Edited by
Andrey Bizuykin
& Peter Symes

POINT & CLICK ON BOLD LINKS

In the zone... Equipment

Underwater Whistle

Capable of being heard over a half mile away, the windstorm whistles even work underwater. Available in Jet Black, Safety Yellow and Safety Orange. Size is only 2 3/4 x 3/4 x 1 1/2 inches. Small enough to easily carry. Loud enough to attract immediate attention. From US$ 4.50
www.wind-storm-whistles.com

Shark Jewels

Divers who love shark jewelery should take a seriously look at Reef Jewelry's collection. It is not often that a company puts its money where it's mouth is. But that is exactly what Reef Jewelry did when it was founded in 2001. From day one, they have had a commitment to marine conservation donating a percentage of all their sales to help the Shark Trust continue their important work. Today, Reef Jewelry produce on behalf of the Shark Trust, their logo in a choice of metals for the discerning diver. Prices range from GB£18.00 for a polished small Silver Hammerhead pendant to GB£110.00 for a small solid 9ct Gold Hammerhead pendant. **www.reefjewelry.com**

COME SEE IT AT DEMA SHOW

Low Mu

The EMC-20H Low Mu is a new Helium compatible computer that has an extremely low magnetic signature meeting the specifications for explosive ordinance disposal teams and developed for military organizations. The Low Mu version is the basically the computer as the civilian model, except it uses some different components to reduce the magnetic signature which should be of great interest to Search & Rescue teams and Homeland Security teams, as well as the military. The EMC-20H Low Mu features Touch Contact Programming and a Lithium battery for improved reliability and longer battery life. **www.DiveCochran.com**

All in one

Rapid Diver is a new lightweight, all-inclusive scuba system that mates a tank, regulator and buoyancy module to a uniform-fit, load-bearing harness. It was created in response to public safety and military needs for a universal fit, compact, versatile and easily deployed scuba system. It is equally well suited to a range of civilian applications such as shore diving due to its user-friendly design, universal fit capability and ease of transporting and storage. Persons who are unable to wear heavy conventional scuba gear, or who simply feel uncomfortable with the associated bulk and weight, appreciate the light overall weight of just 15 pounds and wearer comfort. The Rapid Diver readies for use in less than a minute and provides sufficient air duration for the average dive of 20 to 25 minutes at moderate depths.
www.rapidiver.com

COME SEE IT AT DEMA SHOW

Dragon

The new Dragon BCD from Mares comes with a full range of features. The MRS plus mechanical release weight release system allows for up to 6 kg to be released with one simple pull, yet the buckle simply clicks in place for optimum security. Dragon is made out of scratch resistant 3D Alutex material with woven metal. The cummerband comes with the QAS - Quick Adjust System for fast and safe adjustment of the commerband.
www.mares.com

Quattro forever

The fin that refuses to die. Now with OPB (Optimized Pivoting Blade) a system patented by Mares with the purpose of allowing the blade to assume an optimal angle through upward and downward strokes, reducing diver's effort. Comes with the popular ABS quick-release buckles and anti-slips notches for no skidding aboard dive boats.

www.mares.com

Golden rays

In Seawear's marine sea life jewelry line, we found these elaborate golden eagleray earhangers. They come in three sizes. The medium sized 14kt textured spotted or eagle ray is about 1" from wing tip to wing tip as it is poised in flight. The large is about 1 1/4". US$137.50 Weight 5.5gms

www.seawear.com

Dive Travel Essentials

Protection from pickpockets! Ultra-soft travel pouches designed to be worn under clothing keep your passport, travel documents, cash and valuables secure and accessible. 100% Spun Silk Money Belt and Neck Wallet From US$15.99

www.mcnett.com

COME SEE IT AT DEMA SHOW

Cleaning up your act

Until now, boat cleaners that were effective used harsh chemicals, and environmentally friendly formulas didn't clean well. McNett Boat Cleaner eliminates stubborn stains (even mold and tar!) from dive boats, rafts, kayaks, PFD's and more. Essential preparation for treatment with UV Tech Protectant & Rejuvenator! UV Tech beautifies, restores and protects your boat and gear from harmful UV damage. McNett Boat Cleaner and UV Tech are great for dive charter boats! Boat Cleaner from US$13.99 UV Tech™ Surface Protectant from US$14.99 **www.mcnett.com**

Wear Your Diving Passions!

If you've ever bemoaned the lack of T-shirts that express your passion for scuba diving, it's time you check out the cool tees from Dive Junkie!

The designs found on these casual T-shirts reflect scenes and experiences close to every diver's heart. Some designs are depicted with humour, some with a touch of seriousness, and some with a degree of nostalgia—but always with lots of heart. What you won't find are meaningless loud t-shirts! While some designs bring the beauty and wonder of the underwater world to the surface, others strive to bring home a serious message. An example of this is Barcode Shark, which shows a shark trapped behind a barcode strips, a statement representing the commercialisation of these majestic creatures. The precision with which all Dive Junkie T-shirts have been made mirror the meticulous care all divers take with their diving gear. All T-shirts have been made with 100% fully combed cotton fabric knitted from 25-single ring-spun yarn. Weighing in at 200 gms, they have been pre-shrunk and possess reinforced stitching at the collars, shoulders and sleeves to enhance durability. The lycra-ribbed collars ensure that they retain their shape after numerous washes.

www.divejunkie.com.sg

Get a grip

Max Holding Systems offers the newest form of scuba tank holders and speargun holders by using an effortless, temporary mounting system. Max avoids the unnecessary damages caused from permanent tank mounting systems used today. This system comes with an instant attach and release system. **www.scubastorage.com**

Limited Edition

Island Image's Limited Edition Tees bring a bit of 'vacation' into everyday life. The World's Best Dives Collectible Series is shown here in white. This 100% heavyweight cotton shirt is part of a collectible series that is in demand everywhere. Featuring the best dives in your area, this item is definitely flying off the shelves.
www.islandimagedesign.com

COME SEE IT AT DEMA SHOW

It's reely small

Custom Diver's new diminutive Pocket Reel is designed to offer the diver both ratchet and free run functions allowing divers to not only hold the reel in one hand, but also lets them select the Free Running Mode, simply by depressing the spring actioned pawl with their finger, whilst still enjoying snag-free line deployment.. When it comes to line, the Pocket comes with a 98kg breaking strain 2mm line in a choice of white, neon yellow or pink 50 metre line.
www.customdivers.com

COME SEE IT AT DEMA SHOW

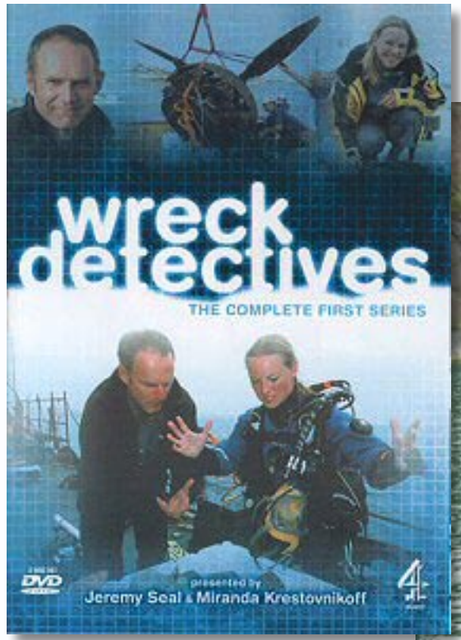
Easy Loop Lock

Worried about leaving your tanks on the boat or in your vehicle? Easy Loop cable is made from the highest grade of multi-strand steel coated with a hard PVC to protect the tank. Simply wrap the wire around your valves and lock. The tip of the main cable is made of chrome-coated hardened steel. The loop wire is made with the same type of cable but with more flexibility allowing the wire to wrap the neck with a much tighter radius; this keeps the securing loops as close to the valve as possible making removal over the top of the valve almost impossible.
www.easylooplock.com

How the world has come to see and know Miranda K. In an Aga mask, transmitting from the seabed

Being Miranda K

TV-Presenter, Wreck detective and producer



Miranda K and the team of the wreck detectives film series

Wreck detective Miranda Krestovnikoff recently completed another series of dive programmes for the BBC. The ambitious new series, *Coast*, is to be aired this autumn. We take a look behind the mask...

How did you get into diving?
I have always been a water baby – born an Aquarius, I was always jumping into water from an early age. I guess I was destined to be a diver; it was just a matter of time…

I was never really exposed to scuba diving as a child as we lived about as far away from the sea as you can get. I started to learn to dive in Bristol, after leaving University. I joined the University of Bristol Underwater Club, as it seemed a cheap and rather sociable way of learning to dive.

How right I was on both counts! I paid a small joining fee to cover weekly pool training, and after just a couple of weeks sitting at the bottom of the university pool on Friday evenings and practicing a good bit of mouth to mouth resuscitation, I had a diving boyfriend! A good start and a great incentive to keep learning! As the club was a BSAC club, rather than a PADI one, the basic training was quite long and thorough – something which I really appreciate looking back at it. I had an excellent trainer who shouted a lot

Miranda gets help putting on her Aga mask before a shoot

but certainly couldn't have prepared me better for my first few dives. I never felt like so many people do, who dive for the first time abroad, that I had been thrown in the water with only the briefest of lessons. I spent the best part of two terms having weekly training and only in the summer break did I get my first "open water" experience. I certainly felt more anticipation than nerves when going for my first dive.

I have managed to dig out my first diving log book which states that my very first dive – over 10 years ago now, was near Skomer in West Wales, was to a pathetic 6.2 metres and I stayed down only 12 minutes and saw nothing more than some kelp and a lone spider crab. But I remember that dive so well. I remember the excitement of getting into the cold water in my new (and rather purple) semi dry suit—a bit of a change from a swimsuit in the university pool! I remember the joy of being underwater—being able to breathe without surfacing and witnessing a whole new world of fascinating sea life which I had only ever seen a glance of while rock pooling or snorkelling. Never did I realise that this experience would lead me onto my future job of presenting underwater.

And what was your first diving and presenting underwater job?
This was actually my very first presenting job as well. I was offered a series of 13 shows for Fox Television in the US, called World Gone Wild. This was covering animal=people stories around the work with a number of different presenters. Because I was a diver, 6 of the 13 stories I was to present were going to be based underwater. This was my first time using an Aga mask and the first shoot was filming reef sharks (See later!). All in all, I had great fun but it was a bit like being thrown in at the deep end!!

How difficult is it to present underwater?
When presenting underwater, you have to wear an Aga mask—either a full face one, which has no method of equalising, or a half mask, which has a nose dam. Apart from the difficulties of the mask and all the cables that tether you to the boat, there are many other things that limit you. You have to plan shorter dives due to the Aga masks using up a lot of air and my talking using up even more air! My depth is also limited by the length of the umbilicals especially if we're not anchored up directly over the site hence the attraction

Going to the Dive 2005 show in Birmingham (United Kingdom)?

Miranda Krestovnikoff will be talking about the recent filming of BBC's ambitious series *Coast* on Dive 2005, which is going to take place over the weekend of 29-30 October.

Miranda's presentation is going to be held in Concourse Suite 2 from 12.45 to 1.45

Miranda presemts intriguing sea life under ice

ABOVE: Miranda K discusses with a colleague the objects found at a wreck site

RIGHT: On location with some unpredictable screen players

of doing shallower dives. Agas do work without umbilicals but the sound quality is much less reliable.

Then there's just the general stuff which goes on—it's a major "multi-task" to monitor your dive time, air, depth, etc. whilst trying to interview someone underwater, maintain neutral buoyancy, hold your breath while you listen to commands from the dive boat, try not to touch the protected wreck you are filming, try not to kick up silt and frustrate the cameraman, watch out for vicious moray eels, making sure they are filming your good side… they say that women are good at multi- tasking and I think they might be right!

Do you like using an aga mask?
Ah, the beloved Aga masks. These I also loathe because of the problems they bring. It's fantastic to be able to speak underwater and to communicate with topside, but after you talk, you need to breathe and this makes a noise so you can't hear what others are saying. So, there's a timing problem—you have to speak, wait, listen, breathe, wait, listen, speak and so on. If things aren't going so well—substitute "shout" for "speak" and add a few expletives! Aga masks bleed air unless the seal is really tight around your face and they only come in one size, so having a beard makes things very difficult—not a problem for me, but definitely one for some of our contributors!

The full face ones are even harder to work with as there is no way of equalising apart from swallowing a lot, and then you need to remember to flush out all the CO_2 every minute or so.

What's the best wreck you've dived?
This has to be the Stirling Castle—a stunningly preserved wreck from 1703. It was sunk in the worst storm to hit Britain in recorded history. A third-rate man-of-war with over 70 cannon, she hit the Goodwin Sands off the coast of Ramsgate—swiftly becoming covered by the shifting sands and disappearing for 3 centuries. She emerged in 1979, almost pristine and I had the pleasure of diving her in 2002 with registered guardian, Bob Peacock. My dive log states that we saw intact gun ports, cannon, intact onion bottles, a bronze cauldron, 18ft anchor deck timbers, human bone, rudder.

It's a tough wreck to dive with only a small tidal window and visibility ranging from near zero to excellent. If you're lucky enough to get good vis—it's an incredible wreck.

And the most challenging?
Ever since the second series of Wreck Detectives was being researched by RDF (the independent company making the series for Channel Four), I had being told about this incredible wreck just off Padstow—a German U-Boat. A great wreck to dive, as it's so intact, great viz, only recently discovered and not yet even identified. Just one problem—it's at 60m. So, the question was asked: Was I up for it? I didn't mind doing another training course in order to see another wreck. I would also end up joining that elite group of divers—the

men in black suits—also known as the techies!

Nine days of classroom sessions and endless out of air drills and equipment checks later, I was an advanced Nitrox and IANTD Normoxic Trimix diver.

The training was well worth it—to dive on a practically virgin wreck in stunning visibility. Diving

A curious seal taps the back of Miranda's fin

in the UK really doesn't get any better than this!

What's been your best diving experience?
Diving with any marine mammal is a wonderful experience. I've dived with dolphins, sharks, seals, and whales… but maybe the most magical of all for me was diving with manatees.

Sadly, this wasn't in the wild, as they are pretty rare and the waters they inhabit are often too murky to film in, but while filming for a wildlife TV series in Brazil, I was lucky enough to visit a manatee rescue centre where they are rehabilitated and kept in large tanks. When we arrived, it was explained that strictly no one was allowed to swim with them but the vet. No one, that was, apart from me.

We have all heard the stories about sailors being lured into the sea by these sirens – well until you've heard them sing to you, you'd have thought that the sailors were mad!

Once in the water, I was surrounded by the most beautiful symphony of sound from these slow and sluggish creatures. They wooed me with their songs… and then moved in for the touchy feely bit!

Wild animals tend to avoid humans, even when kept captive—so to have one come up and touch you of it's own accord, was an incredible experience.

Manatees like to explore—this they do with their bristly lips, which are usually used for collecting vegetation and working it to the back of their mouths where their molars are. But they don't limit their exploration to vegetation—why not try human? First, a bristly massage against my arm, then another one on my leg, then all my hoses were explored and tugged.

Never before, and perhaps never again have I experienced such trust from a wild animal—a truly unforgettable experience in the water!

And your worst?
I have been pretty lucky not to have had any really bad diving experiences (touch wood), but one memorable one, due to my lack of experience and having no Dive Supervisor in control is this:

We were filming reef sharks for World Gone Wild—the series I mentioned earlier where I first started my presenting career. We were in the Bahamas and although for anyone who's dived with reef sharks, it's not that scary, things didn't go according to plan from the start. The director was seasick just minutes from land, so we had to turn around and drop her off and continue, undirected, to shoot the sequence.

Miranda K in action

I was a fairly inexperienced diver at that stage and this was my first time in the water wearing an Aga mask. I was a bit apprehensive about diving with sharks, but after a brief interview with the leader of the project and some "chumming" of the water to attract the starts of our show, we dived in. Our aim was to create and film a feeding frenzy, but also to indicate that the sharks weren't really interested in eating us—just the fish!

Within minutes, we were surrounded by these huge fish coming at me from every direction—maybe it was a time when one is grateful for the lack of peripheral vision in a mask underwater!

"One's on your head, Miranda!" shouted Stuart.

I never saw it; instead, I felt another one on my arm—biting it! Thank goodness we were wearing chain mail (only on our arms, though!) I felt a huge pressure, but no pain, and all I had to show for it was a small hole in my suit.

The filming went well—I was trying hard to look cool, calm, and collected and it seemed to work…

After what seemed like an eternity on the dive—we ascended—this was when things started to go wrong. No one had been monitoring the dive. I guess, understandably, we were too caught up with the sharks and what they were going to eat next!

I started my ascent, to the sound of my computer bleeping a warning for 10 minutes of deco…

I checked my air—practically empty. With an Aga mask on, it's not easy to just rip it off and to swap tanks. Nothing to do but surface to the RIB, grab a mask, another cylinder, descend,

The wreck detectives kit up for another thrilling underwater production

Quicktime video clip. Shark diving with Stuart Cove´s. Size 4.9Mb

Quicktime video clip. Wreck detectives. Size 5.8Mb

Quicktime video clip. Presentation. Size 2.4Mb

and then carry on my deco (I DO NOT RECOMMEND THIS!!!).

So, that's what I did. Back down at my deco stop, I checked the air in my new tank. Nearly empty! They must have given me a used tank. B******ds!

So, up again for a third tank. More expletives!

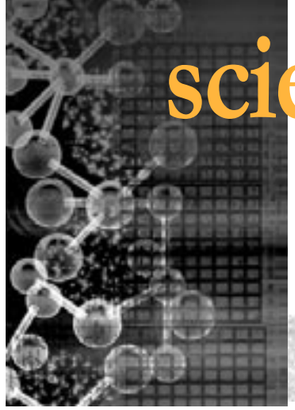
With a full tank, I finished my deco and surface, unharmed, and with no signed of decompression sickness. The dive was certainly not life threatening but for me it was an early warning to an inexperienced diver not to rely on others but to take charge yourself—especially with sharks around!

What plans have you got for future TV projects?

I am just in the process of filming a landmark BBC series called *COAST*, which airs in the UK from July 22nd. It features a diverse number of stories around the British coastline and I am following the natural history pieces. We have only had the chance to dive in a few locations, but when we have, it's been excellent. We filmed the charming and very inquisitive gray seals in the Farne Islands and also dived with mating cuttlefish off the South Coast at Selsey, near Bognor Regis. I have never been able to touch a cuttlefish before—they certainly had something else on their minds other than me!

What do you love so much about diving?

It's something you can't really explain to someone who doesn't dive.... utter weightlessness, therapy, relaxation, the sound of your own breathing, the gentle crackling of life underwater and just... utter calm. ■

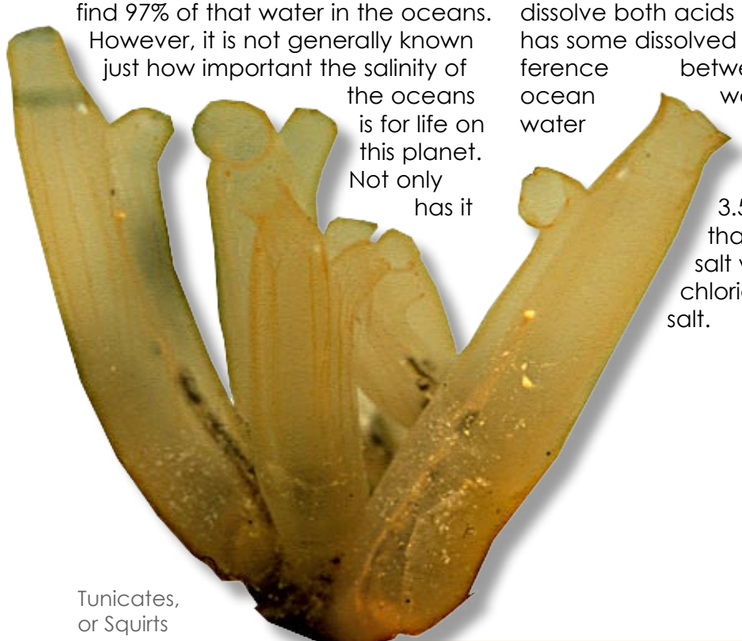


Life and The Salty Oceans

Text by Michael Symes
Photos: Peter Symes

It would seem to be self-evident to use the adjective 'salty' in connection with the World's oceans. Everybody knows that the oceans are salty. It is perhaps the first thing that comes to mind when we think of the oceans.

Everyone who has taken in a mouthful of ocean water while swimming knows that the ocean is really salty. About 70% of the Earth is covered with water, and we find 97% of that water in the oceans. However, it is not generally known just how important the salinity of the oceans is for life on this planet. Not only has it importance for the heat transmission, for example, from the seas to the land and vice versa, and thus affecting global climate, but it is of the greatest importance on the types of life that have evolved in these waters. Because of this salinity special, strategies have had to be evolved not only by the animals that live there but also by the plant life. But how saline are the oceans?



Tunicates, or Squirts

Salinity of the oceans

The salinity of the oceans depends on the solvent ability of water. It is the most universal solvent known, being able to dissolve both acids and bases. All water has some dissolved material in it. The difference between fresh water and ocean water is that ocean water contains many more dissolved salts. Ocean water is about 3.5% salt. And more than 90 percent of that salt would be sodium chloride, or ordinary table salt.

Composition of dissolved salts

At least 72 chemical elements have been identified in sea water, most in extremely small amounts. Probably all the Earth's naturally occurring elements exist in the sea. Elements may combine in various ways and form insoluble precipitates that sink to the ocean floor. The tabulated 7 ionic species make up 99.7% of the oceans' salinity.

Cation	Concentration %
Na^{+}	1.08
Mg^{++}	0.13
Ca^{++}	0.04
K^{+}	0.04

Anion	Concentration %
Cl^{-}	1.91
SO_4^{--}	0.27
HCO_3^{--}	0.01

From the top of the ocean all the way to the depths of the ocean, salinity is between 3.3 to 3.7% with the average salinity being about 3.5%. The salinity for almost the entire ocean at sea surface is around 3.3 – 3.6% with some geographic variations of salinity due to precipitation and evaporation. The salinity of ocean water varies. It is affected by such factors as melting of ice, inflow of river water, evaporation, rain, snowfall, wind, wave motion, and ocean currents that cause horizontal and vertical mixing of the saltwater. Evaporation leaves behind dissolved salts increasing salinity and precipitation freshens the top ocean layers. So, salinity is high in mid-latitudes where evaporation is high and precipitation is low. Salinity is low near the equator because precipitation is so high. Very high latitudes can also see decreases in salinity where sea ice melts and freshens the water.

The saltiest water, at 4.0%, occurs in

Kitchen salt

the Red Sea and the Persian Gulf, where rates of evaporation are very high. Low salinities occur in polar seas where the salt water is diluted by melting ice and continued precipitation. Partly land-locked seas or coastal inlets that receive substantial run-off from precipitation falling on the land also may have low salinities. The Baltic Sea ranges in salinity from about 0.5 to 1.5%. The salinity of the Black Sea is less than 2.0%.

Life in and around the oceans

The saline environment has quite an effect on life in the oceans. Most creatures that live in the ocean could not live in fresh water. However, when the highly saline waters of the ocean meet fresh water, an estuary is formed. This is a special environment where some creatures have learned to adapt to a mixture of fresh and salt water. When fresh water, ground water and soils are altered by human actions and salinity greatly increases, it can have an extreme detrimental effect on life there. Changes in salinity brought about by human residential, commercial and industrial activity can kill plant life, aquatic life, and animal life in a given area. Humans have the responsibility to make sure their actions are not causing this type of devastation.

Mangrove trees

One important example of plant life that has adapted to salty conditions is the mangrove tree. Mangroves are a unique part of the coastal ecosystem, being found along tropical seacoasts on both sides of the equator. They are thought to have originated in the Far East. There are several types of mangrove with the Galapagos being home to four of them. They are interesting because they have evolved mechanisms enabling them to cope with high salt conditions. The Black Mangrove, for example, has the highest salt tolerant leaves of all the mangroves, with its leaves being equipped with special salt-extracting glands. Much research has been done in attempting to elucidate how this salt extraction functions but many fundemental questions remain. The gland ultrastructure has been described but questions remain regarding processes inside the cells as well as ion transport from the secretory cells to the cuticle.

Incidently, apart from their ability to survive saline conditions they are also interesting in being unique in having true plant vivipary. Mangrove species reproduce by producing flowers and rely on pollination by bees and insects. After pollination, the seed remains on the parent tree where it germinates and grows roots before disloging.

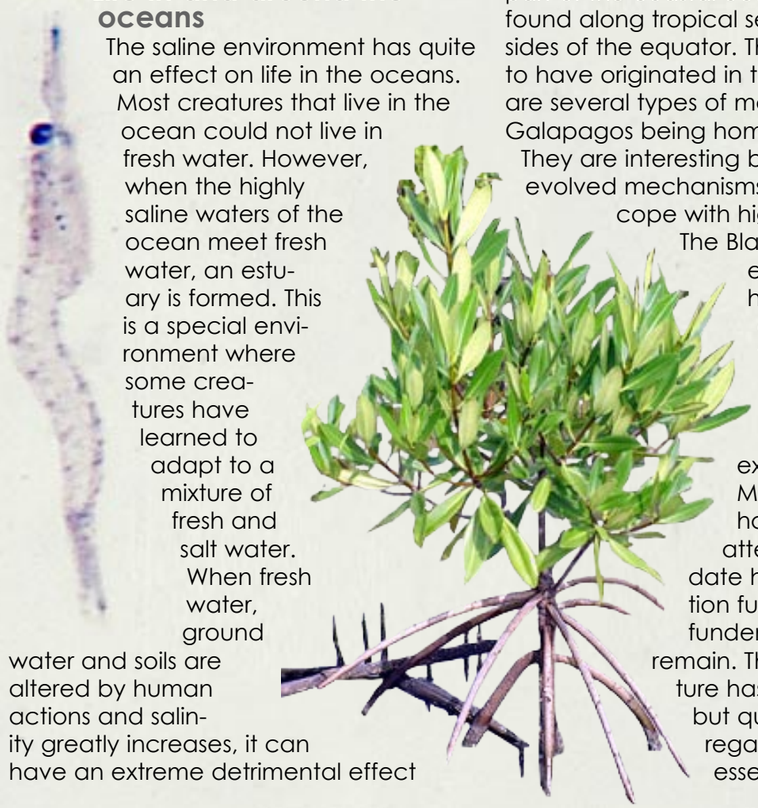
Marine animal life

Due to the salt content, life in the oceans is quite different from that found in freshwater. However, sea water and river water differ in more ways than in just their salt content. For example, rivers carry to the sea more calcium than chloride, but the oceans nevertheless contain about 46 times more chloride than calcium. Also, silica is a significant constituent of river water but not of sea water. Furthermore, calcium and bicarbonate account for nearly 50% of the dissolved solids in river water yet constitute less than 2 percent of the dissolved solids in ocean water. These variations seem contrary to what one would expect.

Life's affecting salt composition

Part of the explanation is the role played by marine life, both animals and plants, in ocean water's composition. Sea water is not simply a solution of salts and dissolved gases unaffected by living organisms in the sea. Mollusks, for example oysters, clams, and mussels, extract calcium from the sea to build their shells and skeletons.

Crab on a red mangrove root off Semporna, Borneo Plants and animals alike. They all have to cope with the changing salinity and, in some places, a constant cycle of flooding and drying out.



Background: Mysids, small crustaceans, usually less than 10 millimeter long, that swarm over the seabed and are often mistaken for juvenile fish. These are from the brackish Great Belt, Denmark
Center: Young red mangrove, Florida

The Salty Oceans

Foraminifers, very small one-celled sea animals, and crustaceans, such as crabs, shrimp, lobsters, and barnacles, likewise take out large amounts of calcium salts to build their bodies. Coral reefs, common in warm tropical seas, consist mostly of calcium carbonate as limestone, formed over millions of years from the skeletons of billions of small corals and other sea animals. Plankton, tiny floating animal and plant life, also exerts control on the composition of sea water. Diatoms, members of the plankton community, require silica to form their shells and they draw heavily on the ocean's silica for this purpose.

Some marine organisms concentrate or secrete chemical elements that are present in such minute amounts in sea water as to be almost undetectable: Lobsters concentrate copper and cobalt; snails secrete lead; the sea cucumber extracts vanadium; and sponges and certain seaweeds remove iodine from the sea.

Thus, sea life has a strong influence on the composition of sea water. However, some elements in sea water are not affected to any apparent extent by plant or animal life. For example, no known biological process removes the element sodium from the sea.

Thus, sea life has a strong influence on the composition of sea water.

Global Conveyor Belt

Together, salinity and temperature determine seawater density and buoyancy, driving the extent of ocean stratification, mixing, and water mass formation. Greater salinity, like lower temperatures, results in an increase in ocean density with a corresponding depression of the sea surface height. In warmer, fresher waters, the density is lower resulting in an elevation of the sea surface. These height differences are related to the circulation of the ocean. The changes in density bring warm water poleward on the surface to replace the sinking water driving the global thermohaline (heat and salt) circulation within the ocean called the Global Conveyor Belt.

The is the principal mechanism by which the oceans store and transport heat. The ocean stores more heat in the uppermost 3 meters than that of the entire atmosphere and acts as a global heat engine. Salinity is thus a key ingredient in the global thermohaline circulation. We will be discussing the importance for the environment of the Global Conveyor Belt in a coming number. ■

Lobsters concentrate copper and cobalt; snails secrete lead; the sea cucumber extracts vanadium; and sponges and certain seaweeds remove iodine from the sea.

Hermit crab in Littlebelt, Denmark. Crustaceans absord and leach salts and metals

Drink saltwater to save your life - *perhaps*

In Coleridge's famous poem, in which a becalmed crew is dying of thirst in the middle of the ocean, the narrator says:

"Water, water, everywhere,
And all the boards did shrink.
Water, water, everywhere,
Nor any drop to drink"

It is certainly ironic that in the middle of all that water they had nothing to drink, for it is well known that if you drink seawater you will die. But, well known or not, can this really be true, or is it just a myth?

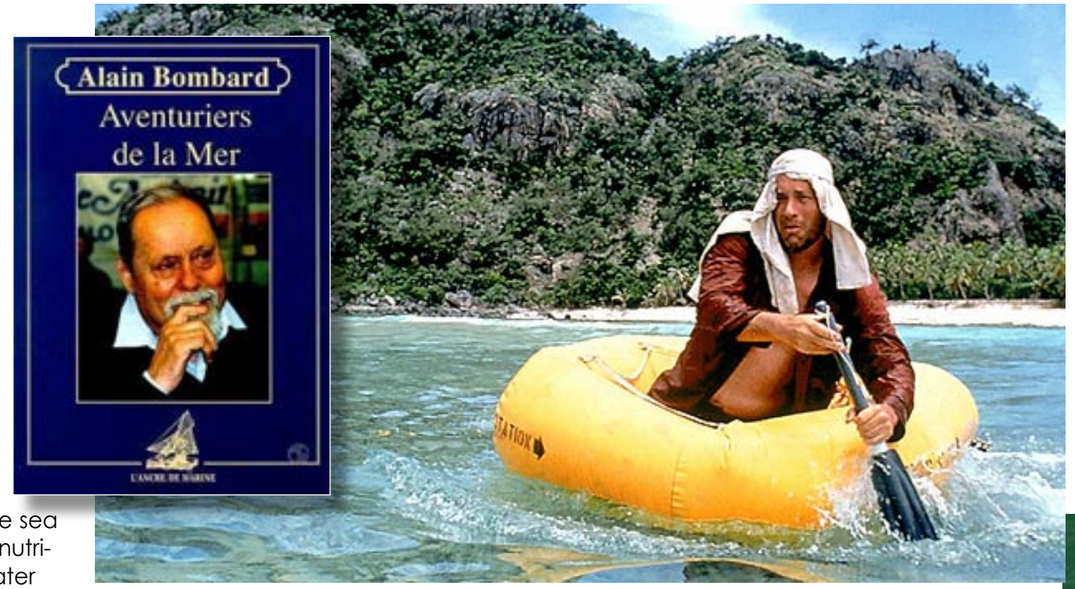
Doctor Alain Bombard, who died in France in July this year, claimed to have proved that you can drink seawater and survive. He, in fact, carried out a trial in 1952 in which he survived 53 days on the ocean in a life raft without any fresh water or food. His theory was that the human system can absorb sea water provided it's drunk in small quantities and taken continuously. Plankton is rich in vitamin C and, filtered from the sea with a special net, it contains all the nutrients required. Bombard drank rainwater and up to a pint-and-a-half of sea water a day on his trip.

He was inspired by Thor Heyerdhal's 1947 Kon Tiki expedition, who crossed the oceans on a raft, living on a diet of fish. This event influenced his life so much that he decided to prove the possibility of survival in a blow-up raft with the very limited amount of resources. Bombard drank only small quantities of salt-water and consumed the plankton which it contained.

His most famous book about his Atlantic raft crossing is titled "The Bombard Story. "

In Theory

After theoretical studies at the hospital of Boulogne sur mer, to determine what quantity of fresh water you can get from a fish, from the rain, how much salt water you can drink, etc, he decided to test his theory on a Zodiac inflatable boat and in 1952 to cross the Atlantic Ocean from the Canary Island to the West Indies. He went without any water, just a few basic tools like a net to catch plankton, harpoons to fish, a few books, medical material to study his health, and a sextant.



Tom Hanks starring in the Hollywood blockbuster "*Castaway*" in which his character also had to depend on his creativity to survive. Promotional photo from 20th Century Fox

Emergency provisions were loaded onto the 15-foot-long, 6-foot-wide rubber boat, but a notary sealed them so it would be obvious if Bombard used them. The seal was reported to be still affixed at journey's end. Bombard left the Canary Islands on October 19, and reached the West Indies December 23. He encountered storms, and weeks of dead-calm seas. When he encountered a tanker, he found that he was 600 miles off course. The mix of raw fish and plankton, which he first thought tasted a bit like lobster purée, grew tiresome. He told Life magazine that it added up to "a starving, thirsty hell."

64 days

After 53 days of travel, he encountered a ship. The crew offered him a meal and proposed to bring him to some islands but Bombard decided to continue alone and he reached Barbados on December 23, 1952. When reaching Barbados he was in such poor condition that he was immediately hospitalized. The total trip was 4400km and took 64 days.

Bombard went to an oceanographic institute in Monte Carlo to develop ways for people lost in small boats to survive on even less. He concluded that drinking limited quantities of seawater and fluids pressed from raw fish, and eating fish and plankton would do the job. Thanks to his achievement and interest in sailors, working conditions and standard safety procedures on board ships have all been greatly improved. He also received many letters from sailors who managed to survive life and death situations using his tips.

Is it really possible?

So, can you survive by drinking seawater? It would appear that you can if you use it as a supplement to other sources such as the juice from pressed fish. However, it might be advisable first to read "Alone at Sea" by Hannes Lindermann. He tried Bombard's tricks on two short voyages drinking saltwater - and almost died. His feet and legs swelled dangerously. In "Alone at Sea", 1958, he not only cast doubt on seawater's potability, but also charged that Bombard had cheated by sneaking provisions aboard. Find both books at Amazon.com. and judge for yourselves.

It all depends, it seems. The 33% salt concentration in the water of the Dead Sea would however certainly kill you fast if you drank it

YANN ST. YVES

Mangrove breathing roots. *Sonneratia sp*

Eco-tourism & education

Mangroves

Text by Bridget Hedderman
Photos courtesy of Eco Field Trips

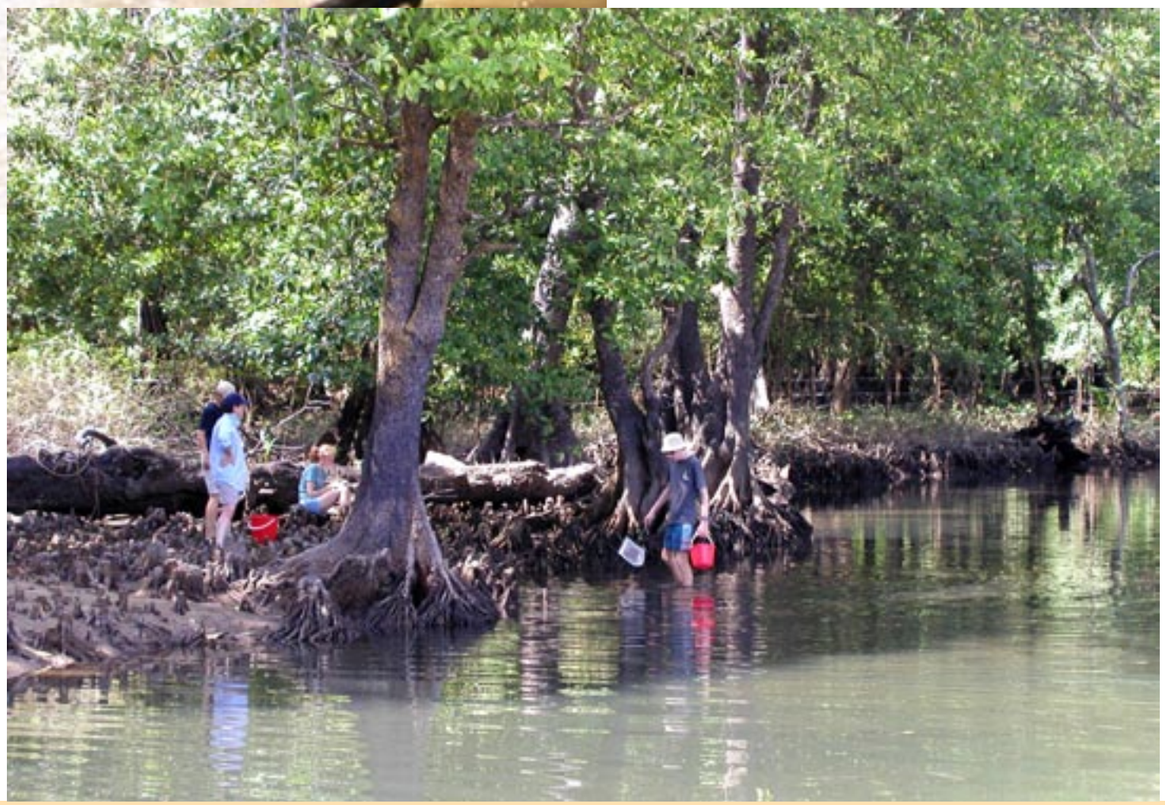
Ecofieldtrips Pte Ltd is a Singapore based company which employs specialist biologists to cover the biology of rainforests, mangroves, seashores and coral reefs in the unspoilt ecosystems of Tioman Island, Sarawak and Langkawi, in Malaysia. School groups from Singapore, Malaysia, Hong Kong, Bangladesh, UK and Ireland come annually on the fieldtrips. Fieldtrips vary in length and content- from fun filled educational trips with 11/12 year olds to in-depth GCSE, A-Level and IB survey work- depending on school requirements. The "hands on" field experience and the knowledge and experience of EFT biologists ensures a better understanding of our wonderful ecosystems and how they are interrelated. The fieldtrips support what is being taught in the classroom and it is hoped that fieldtrip experience leads to life long conservation awareness.

"What would the world be, once bereft Of wet and of wilderness? Let them be left, O let them be left, wilderness and wet; Long live the weeds and the wilderness yet"

Gerard Manley Hopkins

Mangrove quadrat survey

Mangroves

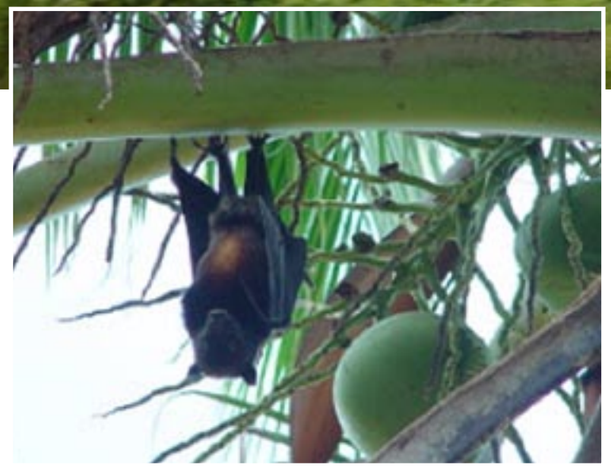


Introduction to the Mangrove forest:

Mangroves seem to have little appeal to the general public and are commonly referred to as "hot, bug infested, smelly swamps that are polluted and mess up the coastline" They are frequently cleared to allow for better sea views or reclaimed to provide more flat land for buildings and aquaculture. The terrible tsunami tragedy of Dec 2004 brought to light the vital function of mangroves in protecting coastal areas during times of adverse weather conditions. During fieldtrips in Sarawak students see exactly how mangrove forests are being cleared to make way for housing development. They also visit a wonderful kampong that nestles amongst the mangrove trees and observe how people can live in harmony with nature.

Mangroves have many other important roles, they are the nursery ground for juvenile fish and crustaceans, they provide food, medicines and a sustainable source of good quality timber for the local people. Mangroves are the home to many creatures such as fruit bats, snakes,

CLOCKWISE FROM TOP LEFT:
Mangrove at hightide;
Horseshoe crab;
Mangrove survey



LEFT: Fiddler crab

TOP CENTER: Sarawak reclaimed mangroves development

INSET: Fruit bat-flying fox

ABOVE: Sarawak reclaimed mangroves

RIGHT: Sarawak development within mangroves

monkeys, birds and butterflies.

Mangroves are a specialised group of plants that have adapted to living in the fringe of land between the sea and the land, along coasts and riverbanks where fresh and salt water meets. Here few other plants can survive the harsh environmental conditions. Mangrove plants have adapted to accommodate daily flooding by seawater when the tide is high and exposure to the hot rays of the tropical sun when tide flows out. Mangroves frequently have to survive freshwater flooding when streams overflow during the rainy season.

Mangrove soil is waterlogged and anaerobic with sulphur producing bacteria giving off the distinctive odour of rotting eggs! The strange roots of mangrove trees often protrude upwards allowing air to diffuse into the plant tissue through specialises pores when exposed to air. This ingenious adaptation works in much the same way as a snorkel when skin diving.

Mangroves are without doubt what students know least about when they arrive to take part in a fieldtrip and EFT biologists introduce mangroves to students in a variety of ways.

The first introduction to mangroves is from the rainforest by following a stream which then meanders through a wonderful estuarine mangrove before it reaches the seashore. It is often the case that students find themselves waist deep in water wading through the mangrove. It is this journey from the rainforest to the seashore through the mangrove that makes students realise how ecosystems are interconnected.

Students also approach mangroves from the sea by snorkelling into mangroves at high tide. This gives a very different perception of

FAR LEFT: Mangrove roots. *Rhizophera sp*

TOP: Snorkeling in a coastal mangrove

LEFT: Mudskipper nest

mangroves and students can well imagine how mangrove roots are a refuge for smaller fish and how they provide such a good barrier against coastal erosion.

Students also spend time doing more detailed surveys in mangroves. This may involve small groups working together to learn as much as possible about a given area of a mangrove forest. A variety of survey techniques are used including a silent survey to observe the timid animals that emerge when they are not disturbed. Mangrove zonation, using quadrates and transect lines are carried out as well as water and soil sampling. The affect of pollution and particularly human impact is brought home to students during their surveys.

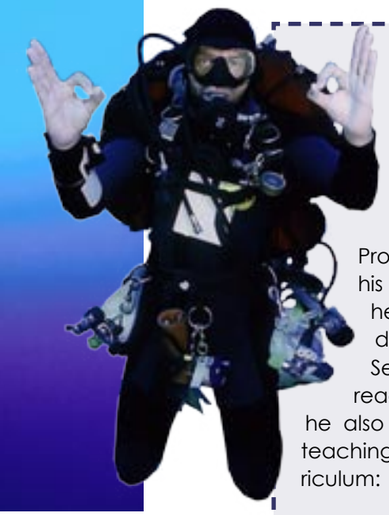
It is hoped that during the field trips the importance of conservation becomes clear and young people leave with a thorough knowledge about these amazing ecosystems and a greater appreciation of their commercial and intrinsic value. From our student feedback over the years, these fieldtrips have influenced their attitudes to the environment, conservation and sustainable development in a very positive way. ■

For more information, visit:
www.ecofieldtrips.com.sg

Leigh Cunningham

Solo or not?

Text: Leigh Cunningham. Photos and graphics: Peter Symes



Leigh Cunningham is the technical manager and TDI Instructor Trainer for Ocean College, Sharm El Sheikh.

Probably best known for his records - Leigh once held the record for the deepest dive in the Red Sea - and attempts of reaching extreme depths, he also has a wide range of teaching credentials to his curriculum:

TDI instructor trainer, DSAT Tech Trimix instructor, PADI MSDT IANTD Technical diver instructor CMAS 3 star instructor.

When divers run out of gas in open water it can only be down to two possible explanations. Either they haven't been monitoring their pressure gauges and plainly run dry. Or they have suffered some equipment malfunction such as a regulator free flow or a split hose which are technical breakdowns that can happen even to the most conscientious, experienced and well trained diver.

But how do we prepare for these eventualities? Do we just rely on our buddy to sort us out? And is that a wise policy?

Now, what if a hose bursts?

Training agencies differ in the degree of self sufficiency training at recreational levels. Most of them instruct divers to, when in a situation where they run low or out of gas, to swim to their "buddy" and share gas from an alternate second stage, or octopus as it is widely known. This obviously requires that the buddy is within swimming distance, which is why we are also taught to keep fairly close together in buddy pairs should anything of this sort happen, however unlikely it may seem.

According to conventions, the alternate second stage, or octopus, should be clearly stowed in the imaginary triangular area between the chin and the lower corners of the rib cage from where it can easily be seen and grabbed in case it is needed. If, however, the diver low on air is too far away from his buddy, the next option would be to swim directly to the surface while exhaling or perhaps breathing from a free flowing regulator. In either case a difficult task. So much for the theory.

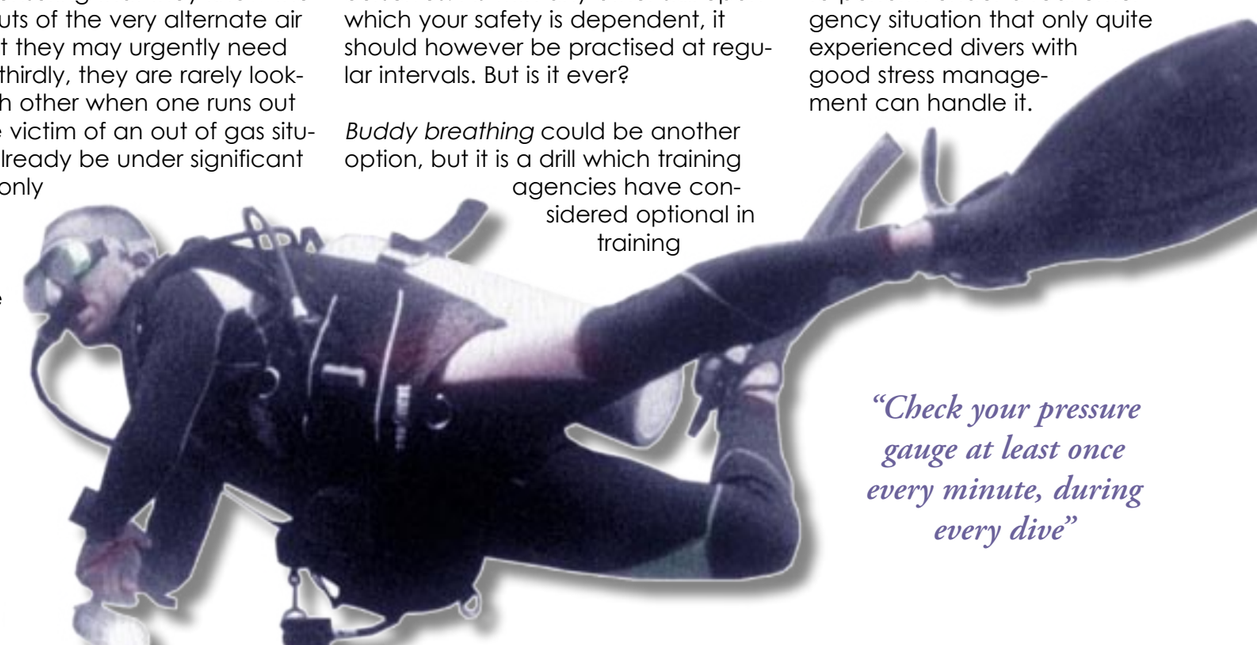
In reality

In my experience, however, in the real world of diving things may be a lot different. One of the most commonly seen deviations from recommended practice are divers stowing their alternate air source octopus in a BCD pocket or have it dangling freely somewhere behind them. Sad but true. Secondly, buddy pairs, once they are beyond their basic training course rarely do a proper buddy check before entering the water ensuring that they know the whereabouts of the very alternate air source that they may urgently need later. And thirdly, they are rarely looking at each other when one runs out of gas. The victim of an out of gas situation will already be under significant stress and only more so if he also has to swim some distance to reach his buddy. If he then, on top of everything else, also has problems locating a not so clearly seen alternate second stage, the situation will very soon, needless to say, become very serious if not already.

CESA

Another option may be performing a controlled emergency swimming ascent (CESA), this is, however, a skill we practice only once during basic training—unless we become instructors ourselves. As with any other skill upon which your safety is dependent, it should however be practised at regular intervals. But is it ever?

Buddy breathing could be another option, but it is a drill which training agencies have considered optional in training for many years now. It is certainly a good exercise and eye-opening experience to practise under controlled circumstances. But as the training agencies also came to realise over time, it is also a drill so fiendishly difficult and stressful to perform under a real emergency situation that only quite experienced divers with good stress management can handle it.



"Check your pressure gauge at least once every minute, during every dive"

Besides, if a skill is optional, most instructors will not practice it with students and few divers, whatsoever, will keep on practising the skill after training.

Usually mentioned in an open water course is the possible advantages of a pony bottle or a small spare air cylinder, but a mention is usually all it gets.

Buddy check

The buddy check gets more than a mention, and is in fact mentioned and practiced every day during basic training. Buddy checks should be a standard procedure for novice divers only. Experienced divers at all levels should not need a buddy check. Why? Basically because you must always be the one responsible for your own life support systems. It should never be up to another diver/buddy to check your life support system (scuba unit) is functioning how it should be. It's your life on the line. All divers diving together should however be aware of their partner's specific equipment configuration, especially where their alternate air sources are, which type of releases are on the BCD/harness and what type of weight system, integrated or weight belt, they use.

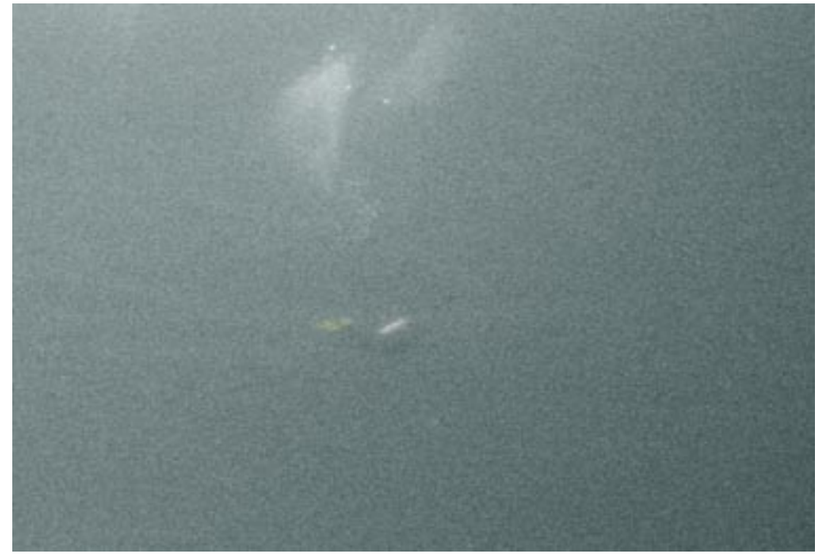
In my humble opinion, for the vast majority of divers the buddy system as we know it, is seriously flawed!

What if...?

Here is a little reality check: If a diver runs out of gas and swims some distance to reach and share gas with their buddy and the buddy is unaware of the problem, what is most likely going to happen is that the diver who is out of gas is going to grab the first second stage they see and know is working, which is the one the buddy is already breathing from.

With this in mind, a better method of training and diving would be for divers to normally breathe from the longer of the two hoses (the one we would usually consider to be the alternate second stage, or octopus) and stow the other second stage (on the shorter of the two hoses) under the chin with a bungee cord around the neck.

That good trusted old regulator. When was it again you had it serviced?



Is this your buddy?

What would then happen in the aforementioned scenario is that the diver who is out of gas would take the second stage from his buddy's mouth. The buddy would then replace this second stage with the alternate second stage, which is easily located just inches away right under the chin. The out of gas diver would then also be breathing from the longer of the two hoses, making gas sharing much more comfortable

But you are *still* dependent on your buddy. A different and better approach to prevent out of air situations is to have another air source on board yourself. Depending on your style of diving, it need not be a twin tank with manifold. A pony bottle or spare air cylinder would still be a great help for many recreational divers. A little spare air tank doesn't hold much but a couple of extra available breaths may make for just the essential difference. Also ask your buddy to carry some extra air supply of his own.

Heard it before?

Does all this start to sound familiar? Well it should, if you have been reading my series. We are revisiting the "redundancy ethic", I wrote about a couple of issues back. In the world of technical training, this approach to diving is the standard procedure and has been for many years. Put simply, according to the "redundancy ethic", anything that could possibly malfunction with a risk to your life as the result, should be duplicated with an independent back up system. While you may share together with someone, pretend that you will be diving alone and prepare and kit up accordingly, and dive within your limits.

We don't call it "Solo" diver training however. A more accurate term would be "following the laws of common sense". The technical diver is taught during formal training that the possibility of being split from the dive group or buddy always has to be taken into consideration. A diver may even have to complete a lengthy decompression obligation alone after being split from the rest of the dive team, so back up sys-

How far can you venture and still see yourself safely out of trouble in the unlikely event of a equipment malfuntion?

The good buddy should always look out for you. But what if he/ she looks the other way?

tems, must be taken on the dive in order to resolve equipment related problems should they occur.

Common sense

No longer does the questionable buddy system apply. What does apply is a common sense, logical outlook on required equipment and appropriate configuration for the type of dive along with "planning the dive and diving the plan". The technical diver does not have the option of a direct ascent to the surface after an equipment malfunction without getting seriously bent or even end up dead.

Ok, we are not all technical divers but the issues at hand applies to everyone. Even for the recreational diver in the 20-40 meter range, running out of gas due to a regulator malfunction or otherwise only to realise that the buddy is out in the distance swimming away from you, can have catastrophic affects. If you don't carry backup, a direct swim to the surface may then be your only option to prevent drowning, but at the same time more than likely lead to a series of recompression treatments and an abrupt end to your diving career. For all divers, whether adhering to the buddy system or not, if there was more emphasis on redundant systems during training, and their use after, less divers would get bent or dead due to an out-of-gas situation.

Diving solo

Maybe it should also be stressed that "diving solo" in this context isn't the same as diving alone. Diving is a social undertaking, and we like to share experiences under water. It doesn't mean either that the proximity of your diving partner can't add to your safety, because help or just an extra pair of hands can indeed come in handy. It is about a mindset. Are you prepared, equipped and capable to independently take care of your own safety and not to make someone else responsible? A little mental exercise can come in handy here: Ask yourself whether you would be comfortable assuming responsibility for your buddy and getting him/her safely out of the water in case he has an accident. Maybe he is panic-prone, who knows? This is for qualified and dive professionals only, who, when you come to think of it, always have to dive solo when doing classes as they can't rely on anyone else to rescue them.

Do you bring your family on a dive vacation and do you dive with your kids? They are most likely not physically strong, trained or mentally prepared or mature enough to deal with any incidences. They can't be expected to react as fully capable buddies. Here too, you are in reality diving solo even though you may not be aware of it.

Do the right thing and be safe. ■

Where is that buddy when you need him?