
MARINE Life
February March 2015
ISSUE 35
Andrew Newton

Our Goal

To educate, inform, have fun and share our enjoyment of the marine world with likeminded people.

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Cover photo, Port Phillip Bay, Victoria by Andrew Newton

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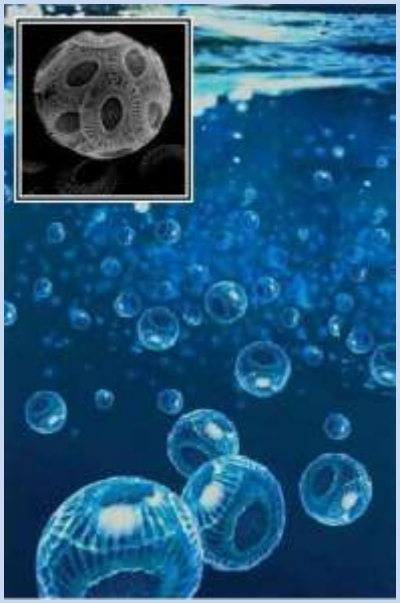
Ancient Fossils Provide Clues to Climate Change



A UK study of ancient marine algae has found that climate change affected their growth, perhaps bad news for modern ocean plankton.

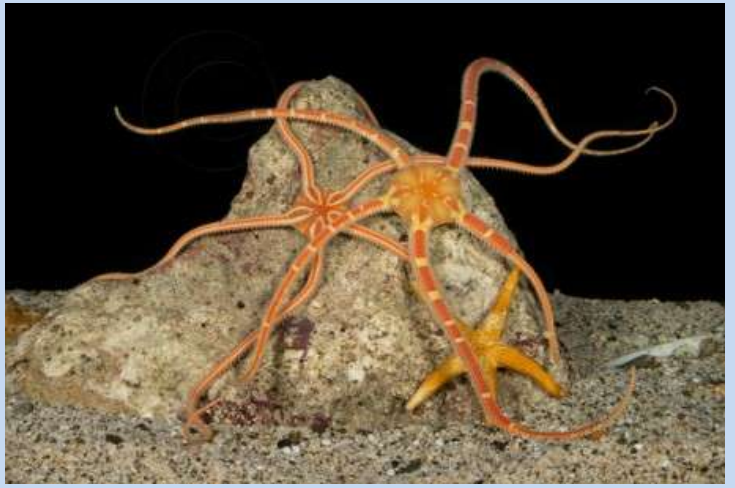
Coccolithophores are a type of marine algae that has been around for millions of years. There are so many of them that they provide lots of food for other animals. For millions of years they have been dying and falling to the sea floor. Their fossilised remains can be used to see how ocean animals were affected by carbon dioxide increases in the past. When carbon dioxide increases in the atmosphere it causes increased acidity in the oceans, potentially dissolving the skeletons and shells of vulnerable species.

UK scientists examined preserved fossil remains of coccolithophores from a period of climate warming and ocean acidification that occurred around 56 million years ago -- the Paleocene Eocene Thermal Maximum (PETM). They used two species that are still around today. They found that calcification rates (speed they grow a skeleton) halved during the different climate conditions of the PETM, due to changes in environmental factors that influenced their growth. The response of each species to these adverse conditions was different though, it slowed growth in *C. pelagicus* and caused an overall reduction in the size of the skeleton in *T. pertusus*. Intriguingly, when they tried to directly relate the results to periods of increased ocean acidity there was very little evidence for any response to acidification, other than perhaps a slight thinning of the skeleton.

The results showed that climate change significantly did alter coccolithophore 'bone' growth millions of years ago when the climate was very different. While it wasn't a catastrophe for these species, the climate was very important in influencing where species live, their abundance, how fast they grow and their ability to adapt to environmental change.

Mass Death Sustains Life

The decaying remains of echinoderms (starfish and sea urchin, brittle stars, sea cucumbers and sea lilies) are reducing levels of carbon dioxide in the Earth's oceans.



Calcifying organisms incorporate carbon directly from the seawater into their skeletons in the form of inorganic minerals such as calcium carbonate. This means that their bodies contain a substantial amount of inorganic carbon. When marine animals die they take the carbon they have absorbed during their life to the bottom of the ocean. There it is buried in sediments. This is called a carbon sink.

There are so many of these marine animals on the 300 trillion square metres of seafloor that this is reducing the carbon dioxide in the oceans and thus the atmosphere.

Scientist Mario Lebrato estimates that the global production from all echinoderms is 0.1 of a gigatonne of carbon per year. This is less than the total biological production in the main water column from things like plankton, which scientists believe to be between around 0.6 and 1.8 gigatonnes of carbon per year. But echinoderms apparently deliver more carbon to the sediments than some other creatures such as forams.

There is a worry that this process could be at risk if ocean acidification reduces the growth of echinoderms and other calcifying organisms. However, different echinoderm species respond to ocean acidification in different ways. How this will affect this important global carbon sink remains to be fully investigated

Underwater Air Con on Ice

Fighting the elements, divers have installed some weird appliances at Casey

A maze of ducts, tubes, thrusters and chambers have been carefully lowered through the Antarctic sea ice onto the sea floor near Australia's Casey station as part of a world-first experiment on ocean acidification.

The ocean is predicted to become two and a half times more acidic by 2100 under the current "business as usual" emissions scenario.

The Southern Ocean absorbs 40% of the global ocean uptake of carbon dioxide and polar waters are acidifying at twice the rate of tropical waters.

It's taken the team of scientists, engineers and divers several weeks to set-up the equipment for the study looking at increasing levels of carbon dioxide in sea water and its effect on sea floor plants and animals.

"First we drilled through three metre thick, multi-year ice in O'Brien Bay to gain access to the sea floor", Dr Stark said.

"The divers then had to manhandle the two-metre long acrylic chambers as well as dozens of metres of pipes, tubes and thrusters through the ice and into position without disturbing the area."

Sea water with elevated levels of carbon dioxide, is now being pumped through the chambers and researchers are measuring any changes.

Robots reveal a complex picture

Robots in Antarctica Sea have found that the ice in the Antarctic is much thicker than previously thought

Satellite images show sea ice coverage is in significant decline in the Arctic due to climate change, however paradoxically it's been increasing in the Antarctic, says Dr Guy Williams of the University of Tasmania.

Satellite measurements of sea ice, shipboard observations and drilling suggested Antarctic sea ice is less than a metre thick on average.

It was suspected that the previous results have been limited by the technology, "Ship captains preferentially want to go through thinner ice," when doing surveys and "there are limits to what a human can drill". Using robots was like "…going from a broken pair of binoculars to a brand new telescope," says Williams.

The study was conducted over two cruises in 2010 covered the Bellingshausen Sea continental shelf and the North-west Weddell Sea continental slope. The second, in 2012, used the Aurora Australis to examine East Antarctica offshore from Wilkes Land.

The submarine uses a multi-beam sonar to map the bottom of the ice. It is launched then sets off on a pre-programmed course before returning to ship 10 hours later. "It operates in a classic mow the lawn pattern" says Williams.

Underwater robots have found Antarctic sea ice averages 1.4 to 5.5 metres thick and can reach up to 17 metres thick.

Fishing in Batemans Marine Park

The New South Wales Government's has decided to allow shore-based recreational fishing to permanently resume in Batemans Marine Park.

Line fishing was totally banned in the marine park in March 2014 but seven areas were then opened up pending an assessment of its impact. Following the release of that assessment, the government has now announced several areas in the park will be rezoned to permanently allow shore-based recreational line fishing:

1. North Head
2. Congo Point South Beach and Mullimburra Point to Bingie Beach
3. Brou Beach
4. Bullengella Beach and Bogola Head Beach to Loader Beach.

The amnesty has now ceased at the following three sites and enforcement of sanctuary zone rules has recommenced:

1. Guerilla Bay Beach (Burrewarra North)
2. Burrewarra Point to Long Nose Point (Burrewarra South)
3. Broulee Island.

The member for Bega, Andrew Constance, said environmental protection needed to be balanced with the demands of the region's tourism economy and recreational and commercial fishing interests. He said allowing shore line fishing didn't present a threat to the environment. "There is next to no damage that can be caused by someone wetting a line off a beach," Mr Constance said. "When the Batemans Marine Park was set up, there was no local scientific data involved. "It was just lines on maps. The government now is working through the evidence and working through the data and that's why we've been able to reopen a number of areas."

About the park

Situated on the far south coast, the marine park falls within the southern most range of the East Australian Current (EAC) and is bathed by both the sub-tropical waters of the EAC from the north, as well as cooler currents from the south. The result is a unique "mixing zone" where sub-tropical and temperate marine species can co-exist.

The numerous islands within the park provide breeding areas for rare and threatened seabirds. The endangered grey nurse shark is known to aggregate at sites at Tollgate and Montague Island. The threatened great white shark also occurs in this area, and individuals are occasionally sighted. Both common and bottlenose dolphins are regularly seen throughout the marine park as well as Humpback, Southern Right and Killer whales.

Montague Island is also home to a large population of Australian Fur Seals, with New Zealand Fur Seals also visiting the island. Large aggregations of morwong, trevally and snapper are also found in abundance off Montague along with pelagic species like kingfish, albacore and yellowfin tuna following the warmer currents.

The park also contains highly significant coastal lakes and lagoons, including Durras, Brunderee, Tarourga and Brou Lake, many of which have been recommended for protection. These smaller lakes are intermittently closed and open to the sea which creates unique environments predominantly found along the south coast of NSW.

Larger rivers including the Clyde and Moruya also have significant estuarine habitats including mangrove, seagrass and saltmarsh. The Clyde River is one of the most pristine in NSW. This is primarily due to the majority of the land adjacent lying within National Park or State Forest. The inlet is unique as it has one of the healthiest populations of the seagrass *Posidonia* within NSW an important habitat to juvenile fish and invertebrates. The protected Black Cod have also been seen within the Inlet.

Happy Shark Encounters

Meeting a shark in the wild can also be quite exciting

Steph Bellamy was at Macauley's Beach Coffs Harbour and was taking snaps of a group of mothers who had taken to the surf for a surf competition.

"I expanded the shot out … and it was as plain as day there was a major photobomb from a beautiful creature of our planet". She said the mums and kids were told to get out of the water, but 10 minutes later the competition resumed with the open men's heat. Everyone remained calm, she said, and there were "no meltdowns". She believed the shark was chasing something when it leapt out of the water. "He's launched twice at some sort of fish he was after, I think," she said. "He certainly wasn't after any of the mums, that's for sure, which is a good thing." Some believe it may have been a mako, a junior bull shark or a spinner.

Two Tasmanian fishermen have also filmed an unexpected encounter with a great white shark in Bass Strait. Shaun Scarfe and Evan Richards were in their boat about 20 kilometres from Devonport when a 4M female great white approached it. It continued to swim around the boat for about three hours. "We just poked the camera down and we actually gave it a bit of a pat on the dorsal a couple of times and it just came right up and bumped the boat," he said. "It was pretty friendly, it wasn't overly aggressive or anything like that."

Shark feeding on whale carcass

Four beaches near South Broulee were closed to swimmers, when a dead whale washed ashore, drawing hundreds of onlookers, and several sharks.

The distressed young humpback whale in very poor condition and was noticed near the headland, but died about two hours later, before a rescue could begin.

About 30 minutes later, the first shark was seen. There were unconfirmed reports of up to four sharks near the carcass. Part of the carcass was towed out to sea by a local fisherman, but some parts of the whale remained near the shore. A Eurobodalla surfer dived into the sea to rope a dead whale, timing his dive between shark feeding sessions, so it could be towed away from a popular beach.

The National Parks and Wildlife Service's Lawrence Orel said, "The sharks are just doing what sharks do." "They are sometimes called the garbage men of the sea - they help keep the oceans clean by consuming carcasses of dead animals."

This fact was not lost on Council workers who spent six hours burying the dead whale when it again washed ashore high and dry on Eurobodalla Beach.

Queensland News

Remove Queensland shark nets?

Incidents of marine wildlife, including whales, becoming entangled in shark nets have led to calls for the shark control program to be scrapped.

Eight whales became entangled during this year's whale migration season, one of them fatally. But it was the dozens of smaller species, including dolphins, turtles and rays, that had conservationists worried.

Queensland Fisheries Minister John McVeigh said the nets were working. "Human safety is the priority and managing shark attack risk is the focus of the Government."

In the last financial year, 667 sharks were caught, including almost 300 whalers, 270 tiger sharks and seven white pointer sharks. The nets and drum lines also caught more 130 other marine animals - referred to as by-catch - including 67 rays, 18 turtles and 16 dolphins. Four protected grey nurse sharks were also caught.

Conservationists want the nets pulled out during the winter whale migration, similar to the system that operates in New South Wales. "First of all, there is less people in the water and secondly, there is no evidence that shark nets have ever prevented any attacks."

"Queensland's tourism is year-round," Mr McVeigh said. Since the introduction of the shark control program, the number of nets has been reduced from 50 to 30. Mr McVeigh said there was little chance the nets would disappear. "The program is now 52 years old and very successful - it is something the Queensland Government will stick with," he said. "There has only been one death in those 52 years..."

Pink Snapper Fishing Study

It's true, granddad did catch more fish in the 'old days'

Scientists in Queensland have used historic media to measure the decline in Queensland's pink snapper fishery, highlighting a drop of almost 90 per cent in catch rates since the 19th Century.

Researchers from the ARC Centre of Excellence for Coral Reef Studies (Coral CoE) at the University of Queensland and the Department of Agriculture Fisheries and Forestry examined thousands of newspaper articles dating back to1870 to reveal the historic catch rates for the iconic Queensland fishery.

"We found that 19th century recreational fishers would regularly catch hundreds of fish off the coast of Queensland, often in just a few hours of fishing," says Dr Ruth Thurstan, a Research Fellow from the Coral CoE.

Combining historical data with statistical analyses allowed the researchers to calculate catch rates, which are the number of fish

caught per hour fishing per day, for nearly 300 fishing trips between 1871 and 1939.

When the researchers compared the findings to contemporary fishing trips, they found that recent catch rates averaged just one-ninth of historical levels.

The old news articles have given researchers unparalleled insights into the history of the Queensland snapper fishery.

"When we searched through these old newspapers we were amazed by the level of detail they provided," Dr Thurstan says.

"They give us a much better understanding of just how rich and productive this fishery used to be, as well as providing us with some fascinating insights into the development of offshore recreational fishing in Queensland."

"Crucially, these newspaper articles place the modern day fishery into a longer-term perspective that isn't available using only official records. This helps us understand the changes that have occurred in the fishery over time, and provides an additional piece of the puzzle for those managing this fishery today," Dr Thurstan says.

GBRMPA are Grumpy

The Great Barrier Reef Marine Park Authority had budget cuts and is slashing 17 staff including five senior directors. It comes at the very time the Great Barrier Reef is facing the biggest threat to its survival.

It's been described as the biggest loss of expertise from the agency. Morale has plummeted. One industry group called the loss of so much experience a "disgrace" and warning that "bureaucrats, not scientists are making the big decisions". Outgoing scientists commented, "Sometimes we had eight to 10 people working on climate change. Now you can't point to one who's entirely focused on climate change".

The Abbot Point coal terminal development and the proposal to dump three million cubic metres of dredge spoil in the Great Barrier Reef Marine Park was a thorny issue for the organisation. A tourism spokesman said of the controversy, "I mean, you had the Great Barrier Reef Marine Park Authority's own marine scientists saying, "Do not do this" and a bureaucrat with no scientific background whatsoever made the decision and said, "Yes, we'll go ahead and we'll ignore our own expert advice." Even the current chairman (assumedly one of those "bureaucrats") admits "…people were disappointed with the Abbot Point decision inside the authority and a third of the staff felt strongly that we were not making the right decision".

According to the Federal Government, the overall outlook for the Great Barrier Reef is poor, having worsened in the past five years. The Academy of Science said that the Queensland and Federal governments' draft plan to save the Great Barrier Reef will not stop its decline or even

maintain its current diminished state. It also complained about fundamental governance issues, including conflict of interest issues and a lack of oversight. The "Reef 2050 Long-Term Sustainability Plan" was said to have failed to effectively address any of the key pressures including climate change, poor water quality, coastal development and fishing. Measures to reduce agricultural runoff were likely to be swamped by unprecedented amounts of dredging for coal ports and by Queensland Government plans to double agricultural production by 2040. It also called for more funding for GBRMPA.

The cuts appear not to have cowed GRMPA if that was the hope. The Great Barrier Reef Marine Park Authority has recently criticised a water reform bill due to "...unacceptable impacts to coastal waterways and Great Barrier Reef ecosystems". Legislation will give coal companies the right to extract billions of litres of ground water without having to buy licences or to adhere to caps. It is feared it will allow for an overallocation of water out of Great Barrier Reef catchment systems.

Growing popular opposition to big industrial developments adjacent to the reef have also kept growing, with even pro-industry politicians having to soften their policies, particularly on sea dumping. That still leaves plenty of things for a reef management body to do, but in the current budget environment, we are unlikely to see any restoration of funding levels in the near future.

Feedback on Kent Group Dive Guide Information

You may not be aware that Marine Life has a diving site guide on its website www.marinelife.org.au.

Photo Tasmaniaforeveryone.com.au

What is obvious from seeing it is that this infomation is still not nicely cleaned up yet, one day. A lot of the Tasmanian stuff is actually Mike Jacques' (the editor's) 1996 "Dive Tasmania" book, reprinted free on-line. Parks and Wildlife has spotted an error with the Kent Group description (in the Tasmanian information) which shows out of date information on fishing restrictions in West Cove, it is actually a "no take" area.

Thanks for the info. One of these days I will make a concerted effort to polish this offering.

For reader interest, we also have a guide to the NT, SA, WA and some external territories, in a very basic format *(I know it's cruddy, but it is free)*. Victoria is also basically done and will be uploaded one of these days. Qld and NSW might take some time (and you can already buy good dive guide books anyway)

Happy for any donations of fact-checking time, photos or info for these guides if you think they are of value to anyone. As for recommendations, check out Christmas Island. But you will all have your own favourites.

We could also put more information up there on topical issues or educational topics, any suggestions?

Feedback from Lisa on the last edition

Jelly expert Dr Lisa Gershwin states the facts.

Man, no Porsche... that's cruel!
[withdrawn offer from last edition]

This newsletter was beyond fabulous - so many goodies to gorge the mind on, morsels to marvel at, and fodder for holiday cud-chewing -- what more can a marine biologist ask for at Xmas... or Hannukah... or Quanzaa...

But I do have to frown at one thing... okay, three things actually. Your radar for bioluminescence is both brilliant and jammed. Three cheers for including something so wondrous at such a glittery and sparkly time of year. But dude -- the whitish jellyfish is Cephea, which is not luminescent; the red conical jellyfish is Periphylla, IMHO the worlds most spectacular of all bioluminescent critters because of it's scintillating twinkling light show -- like a glittering Christmas tree!! -- but the photo you've used is artificially lit and does not show bioluminescence; and the bioluminescent tide photo is apparently apocryphal. Man, what a drag! Welcome to my world! Any time in the future you want to do jellies, salps, ctenophores, or bioluminescence, I'd be happy to act as a fact checker for you... in exchange for a Porsche of course (LOL)... Ok, maybe no Porsche, can't blame a girl for trying!, but seriously, jellies et al are freaking cool, but not when they miss the mark :-(

Thanks Lisa
You are very kind and its good to get some feedback, especially the polite and balanced stuff. We need help with the serious science stuff as the magazine is a proudly amateur effort so that's all great info. Keep up the good work and Happy Hannukah. Sorry about the Porsche, seems like you still need the bus card.

Hopefully this is the right underwater Christmas decoration.

Yes, the beach scene in last edition probably was from Pirates of the Caribbean, but it does look like that when you are underwater at night and agitate the water with fins. A camera never does full justice to anything, but the great thing is that the reality is easily that, if not more, beautiful.

More Jelly News

Tasmanian beachgoers are reporting extra large numbers of "lion's mane" jellyfish.

This is a common occurrence each year and despite all the angst its safe to go swimming. On a scientific note, not all 'lions mane' jellies are alike.

The "lion's mane" jellies we see here in southern Tasmanian waters are two types of jellyfish. Recently Dr Gershwin has found these two distinct and previously undescribed species. Hard to pick out? Not too difficult, one is red and one is brown.

Gentoo penguins

Photos Keith Thompson, Antarctic Divn, Birdwatch.org.uk, Antarctic field guide

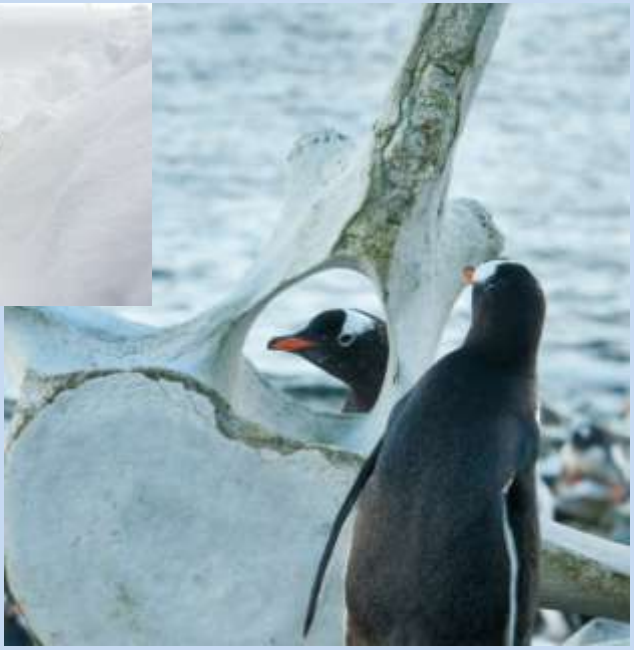
Gentoo penguins are the least abundant of the penguins found on the subantarctic islands, with a total breeding population of approximately 314 000 pairs.

They breed on subantarctic islands and on the Antarctic Peninsula in small to large colonies. Larger populations of gentoo penguins are found at South Georgia, the Falkland Islands and the Iles Kerguelen.

Humans have depleted some gentoo penguin populations in the past. Populations appear to have remained stable for the last 50 years due to the lack of any major threats.

Gentoo penguins forage at sea close to the colony, and thus their chicks are fed frequently. This may explain why gentoo penguins rear two chicks each year more often than other penguin species.

Gentoo penguin eggs are taken by gulls. Young birds are preyed upon by sheathbills, caracaras (falcons), kelp gulls, giant-petrels and feral cats, while older birds are taken by leopard seals.



Natures Real Survivors Pt IV

Paleozoic Period

(Carboniferous Era 359 - 318 Million Years Ago)

Time travellers, finally it might be worth a trip to this period. The land has plants and the weather is definitely good for sunbathing. The beginning of the Carboniferous Era generally had a tropical, and humid climate throughout the year. A large expanse of ocean covered the entire surface of the globe. Travel destinations were limited to one land mass, Pangea, the massive supercontinent. Shallow, warm, marine waters often flooded the continents and salty swamps were common.

In the ocean there wasn't much seaweed. Crinoids (featherstars) dominate the shallow water habitat. The base of their stalks was modified to anchor the animal securely in the soft sediment. They evolved a variety of stalk heights, which enabled them to capture food at different levels above the sea floor. Crinoids were relative skyscrapers in the community, sometimes towering up to two meters (6.5 feet). Lacy bryozoans occupied a lower level.

The prospects of getting a resort fishing adventure going had definitely improved. The heavily armoured fish from the Devonian became extinct, being replaced with fish fauna that looked more modern. Small bony fishes weaved among the crinoid stalks. Sharks cruised above the crinoid forests on the lookout for a meal.

Below them, huge numbers of brachiopods (mollusc-like shelly creatures) monopolized the muddy bottom. Trilobites were increasingly scarce, but a few scuttled about like crabs, while tiny foraminifer shellfish were abundant in the mud.

The sea levels all over the world fluctuated because of the presence of two large ice sheets at the southern pole. The uplift of the continents caused swamp forests to spread. Thick vegetation was pressed down on the bottom of swamps, eventually to become modern-day coal and oil deposits. Like all eras, the end was marked with a big extinction event after a drying trend, most likely caused by the advance of glaciers.

The Paleozoic Era – Permian Period

286-250 million years ago

The end of the big extinction event saw the remaining species boom again and start to diversify. The continents continued to shift around slowly with what is now North America along the equator, and Africa at the South Pole. Australia lay beneath an ice cap at the start of the Permian and Victoria was swathed in a slow-moving ice-sheet. Desert areas covered the northern inland part of the supercontinent that Australia was a part of.

Low lying and swampy shallow seas were still common. The oceans teemed with fish and invertebrates. Seas were dominated by crinoids, echinoderms, brachiopods, and planktonic graptolites.

Permian reefs were generally mud mounds of carbonate sludge or reef mounds partly built up by larger skeleton building organisms including bryozoans. Importantly, corals had appeared but they were low growing rugose and tabulate corals.

During this era animals, fungi, and plants colonized the land, the insects took to the air, and its swampy so bring the Aerogard. The early amphibian-like animals eventually gave rise to the reptiles. By the end of the period pine forests were common. Finally, the earth looked like something we might recognise today.

At the end of the Permian, 251.4 million years ago, the biggest natural disaster in history killed 90 per cent of the planet's species. The cause is not yet known – perhaps an asteroid impact, stagnant oceans, massive volcanic eruptions, a significant fall in sea levels, or a combination of these. Many marine groups became extinct including tabulate and rugose corals, eurypterids, sponges, blastoid echinoderms, graptolites, trilobites, and most crinoid species.

The Permian extinction left "…crumbling blocks of lifeless rock, around which no fishes swam. Instead, there sprouted, here and there, the squat and flaccid mushroom shapes of pale stromatolites. These glowed a ghost-like green against the garish, toxic shades of fungal blooms. The seas were weirdly clear. The rich planktonic rains of fusilinid forams, diatoms, and softer-bodied forms, uncounted and unknown, were gone. All ocean life was strangled by anoxic waters reaching through unheard-of depths; and nothing lived that did not feed on death." Time travellers, cancel those travel plans.

For the following ten million years, there were no reefs. This period is known as the Early Triassic Reef Gap.

Crinoids (feather stars)

Crinoids feed by filtering small particles of food from the sea water with their feather like arms. In most living species, the arms branch several times, producing anything up to two hundred branches in total. The arms are jointed, and lined by smaller feather-like appendages, or *pinnules*. They are covered with a sticky mucus that traps any food that floats past. Once they have caught a particle of food, the tube feet can flick it into the groove in their arms, where the cilia (hairs) are able to propel the stream of mucus towards the mouth. Divers can see this happening if they have the patience to look for it at night.

Feather stars have separate sexes which are impossible to tell apart. The pinnules hold the eggs which will eventually rupture to release into the surrounding sea water. In most species, larvae don't look much like the adult. These swim in the water column for 10-40 days and eventually settle as baby feather stars. The feather star grows gradually to become an adult feather star in 8 –12 months.

Some species develop directly (have no different-looking larval stage) and are nourished by food in the egg supplied by the mother.

The majority of living crinoids are free-swimming and have only small stalk which is a reminder of their past evolution when most were attached to the bottom.

Crinoids were much more numerous both in species and numbers in the past. Crinoid fossil fragments make up the majority of many old limestone beds. In fossils they usually only have five arms, but most living species have doubled their structure, having ten arms in total.

The earliest known group crinoids lived about 400 million years ago and they evolved into many species. About 250 million years ago there was a massive extinction event. The crinoids with flexible arms that could filter-feed very efficiently survived and became very widespread.

A response to heavy predation possibly caused them to further evolve by separating from the bottom to improve mobility. The crinoids we see today are just a small fragment of the species of feather star that once carpeted the bottom of our ancient oceans.

Looks like a plant?, well this deep water crinoid was photographed crawling along the bottom using its feather arms like feet

Ancient Sharks (Hexanchiformes)

The various types of sharks were at a high c. 360 mya, but by the ending of this period (also known as Carboniferous) and the beginning of the Permian age, many of them had become extinct. The rest were saved thanks to a rise in the numbers and variety of ray-finned fish. Since they make for great shark food, sharks once again flourished and the evolution of sharks continued.

Hexanchiformes are an ancient living shark from 260-300 mya. Their 2 families are Frilled sharks (Chlamydoselachidae), which look like eels, and Cow Sharks. This order includes some of the most primitive looking sharks that swim in our oceans today. Besides rows of scary needle teeth, one of the other 'primitive' features of these sharks is the presence of six or seven gill slits.

The Frilled shark

Frilled Sharks resemble the ancient shark, Xenacanthus. The teeth of the Frilled shark closely resemble those of species which dates back to the Carboniferous Period – over 340 million years. There are 4 species of Frilled sharks. Due to the very deep water that Hexanchiform sharks inhabit, little is known about these mysterious sharks. One was recently caught off the NSW coast by a trawler, fishing near Lakes Entrance in Gippsland caught in water more than a kilometre deep.

It has up to 47 rows of teeth, grows to lengths of two metres and is mostly found in ocean depths below 400 metres - or in a Taiwanese fish market. Frilled sharks have 6 to 12 pups per litter. The frilled shark has six gills on either side that wrap around and almost join underneath. These are what give the shark its name.

It is capable of swallowing prey more than half its size and it eats squid and octopus. Like an eel, it can turn back on itself.

Its teeth are described as backwards needles and it is capable of extending its jaw so that it can swallow everything whole.

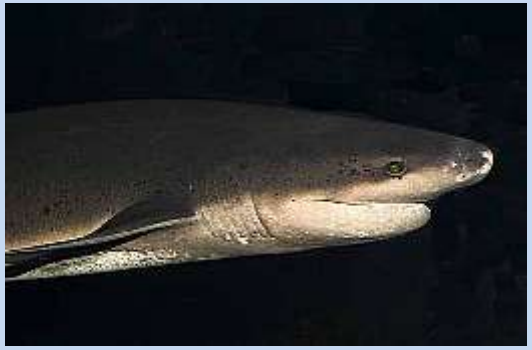
"I remember seeing one off Victoria a while ago and also when I walked through fish markets in Taiwan," said William White, research scientist at the Australian National Fish Collection, CSIRO.

"I know they occasionally see them at the surface, because a lot make vertical migrations at night time, as they follow prey up and down in the water column," he said, adding that its eel-like swimming motion makes it quite unique among sharks.

The species is more likely to be found in cool, temperate waters and seems to avoid warm water, said Mark Meekan, shark biologist at the Australian Institute of Marine Science.

"There are usually three main spots it is found, in waters off New Zealand, near Japan and along the coast of the British Isles, down through Spain into northern Africa. However, there are some maps that show distributions that encompass the Victorian coast," he said.

Cow Sharks



The other Hexanchiforms are relative newbies, evolving about 95 million years ago, after dinosaurs disappeared. They are located throughout the world. The Broadnose Sevengill inhabits shallower water than other cow sharks thus making observation and study possible.

Cow sharks have anywhere from 6 to 108 pups. They hunt mostly at night, attacking smaller sharks in the water column. They will also eat anything else they can catch, fish, crabs and carrion. Cow sharks skeletons resemble those of ancient extinct forms, with few modern adaptations. Their digestive systems are also unspecialised and primitive.

Their feeding behaviour seems to differ from place to place, with the species schooling to attack seals only in South Africa.

It isn't especially aggressive or powerful and attacks so far haven't been fatal. In captivity it has bitten divers and may be responsible for some infrequent attacks on swimmers. Attacks on human bathers and divers are very infrequent and have largely been recorded from the South Island of New Zealand. The biting incidents may be territorial rather than hunting responses.

They are common in embayments like Norfolk Bay in Tasmania and Port Phillip Bay in Victoria, but they are mostly active at night and are rarely seen. Divers have encountered them on the deep and dark wreck of the Lake Illawarra under the Tasman Bridge in Tasmania. They are also seen at night off Rye Pier in Victoria and off Phillip Island. They are also seen in the Rip, Cape Schanck and Flinders. This species was responsible for an attack on a surfer at Flinders recently.

They are also commonly fished, being caught by anglers off Point Lonsdale and Queenscliff. They are also common in the Illawarra where they regularly get caught by the NSW beach meshing program (92 caught in NSW from 1991-2007, 59 in the Illawarra and 14 in Sydney). They are under heavy game fishing pressure in some areas.

Chimaeras

The DNA of the elephant shark hasn't changed much in 400 million years, now that's a winning design.

The elephant shark uses an elephant-like trunk to rummage for crustaceans on the ocean floor at depths of around 200 metres. To the ancient Greeks, Chimaera was a mythological monster made up of the parts of other animals.

Sharks evolved from bony vertebrates around 450 million years ago. Elephant sharks are not a true shark but a chimaera, a small group of fish that diverged from sharks, rays and skates around 420 million years ago.

A comparison has been made of the genomes of the elephant shark, humans and other vertebrates. The study found that the genetic code of the elephant shark isn't complicated, being less than a third that of humans.

The genome could hold insights into how bones are formed, which could help the fight against the bone disease osteoporosis. More secrets may lie in the elephant shark's immune system. Its defences seem rudimentary, lacking the kind of immune cells found in humans that combat viral and bacterial infection. Despite this, its immune system is clearly robust and enables the fish to live a long life.

Maybe there are some secrets for a longer human life.

Kiwis Attacked by Prehistoric Monsters

In 2010, Lydia Ward, 14, was waist deep at Oreti Beach, near Invercargill on New Zealand's South Island body-surfing. A 5ft shark sank its teeth into her hip, tearing through her wetsuit.

The creature, thought to be a broad-nosed seven gill shark, lunged at her hip and she instinctively started bashing its head with her polystyrene board until it released her. The bite penetrated her skin, but Lydia did not need stitches.

The sharks had attacked swimmers at Oreti Beach in the past. In 1999 - a 13 year old girl need 60 stitches. She had been swimming at the beach with friends when a broadnose shark bit her left arm. The bite went through to the bone and severed her ulna artery. Two other people had minor bites from a similar shark on the same day at the same beach. Seven years later, a reality television show contracted with her to tell her story, and made her dive with sharks - classy.

A diver was bitten on the head by a shark while helping to remove a pest weed from Sunday Cove Fiordland NZ in 2013. The shark swooped over her, making several attempts to bite her tank. "[I] felt that staying calm and letting him figure out that my dive gear wasn't food would be better than aggravating him," she said. However, the shark would not leave her alone. It gave up biting her regulator, only to start biting her head and she became trapped in its jaws. She was uninjured and undeterred. "I'm looking forward to the next trip. I feel lucky to have the opportunity to dive and spend time in such a special place". Sevengill sharks are often spotted in Fiordland and usually ignored divers.

In 2014, a South Island surfer was also bitten on the leg, by an unidentified shark of a similar size. A short time later a spearfisherman suffered minor bite injuries from a seven gill. The seven gill has also been implicated in relatively minor attacks off South Africa and California.

Off our beaches and posing a threat!

Just to put media reporting of ocean risks into some perspective, Auckland health authorities have warned people to watch out for highly poisonous sea slugs on beaches after a "near miss" involving a four-year-girl in 2010. "Even a small dose could be fatal". 15 dogs fell ill after eating the slugs and five of those died. "Clearly, sea slugs are still just off our beaches, and still pose a threat" an official said. He warned people to supervise children and pets, not eat anything washed up on the beach, report any slug sightings but not touch them.

The culprit was a side gill slug *Pleurobranchaea maculata*, that washed in after very big tides. Tetrodotoxin (TTX) can be found in naturally occurring marine bacteria. The sea slugs may be ingesting the bacteria with their food.

Stop trying to look cute you evil bastard

The lethal dose of TTX to humans is 1–2 mg, probably half to one teaspoon of sea slug if you can stomach it, toxic seaslugs taste awful!

Sow and Pigs Reef, Sydney

Source, Michael McFadyen and H2O

A nutrient-loaded harbour still has some gems

This rocky reef is situated on the eastern side of the main shipping channel between Middle Head and South Head. It is 150 metres long and up to 70 metres wide. Originally the reef was exposed and resembled a sow and her litter.

Wrecks

The Sow and Pig's reef is located just inside the Heads, dividing Port Jackson into two channels which ships must negotiate.

A number of ships have been wrecked or damaged after hitting the reef.

- *Joke*, a schooner carrying a cargo of maize, ran onto the reef on 18th June 1821. The schooner was damaged beyond repair.
- *Phoenix*, a 600-ton ship, was ashore on 1824, and was then salvaged and hulked after heavy damage.
- The *William Cossar*, on 14th February 1825, after taking part in a towing operation in high seas, foundered on the reef.
- The cutter *Emma Kemp*, was badly damaged when blown onto the reef in a southeasterly gale.
- The *Como* ran ashore on the reef in 1848,
- The wooden barque *Fame*, came to grief on the Sow and Pigs in July/August 1857.

The reef has long been recognised as a navigational hazard. In 1816, architect Francis Greenway proposed that a warning beacon be installed to mark it. However, it took 20 years for the schooner *Rose* to be anchored off the reef to provide a manned, lighted marker. The *Bramble*, a former naval vessel, replaced the *Rose* in 1856, and was in turn replaced by a purpose built lightship in 1877. Various fixed markers have followed in more recent times.

Explosives were then used to reduce the shipping dangers posed by the reef. Now the reef is only exposed at a very low tide. All this did was to make it a bit more dangerous as it is now invisible in all but the lowest tides.

Diving and kayaking

Local diving identity Michael McFadyen suggests divers anchor on the southern or western sides. The maximum depth here is almost 8 metres compared to 4 metres on the northern or north-eastern side. The location is a very popular fishing site and at times you may not be able to dive it due to the numbers of boats anchored. It is better dived on an incoming tide and as close as you can to high tide.

There are plenty of overhangs and cracks. Some are large enough to enter and there are even a couple of tight swim-throughs.

There are lots of bream, luderick and similar fish. However, the fishlife is not as good due to the number of fishers here.

Visibility is normally five to seven metres. However, on a high tide when blue water is off the Heads, you could get as much as 25 metres. Worth doing if the seas outside are too rough.

In really big weather it is also popular with kayakers. Spectacular breaking surf give bouncing, broadsiding rides through the white water.

Photos: H2O blog

Bathurst Channel, Port Davey

Source UTAS – I think photos are yours Nev?

The Marine Biodiversity Research Group at the University of Tasmania have been looking at the sea creatures that live in the dark tannin coloured waters of the Bathurst Channel in the Port Davey Marine Reserve, in the far south-west corner of Tasmania.

These sea creatures aren't normal for shallow channels and are more like deep sea species. "They're certainly species you normally see round about 300 metres at the edge of the continental shelf, but Bathurst Channel at Port Davey you can find them as shallow as two metres. It's quite amazing," says Dr Neville Barrett from the Marine Biodiversity Research Group.

"In that corner of south west Tasmania...you get very very dark tea coloured tannin stained waters that run off from the land after heavy rain and those fresh waters sort of overlay the marine waters and particularly in Bathurst Harbour and narrow Bathurst Channel."

"You feel like your diving in a great big glass of beer, it's a beautiful ale colour," says Dr Barrett.

It's not just the colour of the water and the lack of sunlight that creates the perfect place for these species to live, it's also due to the very low nutrient levels.

"What is completely unique about the area we've been working, pretty much on the entire planet, is that in the Port Davey area, the whole catchment for Bathurst Harbour, Bathurst Channel, is totally nutrient poor."

The lack of nutrients in the runoff water coming into the catchment means hardly any algae can grow and the only real source of food is from the ocean currents that move up through the channel into the harbour.

Emigrant Clippers of the Black Ball Line

Fast as "Lightning"

In the 1840s, all vessels were built to a budget to carry cargo. The slow squat little British-built sailing ship took in a lot of seawater, often rolled, and usually ran low on food and water on the tediously long voyage to Australia. After the gold rush of the 1850s there was a huge jump in emigration, demanding a new kind of vessel built primarily for passengers who were in a hurry.

American shipyards responded to the new requirements with gusto, building huge sleek vessels called "clippers". They were designed for speed with highly sophisticated rigging and fit out. Their softwood hulls weren't as tough and could be expensive to maintain, but customers were willing to pay for the convenience.

The "Lightning" was built by celebrated American shipbuilder Donald McKay in 1854, for British-based firm James Baines & Company of the Black Ball Line. She was described as "one of the sharpest ships ever launched". She was big, and when under all sail she spread 13,000 yards of canvas. She was provided with iron water tanks holding 36,000 gallons of drinking water. Her accommodation for passengers was better than anything attempted before. There was 8 feet of head room below decks, which were nearly always dry. Even in big seas she was so stable they held dances on deck supported by the ship's musicians. It even had its own onboard newsletter.

The Black Ball Line built its reputation on big, fast and clean vessels. They were well-presented with crews drilled with navy-like discipline. The ships were run at record breaking speeds in any weather. On her maiden voyage across the Atlantic, the "Lightning" made the greatest 24 hour run ever accomplished by a sailing ship, 430 nautical miles. On her trip to Australia in 1857 she averaged more than 18 knots an hour, the top speed of a small speedboat.

Her first captain was the famous "Bully" Forbes, with the almost as famous "Bully" Bragg as mate. They drove the ship, its crew and even the passengers to the limit of their endurance in the name of speed. Passengers told stories of 'Bully' Forbes standing at the poop with a pistol in each hand, in order to prevent his scared crew from letting go the royal halyards in a screaming gale.

The Lightning’s first voyage to Australia was in 1854. She arrived in just 77 days from Liverpool. She loaded up with £1,000,000 sterling in gold dust and returned 64 days 3 hours and 10 minutes later, a record for her class which was never beaten.

In 1857 the Lightning was taken off the Australian trade and used as a troopship to carry reinforcements to India during the “mutiny” of local rulers.

It also had the distinction of carrying consignments of introduced animals, including rabbits into Victoria.

In the early morning of 31 October 1869, Lightning was moored at the Yarra Street Pier Geelong loading 4,000 bales of wool. A fire was discovered in the Lightning's forehold. It was feared that the wharf might catch fire. An attempt was made to heave her clear of the pier, but the flames soon drove the crew from the windlass. The mooring were cast off and she drifted clear. The iron foremast melted and soon went over the side. An attempt was made to scuttle her by the desperate means of bombarding her from two 32-pounder cannons. At only 300 yards range most of the rounds missed altogether. The few that hit her did more harm than good by giving the wind access to the fire. After burning all day the ship sank at sundown.

The wreck was reduced in size with the use of explosives, and a substantial quantity of the hull and rigging removed and broken up. There she has remained, occasionally disturbed by the buckets of a dredge.

The wreck's position was described at the time of wrecking as being in "24 feet (7.3 metres) in low water, its position being NW and SE, approximately 200 yards (183 metres) from the Yarra Street Wharf".

Local divers located timber shipwreck remains off the Yarra Street Pier in Corio Bay in May, 1973.

The burnt timbers and copper-alloy sheathing provided enough archaeological evidence to determine these were the remains of Lightning. In July 2008 a M.A.A.V. survey commenced. Very substantial timbers were located, buried up to 1.7 metres under the seabed. Conditions on the site are difficult with poor visibility and cold water in winter.

Reminisces of the "Lightning"

By C. P. Willan

A 12 year old boy describes a voyage on the "Lightning"

"We left Sandridge, now Port Melbourne, at the end of November, 1860. There were about a dozen other passengers on board. After the first few days at sea, during which I was very seasick, I began to move about the deck and had the boldness to try to go up the ratlines. I soon became so accustomed to going up and down the ratlines that I got to the mizzen-top, and afterwards higher and higher until I had no fear or trouble in going to the mast head. I could not now attempt that for £100, 000,000, but at that time I preferred it as an occupation to keeping up my studies on the long voyage of 95 days.

When we were off the Horn [Cape Horn] we were blown by stress of weather very far south and got among icebergs. We were never out of sight of them for three weeks. The floating ice from those bergs caused our skipper, Captain Clark, great anxiety. The ship might have run into any of them, especially at night, at any time. I was not old enough or sensible enough to feel troubled.

When we reached the tropics we were becalmed, and we travelled very slowly. We then came across about the only vessel we saw during the voyage. Her name was the White Star, and I think she was coming out to Australia. We eventually got about abreast of her. It was so calm that they sent a boat over from the other vessel to us containing newspapers, all giving an account of the death of the Prince Consort.

Near the West Indies we fell in with terrible gales. We ran under bare poles, seas coming over the ship and swamping the cabins. When on deck we had to hang on to anything available like grim death. There were mountainous seas on one side and deep valleys of water on the other.

The weekly newspaper, the "Lightning Gazette," was issued on this voyage, and it was full of interesting reading. It was handwritten, as typewriting had not come into existence in those days.

When we left Melbourne we had dozens of fowls on board in coops under the seats on deck. They were so crowded that their lives must have been a misery. I was taking a little favourite terrier with me, but the cow we had on board trod on his head. That was the end of him.

Salt beef (not corned beef) used to be an article of diet of sailors in those days, and they had a rhyme—"Salted horse, what brought you here, From carting stones for many a year; from Melbourne Town to Sandridge Pier, To put our stomachs out of gear"? This did not apply to the Lightning only, but to the diet generally in those days. Happily it does not apply to the present time.

Sailor's Hard Tack Biscuits for the homebody

1 lb flour
1/2 pint water
1/2 tablespoon sea salt
Maggots to taste

Rolled out thinly and baked slowly until very, very hard and dry.

Serving suggestions - no good for dunking in tea as they are still rock hard afterwards.

Best eaten in the dark, maggots help break it down but aren't much to look at.

Wreck of the "Schomberg"

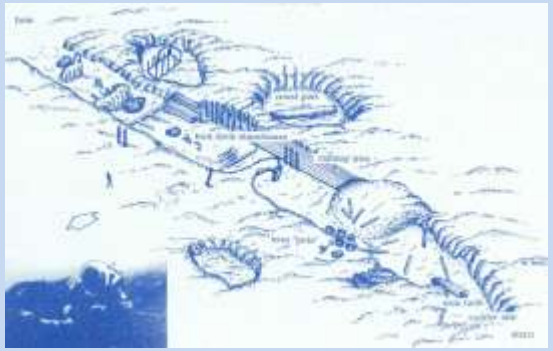
This three masted wooden ship was built in Aberdeen for James Baine's Black Ball Line as a fast and luxurious immigrant ship. It was designed and built in Aberdeen to match the very fast clippers of North American designer Donald McKay, like the "Lightning". No expense was spared in building *Schomberg*. The ship was designed to be the most comfortable vessel to sail to Melbourne and cost £43,103 to build. The three masted ship was heavily sparred and carried a massive 16,000 square yards of canvas sail. It had a gross tonnage of 2284 tons. Special features of *Schomberg* included ventilation ducts to the lower decks and port holes. Unfortunately the port holes leaked badly at sea. First class passengers were treated to lavish accommodation including a dining saloon, smoking room, a library and bathrooms.

When James Baines, owner of the Black Ball Line launched *Schomberg* he said, "by the grace of god, this ship under the capable command of Captain Forbes will break the record he has already made". Captain Forbes, who was drunk at the time, replied, "with or without the help of God I'll make the trip in 60 days". In 1855, the "Schomberg" was on its maiden voyage from to Australia. *Schomberg* left Liverpool with 430 passengers on board and 3,000 tons of cargo comprising iron rails and bridge iron. However, at the equator *Schomberg* experienced a number of windless days which slowed the journey considerably.

On Christmas Eve, some 78 days out of Liverpool, the vessel saw the Victorian coast. In the evening the wind dropped and the ship was again heading in the direction of Moonlight Head. The gentle breeze made it difficult for the vessel to turn about. She drifted onto an uncharted sandspit at Peterborough.

Captain "Bully" Forbes, was accused of neglect of duty. Some passengers told tales of dangerous sailing of Forbes. It was Christmas Eve and allegedly all of the officers on board *Schomberg* were accused of being ungentlemanly and immoral. Rumours spread of "half naked women" emerging from Captain Forbes' cabin at all hours of the night. They said he was playing cards with two female passengers when the "Schomberg" ran aground. By the time he came up on deck and gave orders it was too late.

Captain Forbes was finally acquitted. There were no grounds or evidence. The court concluded that he had used every precaution necessary to save his ship. Following his acquittal there was a public outcry.



The remains of the “Schomberg” now lie southeast of Schomberg Rock off Peterborough. The wreck runs north south along a reef, with its bow to the north. The site is badly broken up and heavily concreted with only railway iron usually noticeable in the thick kelp. Plenty of reef fish now inhabit the wreck.

Southerly and south-easterly winds expose the wreck to dangerous swells. It is safer after a period of northerly weather. Launches can be made at the Port Campbell Beach Ramp, or by 4WD at the very steep Bay of Islands boat ramp near Peterborough. A permit is required to dive the site.

Captain “Bully” Forbes

Every workplace has one, the hard-driving corporate psycho, full of vinegar with a ‘whatever it takes’ attitude. Was “Bully” Forbes a menace, or a miracle worker?

James Nicol Forbes was born in Aberdeen in 1821. His father was a distinguished lawyer. In early life, Forbes attended navigation school.

At 18 he went to sea and quickly rose through the ranks. For several years he was engaged in the trade between Aberdeen and the Canadian ports. An old Quebec brig was his first command, yet he made very fast passages to Argentina. He came to the notice of James Baines, the head of the famous Black Ball line. Baines gave Forbes command of the “Maria”, and later the “Cleopatra”, both on the Australian run. They were poor ships but Forbes made good passages. He then astonished the shipping world with record-breaking fast voyages in the “Marco Polo” and “Lightning”.

Forbes methods were questionable, he was obsessed with speed and accused of having no consideration for either his crew or his passengers. From the beginning to the end of each voyage he would let it be known that storms wouldn’t deter him. On one of his voyages the passengers became so frightened at the way in which he was forcing the vessel that a deputation asked him to shorten sail. Forbe's reply, "This is a case of Hell or Melbourne!"

Forbes pioneered the 'Great Circle Route', sailing far south in the Southern Ocean, where he could catch the strong, icy Antarctic winds. These winds also caused the unprepared and sick passengers some distress, but for Forbes it was all about the results. On this first voyage an outbreak of measles and influenza led to the deaths of 51 children and two adults. Although this was fact was used against him, this was not a large number of deaths by the normal standards of the overcrowded ships of the era. Yet, at other times the passengers

considered him attentive and kind. Perhaps this was only when they weren't complaining or in the way of a fast run.

Forbes soon earned the name of "Bully". To achieve his record passages, he padlocking his sheets (sail ropes) so the crew couldn't remove dangerous amounts of sail, and threatened his crew by displaying his pistols.

He was hard, but also pious, loyal and without fear. He would climb the rigging to the tops of the masts in a storm just for a bet. One diarist records him leaping into the water without hesitation to rescue a crewman that had fallen overboard while in port.

Before the first voyage Forbes made to Australia in the Marco Polo he bragged, "Do not be surprised if you see me back in the Mersey again within six months." He beat the previous record of the steamer "Australian" by a week. When Forbes arrived in Victoria, gold had been discovered. Sailors had rushed to the diggings and 50 vessels lay abandoned in Port Phillip. Forbes promptly had the whole of his crew imprisoned on a trumped up charge of insubordination. They were kept in prison until he was ready to sail again. The Marco Polo round trip occupied only 5 months and 21 days, even with a long stay in port.

When the Marco Polo set out on its next trip Forbes was even more arrogant. "Ladies and Gentlemen - On my last trip I astonished the world. This trip I intend to astonish the Almighty." But he met adverse winds and he took 75 days on the outward trip. The round trip still only occupied six months which was another great achievement. The "Marco Polo" was then assigned to other captains, slower but less likely to strain the already deteriorating hull and rigging.

Forbes was then sent by James Baines to bring the recently built "Lightning" from Boston, and make a name for her with some fast voyages. On the first voyage of the Lightning to Australia "Bully" Forbes set a record which has never been broken by a sailing ship.

James Baines then ordered to do the same with another new emigrant ship. It was designed to surpass anything of its kind on the seas, the "Schomberg". Forbes was placed in command. At the dinner before the sailing in 1855 he declared that he would make the passage to Melbourne in 60 days.

Conflicting stories have been published of the wreck of the Schomberg, It was stated that the accident might have been averted but for Captain

Forbes' ill temper. He was playing cards and losing. Allegedly he insisted upon playing another rubber. By the time he went on deck it was too late. It was also claimed that Forbes cried, "Let her go to hell, and tell me when she is on the beach." The enquiry found no evidence that Forbes' behaviour had been anything other than proper.

It was usual at the time for ship's masters to have to deal with constant complaints from cramped, bored and argumentative passengers. All this chatter wasn't true, but showed how easily he could attract hatred.

Forbes had lost James Baines' pride and joy. He had stained the name of the Black Ball Line. Forbes fell, and fell a long way. He never commanded a vessel of the Black Ball line again. He remained in Australia for some time "a silent and sad man." In 1857, he obtained command of the "Hastings", a ship of 596 tons. She was only three years old, but had to be abandoned in a poor condition and sinking, off Port Elizabeth, South Africa in December 1859. A year or two later he was "on the beach" at Calcutta (without a ship). Then he was noted trying to make a living as a shipping agent.

In 1864, he was in Hong Kong in command of the "General Wyndham". He was described as "a seedy, broken down skipper with the forced joviality of a broken-hearted man". There is no indication that age and bitter experience had mellowed him at all. A story is told that while in Hong Kong he insulted two Americans. When they look offence he pulled off his coat and soundly thrashed them both.

He kept command of the General Wyndham until 1866 when he retired. On June 4, 1870, he died in Liverpool. His tombstone says, "Master of the famous Marco Polo." His newspaper obituary marvelled at his exploits, but commented that few would miss his passing. He then faded from history.

Dugong Hotspots

Once widespread throughout the tropics, dugongs are becoming as Australian as meat pies (and no, they are not one of the mystery ingredients).

In the late 1960s, herds of up to 500 dugongs were observed off the coast of East Africa, but they are soon likely to become extinct in this area. Populations in India, Sri Lanka, China, Okinawa, the Philippines, Gulf of Thailand, Malaysia, the Red Sea and Borneo have crashed. They are now extinct on Taiwan and the Maldives

The Persian Gulf has the second-largest dugong population in the world at around 7,500. Australia is the stronghold for dugongs with a range from Shark Bay W.A. to Moreton Bay in Qld. The population of Shark Bay is thought to be stable with over 10,000 dugongs. Smaller populations exist along the W.A. coast. Large numbers of dugongs live along the NT coast and there are believed to be 20,000 in the Gulf of Carpentaria. A population of over 25,000 exists in the Torres Strait, while the Great Barrier Reef has a stable population of around 10,000.

Dugongs are generally found concentrated in wide and shallow protected bays where seagrass beds are common. They are usually located at a depth of around 10 m. Dugongs have been known to travel more than 10 kilometres from the shore, descending to as far as 37 metres where deepwater seagrasses are found. Deep waters may provide a thermal refuge from cooler waters closer to the shore during winter.

Shallow waters are used as sites for calving. If dugongs do not get enough to eat they may calve later and produce fewer young. Food shortages can be caused by many factors, such as a loss of habitat, decline in quality of seagrass, and a disturbance of feeding caused by human activity. Sewage, detergents, heavy metal, hypersaline water, herbicides, and other waste products all negatively affect seagrass meadows. Human activity such as mining, trawling, dredging, land-reclamation, and boat propeller scarring also cause an increase in sedimentation which smothers seagrass and prevents light from reaching it.

One of the dugong's preferred species of seagrass, Halophila ovalis (paddle weed) declines rapidly due to lack of light, dying completely after 30 days. Extreme weather can destroy hundreds of square kilometres of seagrass meadows, as well as washing dugongs ashore. The recovery of seagrass meadows and the spread of seagrass into new areas, or areas where it has been destroyed, can take over a decade. Most measures for protection involve restricting activities such as trawling in areas containing seagrass meadows. There has been little action on pollutants originating from land.

Moreton Bay - Home of the Herds

It is said that Moreton Bay is the only place in Australia where dugong still gather into herds, but they live right next to one of Australia's busiest cities.

Within this region, there are several dugong 'hot spots' that were visited repeatedly by large herds at high tide. The Eastern Banks region of the bay supports 80–98% of the local dugong population at any one time. Dugongs in other parts of Moreton Bay were at much lower densities than on the Eastern Banks.

These seagrass 'hot spots' are over the whole Eastern Banks, but only specific parts of them. The western Maroom and northern Coonungai Banks make up a relatively small proportion of the total eastern banks region (13 km2 from 110.5 km2 of total seagrass beds). Dugongs are only rarely encountered over southern Amity Banks, Wanga Wallen Bank and in Rainbow Channel.

These 'hot spots' contained especially nutritious seagrasses that dugongs prefer to eat and they may even eat it down in a way that makes it resprout with more easily digestible shoots. In that sense the dugongs 'farm' these hotspots. These hotspot areas are dominated by sparse *Halophila* spp. (*H. ovalis*, *H. spinulosa* and *H. decipiens*) with lesser amounts of *Halodule uninervis*.

It has also been suggested that as their habitat declines, dugongs may simply be forced to graze smaller areas of suitable seagrass.

Apart from the eastern banks seagrass area, only patchy dugong habitat remains in Moreton Bay. Relatively small seagrass areas in the southern bay are used by considerable numbers of dugongs year-round and dugongs may move between these areas and the eastern banks.

The waters of Rous Channel, South Passage and nearby oceanic waters are also frequently visited by dugongs in the winter months.

Threats to Moreton Bay dugongs are probably different to elsewhere and reflect the human activities in the bay. Major threats include mortality caused by boat strike and also loss of coastal habitat.

Effects of Boat Strike

Dugong Hunting by Europeans

When Europeans began settling Southeast Queensland in the 1820's, they were quick to learn about bush medicines from local Aboriginal people.

The oil from dugongs was held to possess enormous medicinal value. Dugongs were hunted and attempts were made to establish a market for it in London. However, the majority of the harvested dugong oil, hides, and bones were sold at the Brisbane markets.

Dugong skin was also used in the manufacturing of leather products, the bones for cutlery holders and the meat for curing and consumption.

Dugong oil, hides, bones and meat were produced at stations in Moreton, Tin Can, Wide, Hervey and Rodds Bays, and also at a small dugong factory in Cardwell. The stronghold of the industry from 1847 until 1969 was Moreton Bay, which then had vast herds. Even after heavy fishing, in late 1891 a pod of Dugongs were spotted just off Woody Point on the Redcliffe Peninsula. It is said that this pod measured approximately 8km wide by 300 metres deep. It was estimated that there were thousands of dugongs. Today this area has a population of approximately 500-1000.

By 1888, the low reproductive rate of the dugong was beginning to be appreciated. Only 16 dugongs were caught in Moreton Bay in 1888, almost all were cows in calf. The unsustainability of such a harvest was recognised and ineffective controls were put in place.

In 1893, large herds of dugongs entered Moreton Bay after extensive flooding (or more likely they were driven out of inshore bays to the East Banks where they could be easily seen and counted). Crisis apparently over, an annual three-month open season was declared. By 1896 dugongs were again rarely seen in Moreton Bay. From 1900 to the 1920s few were caught. Hunting was finally outlawed in 1969.

Indigenous hunting of dugong still occurs in North Queensland today, allowed because of the cultural significance of the practice.

Ancient Ocean Anxiety

With fatal shark attacks in WA now reaching eight in the past five years, we are starting to reflect on possible long-term changes to our swimming behaviour.

A fear of interacting with the ocean may be growing, one tourism operator commented, "there are people that have decided that they will get eaten by a shark even if they just put their toes in. We get tourists that won't even swim, thinking they will get eaten by a shark."

Psychologists are concerned that we may change our whole way of life, with unexpected consequences, such as to the health of our children. Perth-based sports psychologist Shayne Hanks is concerned there could be a generation of young children who were "too scared to get into the water," which could lead to inactivity and contribute to childhood obesity, "…beaches have always been the Aussie playground. It's somewhere families and kids can go that is free. "I miss the days when you would go down to [Bunbury's] Back Beach and see hundreds of families enjoying the water, you just don't see that anymore".

Mr Hanks said people needed to better understand their "shark anxiety". Mr Hanks advised taking a considered approach to swimming along WA's coastline and "If you're a parent, you don't need to show your kids those front page pictures of sharks," he said.

There are some signs that maybe we are slowly adjusting to the new and tragic realities. A Bunbury scuba diving shop, Coastal Water Dive, had just noticed a return to the water by divers after a fear of the ocean almost put them out of business. "Our business took a 50 per cent hit about three years ago which correlated with the first major attack and the first attack on a scuba diver". "It was touch-and-go for a while there and if I hadn't had the commercial diving side of my business it could have been the end." "People should be able to enjoy our beautiful coastline – I don't want my kids to grow up in a world where people are afraid of the ocean."

But that was before fatality number eight and it is yet to be seen what impact the latest news headlines might have.

Yallingup Surf School owner Crystal Wallace said that, while her business continues to be hit by shark-fear fallout, it appears the worst is over. "It had more of an impact when we had that big clump of shark attacks together". "It almost feels like people are getting a bit more used to it.

On the tourism side, the government are at least talking it up, "Tourism WA doesn't have any statistical evidence to suggest that shark attacks have impacted the number of tourists coming to Western Australia," a spokesperson said.

Surf Life Saving WA CEO Paul Andrew said figures showed people were still flocking to WA's beaches, "According to the statistics collated by our lifesavers, attendance at patrolled WA beaches rose approximately 14 per cent in 2013/14 compared to the previous year," he said. However, the swimmers had changed, "What we have seen over the past few years though is subtle changes to swimming behaviours, in that fewer people seem to be swimming around dawn and dusk and that, generally speaking, they are swimming closer to shore."

Surf teacher Crystal Wallace has been around the ocean all her life, but even for her it's hard to rationalise about the fear of harm to a loved one, "I feel safe when I'm teaching. But when my husband or other family members go and surf places where there has been a fatal shark attack, that's when I feel a bit ill," she said.

In South Africa, there has always been a healthy shark population and frequent encounters thanks to the popularity of spearfishing and surfing. The attitude there seems to be a bit more resigned and accepting of the risks involved. The Cape Town council website even includes shark safety tips for water users and starts with, "If you are not fully aware of all of the risks of bathing in the ocean and are not prepared to take these risks, do not go into the ocean", a variation on a popular local saying used with any nervous foreigner in any situation, "This is Africa, toughen up". This comment is then followed by a sensible list of ways to manage the risk as best you can. Have a look,

https://www.capetown.gov.za/EN/ENVIRONMENTALRESOURCEMANAGEMENT/TIPS/Pages/SharkSafetyTips.aspx

I don't think that you need to be "tough", but as all humans are evolved to do, we need to adapt to a changing environment. We generally do not fear cars, or domestic dogs, even though they can and often do kill us. We have learned to live with the risks and adjust our behaviour.

Sharks are just another day at the office

Source Perth Now

Learning to live with the risk of shark attack is nothing new. "Be careful and do not live in fear".

Former South African Gyula Plaganyi dives for abalone off WA's south coast spending six hours a day underwater. He claims to have encountered 20 great white sharks and 1000 tiger sharks in a lifetime of spear fishing and abalone diving in WA and South Africa. The one-time chartered accountant said he was miserable working in an office.

"I'd rather swim with a shark than try and catch a big spider. It's what you're familiar with," he said.

But encounters with great whites were rising, he said. "Last year the abalone divers had 17 great white shark encounters. This year we're on two already. I'm guessing we're going to get around 20. But 10 years ago, it wouldn't be more than three a year," he said. "Maybe the bold and inquisitive ones in the past were caught or shot or killed, but now they're not."

"A big pointer came up to me off Bremer Bay recently. It was big – really big. I saw him coming straight at me. When he got really, really close he turned sideways and I pushed him off with my abalone bar. He came back for another look… I pushed him off again with my spear gun. I don't think he was trying to eat me; I was just in his patch."

His last encounter was not the scariest, that belongs to a 6.5m creature that attacked in his blind spot and Plaganyi said he only survived because it virtually impaled itself on his heavy duty, big-game spear gun. But the veteran diver believes it was a case of "mistaken identity". "If they targeted us, there's no way I'd be diving," he said.

Plaganyi refuses to use a shark cage. Instead, he puts his faith in a carbon fiber wetsuit known as a Stealth Sharkskin, which masks the body's electromagnetic signal. "I also carry a serious spear gun and I keep a low profile in the weed and around boulders. If we see a pointer, we call it a day," he said.

He said he accepted the dangers and his biggest worry now was his 10-year-old daughter Zita, who has caught the diving bug. "It's a moral dilemma every parent has with their kids entering the water, whether it's surfing or diving or swimming. Every parent is thinking about it. "I don't stop her though. My advice is to be careful, enjoy the ocean and not to live in fear," he said.

Swimming Without Fear

Perhaps you have met some people who seem to have an unnatural lack of fear for things like sharks, what is their secret? How can you become just as fearless?

Apparently you need to think like a "successful diver". According to Dr Peter Forster, many successful divers tend to fall into the "sensation seeker category". "Boredom [not sharks] is the main enemy of sensation seekers, who like adventure and challenges such as those you get from scuba diving. They are generally more impulsive, uninhibited, extraverted and non-conformist."

Some of the doctor's more interesting observations included that "successful divers" were,

1. more likely to experiment with recreational drugs such as marijuana.

2. They are more willing to volunteer for unusual experiments… such things as meditation or studies of hypnosis.

3. They engage in a wider range of sexual activities with a greater variety of partners [*or just bulls##t about it more*].

4. They tend to like extensive travel, gambling, spicy foods, provocative art, wild parties and unusual friends.

So the reason why a "successful diver" doesn't get frightened of sharks is that they just never stop smoking dope, or shagging someone else's spouse, for long enough to really think about risks of shark attack? All I can say is Dr Forster goes to much more interesting dive events than I've ever been to.

It is also possible that brain damage plays a part in this bravado. According to DAN Asia there are some scientific studies which show evidence of at least transient brain damage in some divers. A study of EEG ("electrical brain waves") showed abnormalities in 43% of a group of Polish professional divers compared to 10% in a normal population. But a study of a particularly hard-diving group of Australian abalone divers in the 1980s suggested no differences [*they probably don't drink as much neat vodka though*].

According to DAN Asia "…successful divers tend not to be anxious people; they are self sufficient, intelligent and emotionally stable. Their tolerance to stress often allows them to continue to function during difficulties which would incapacitate many non-divers. This may be helped by their tendency to use "denial", a mental mechanism by which they confront them".

So, a sure -fired way of avoiding the fear of shark attack, if you can take all that flatulent indigestion, is to keep eating spicy food and never get out of the toilet.

Otherwise get into sin. If you do enter the water and suffer anxiety at seeing a big shark, then you can just close your eyes, meditate on a wicked life of drugs, sex, rock n'roll, while pretending the shark really isn't there. After a minute or so, one of you won't be. Problem solved.

At worst you will be dying with a smile on your face thanks to a lifetimes worth of dirty memories, and you will also be freed from the pending divorce proceedings caused by all that adultery.

At Marine Life HQ we have all the answers!