 camera, Nikkor 85mm lens, Nauticam housing, Inon Z-330 strobes. Exposure: ISO 200, f/11, 1/125s, FL 85



Invertebrates and Chordates

Text and photos by Gary Rose, MD

Little did I realize in my college days, as I was falling asleep in Biology 101, that the lecture topics of invertebrates (with no spinal cord) and chordates (with at least a stiff supporting rod) would one day become very relevant in my diving world. Now, when I come across these fascinating creatures, I enjoy watching the confused looks on the faces of my fellow divers as they observe these captivating creatures in the water column.

Photo 1 is of a four-foot-long pyrosome, a tunicate (chordate) that is a cylindrical colony made up of thousands of individual zooids. Pyrosomes are transparent, gelatinous, and float, writhe and dance close to the surface of the sea. As they drift with the prevailing currents, they catch phytoplankton in a self-created mucus net and feed on them. At night they are bioluminescent. I have seen only a few pyrosomes in my many years of diving. Their large size and mystery create a very lasting impression.

In contrast, Photos 2a and 2b are of a much smaller larvacean (chordate), also a transparent tunicate. This one was about five inches long. The central part looks like a tadpole. The larger outer parts are self-created gelatinous wings with which the larvacean captures and eats tiny particles and debris that sink in the water column. They are hard to find. It helps to be near the surface, have good visibility and bright sunlight. Shooting upwards and at an angle allows light to both transmit through and reflect off the surface of a larvacean, enhancing the ability to take very creative photographs. By playing with the ambient light and patiently adjusting your settings, you can capture the central larvacean and the delicate mucus wings.

Every time that I see a bottle, can or pipe lying in shallow water, I look inside and closely inspect it. There are all types of surprises to be found. Many wonderful creatures take refuge and hide in these man-made objects. I like to use a very low intensity dive light to help with my investigation. Photo 3 was the reward for such an investigation. This beautiful "octomom" was protecting her bead curtain of eggs. It is easy to see the tiny, almost fully formed octopi inside the individual transparent eggs.

This was one of the most technically difficult photos that I have ever taken. The 14-inch segment of pipe protruding from the sand was pointing straight up. The diameter of the pipe was just large enough for my camera lens to slightly overlap. Forced to handhold my strobe remotely, above and just off to the side, I shot a series of photos—all the while being careful not to burn Octomom's eyes or the eggs. Each photo was taken blindly and was dependent on my pre-shoot setup. The strong ebbing tide in shallow water added another level of difficulty. The octopus is an invertebrate and not a chordate.

The first time that I encountered a huge invertebrate chordate was in a cave in the British Virgin Islands. It was about eight feet long, amorphous and, frankly, quite scary. I was a relatively new diver and had no idea what it was, but I was fascinated by it. I saw my dive guide's terrified face and was unfortunately forced by the guide to abandon my investigation of one of nature's marvels. As humans, we are often afraid of the unknown and that which we do not understand. As we explore the sea with our cameras, we will find many new and fascinating creatures. Visit: **garyrosephotos.com**

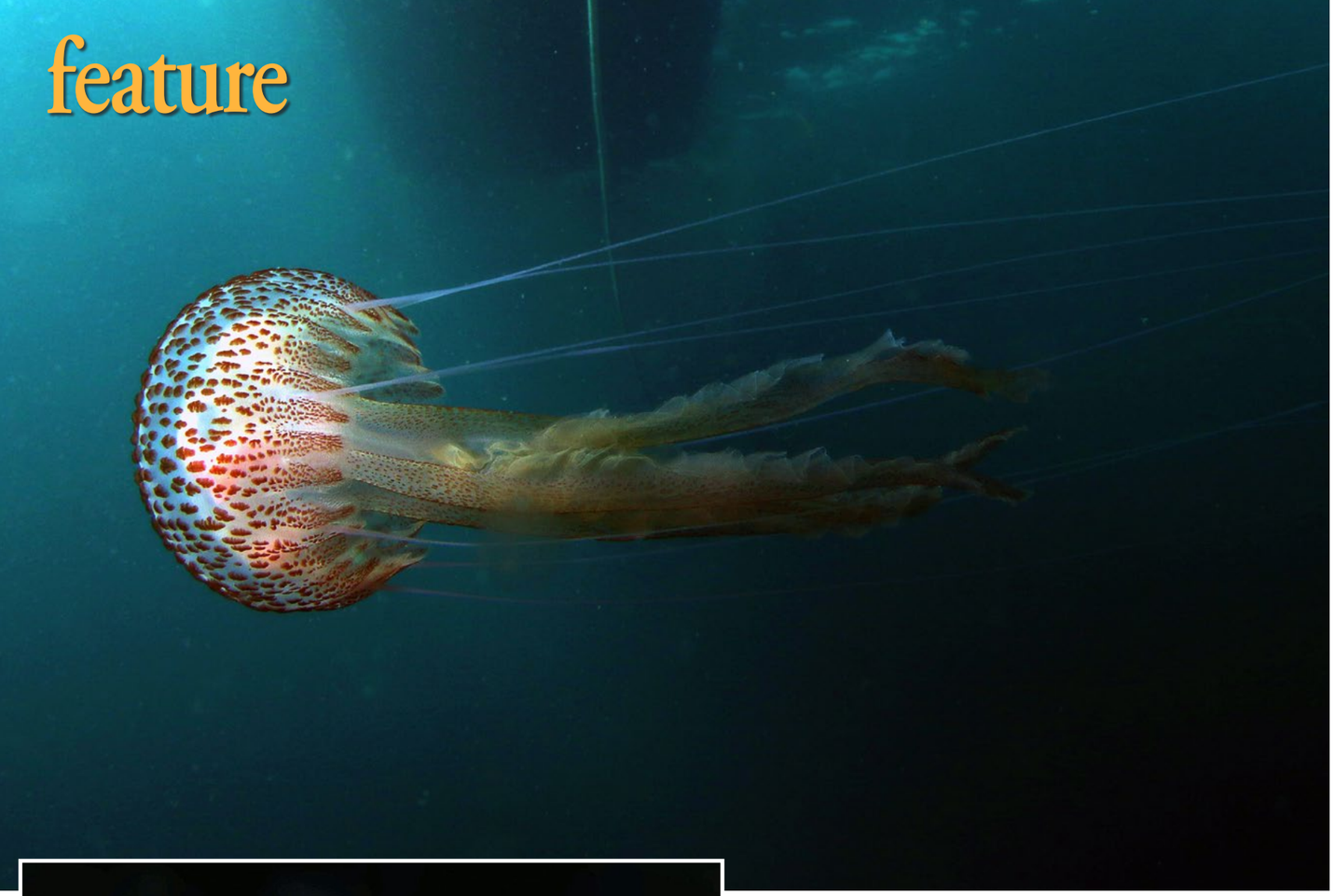


Photo 1. Sea angel, New Jersey, USA. Gear: Canon EOS 7D Mark II, Tamron 60mm macro lens, Nauticam housing, dual Inon Z-330 strobes. Exposure: ISO 200, f/18, 1/160s

Photo 2. Sea nettle, New Jersey, USA. Gear: Canon EOS 7D Mark II, Tokina 10-17mm fisheye lens (at 10mm), Nauticam housing, dual Inon Z-330 strobes. Exposure: ISO 160, f/13, 1/200s

Angels, Nettles, Larvae and Stars

Text & photos by Michael Rothschild, MD

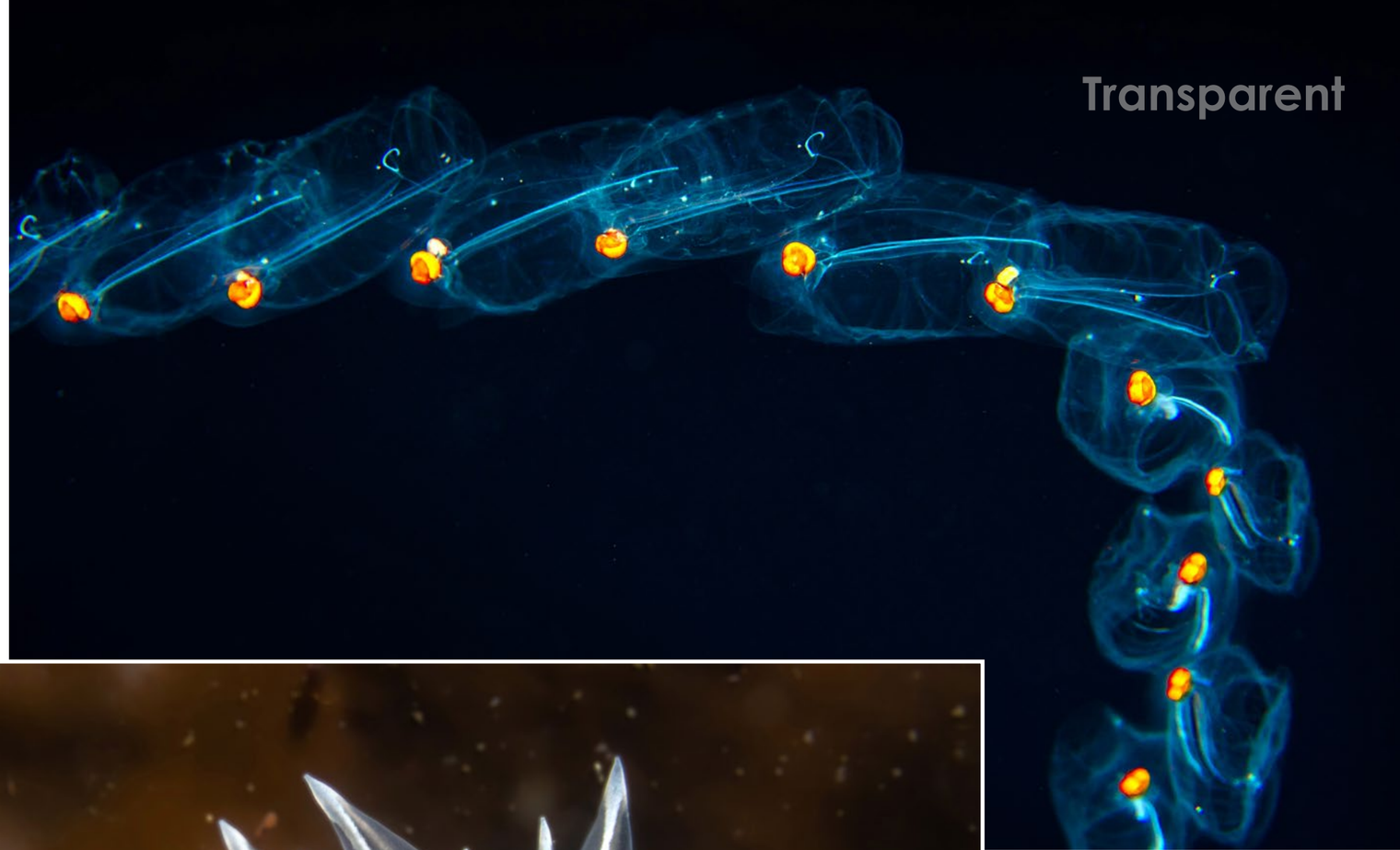
Light is to the photographer what stone is to the sculptor. We focus it and bounce it. We add it and remove it. And ultimately, we use the light reflected back from our subjects to create our images.

But some subjects do more than just reflect the light—ambient or artificial—that we guide towards them. Some of the living organisms of the deep can absorb and filter light, passing it through their bodies, with evolutionary benefits for both predator and prey. What better way to camouflage yourself than to let the background show through your body?

Photo 1 is of a sea angel—a free-swimming slug—floating in the shallow water over a shipwreck near New York City. Photo 2 is of an Atlantic sea nettle jellyfish, also over one of the local wrecks. Photo 3 is of a northern star coral, with its sticky translucent fingers always filtering the water for food. Finally, Photo 4 shows the larval stage of a flounder, whose body has yet to turn into a flatfish, with its eyes migrating to the topside. Visit: **dive.rothschild-design.com**

Photo 3. Northern star coral, New Jersey, USA. Gear: Canon EOS 7D Mark II, Tamron 60mm macro lens, Nauticam housing, dual Inon Z-330 strobes. Exposure: ISO 320, f/16, 1/100s

Photo 4. Larval stage of a flounder, Florida Keys, USA. Gear: Canon EOS 7D, Tamron 60mm macro lens, Nauticam housing, dual Inon Z-330 strobes. Exposure: ISO 200, f/8, 1/125s



Nudibranchs and Salps

Text and photos by Olga Torrey

The white-lined dirona (*Dirona albolineata*) is also known as the alabaster nudibranch, frosted nudibranch, or chalk-lined dirona because of its snow-white color. It has a translucent body and there is a white outline on each of its cerata and on its tail. This sea slug is carnivorous and preys on bryozoans, snails, hydroids and ascidians.

The hooded nudibranch *Melibe leonina* is found on seagrass and kelp. It is clear in color and has wispy tentacles and a round hood. This nudibranch looks like a jellyfish and is most often seen swimming at night, using a fruity scent to ward off predators. It is carnivorous and eats crustaceans, ostracods, amphipods, larvae and copepods, swallowing its prey whole.

The pelagic tunicate or salp *Salpa aspera* spends most of its time in deeper waters during the day. Its gelatinous, barrel-shaped body is translucent and colorless with a hint of pale green or yellow. It has dorsal nerve cords and moves by propulsion, which helps to pump water through its internal feeding filters. *Salpa aspera* is a tubular, transparent, gelatinous animal that feeds on phytoplankton. It resembles a jellyfish in body shape and is planktonic, drifting passively with the current. Small fish can sometimes be seen swimming inside it to protect themselves from predators. Visit: **fitimage.nyc**

SOURCE: WIKIPEDIA.ORG

All photos were taken with an Olympus OM-D E-M5 camera, Olympus M.Zuiko 12-50mm lens, Nauticam NA-EM5 housing, Sea&Sea YS-D1 strobes.

A chain of salps, *Salpa aspera*, Big Island, Hawaii, USA (above). Exposure: ISO 320, f/7.1, 1/160s

White-lined dirona, *Dirona albolineata*, Port Hardy, British Columbia, Canada (left). Exposure: ISO 200, f/7.1, 1/200s

Hooded nudibranch, *Melibe leonina*, Browning Pass, Vancouver Island, British Columbia, Canada (top left). Exposure: ISO 250, f/13, 1/250s