

Text by Cindy Ross

Many women dream of taking a solo adventure. Kayaker extraordinaire Sheryl Clough coined the phrase, "Go now, and go solo". Women travel safely all over the world, both solo and in the company of others. As you embark on a solo adventure, you'll have naysayers. Thank them for their concern, prepare yourself well and then you'll be ready as you arrive at your destination.

Before you go, research your destination. Not just the fish that you'll see on your dives, but the culture of the country so you'll know what to expect when you arrive. Be sure to understand their dress code. In some cultures, women are expected to wear long skirts or not expose their shoulders and arms. Some cultures are "beach casual" where others dress more formally for land

Going It Alone: *Tips for Diving Divas Traveling Solo*

based activities. It's important as you travel to respect the culture you're exploring and avoid negative attention.

Pack smart. You will be bringing your dive kit along, so think carefully about the clothing/accessories that you'll want to bring so you can cart your gear and get around without assistance from others.

Take a self-defense class This is not just a good idea for foreign travel, but also for day to day explorations. Bad guys don't just abide overseas. Being aware of your surroundings and learning a few techniques to ward off would-be attackers can give you a greater sense of confidence.

When traveling abroad, realize that though a foreign environment may seem intimidating at first, if you stay alert and in tune with the surroundings, you'll soon feel like the locals. To ensure your safety while abroad, make sure someone knows where you're going. Leave your travel itinerary with someone at home and send an email or phone call upon arrivals and departures.

Many cell phones are able to be used overseas so you may want to check with your carrier to see if yours is compatible with your destination.

Arrive at your destination during the day This does two things, first it allows you to take in the area by daylight and second, it helps your body to adjust to the lag time when changing time zones. If you must arrive at night, be sure to secure your lodging and your transportation ahead of time. If the hotel does not have a driver for airport arriv-

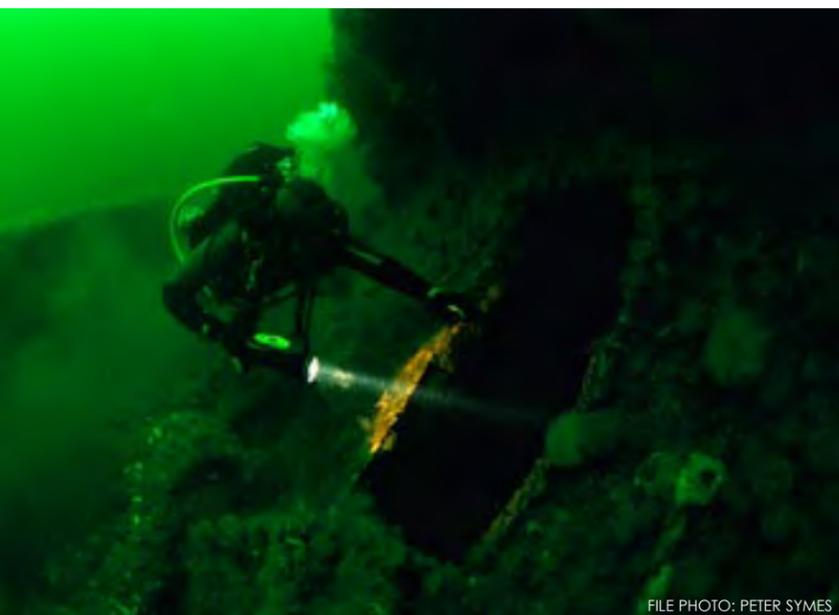
als, then definitely hire a "registered" taxi driver. These drivers have been approved by the local municipalities to drive visitors and are a safer choice.

Walk with a purpose Even if you don't know where you're going, by appearing that you're confident and in control, you'll avoid looking like a target. If you must carry a map, try to leave the poster sized version at home. Be discreet and don't hesitate to ask for directions, afterall...we're girls, we can do that. Be aware of how other women in the country interact, as non-verbal signals mean different things in different cultures. When in Rome....

Safe travel is about common sense Don't walk down a dark street, late at night by yourself. Don't allow men you don't know into your room. If you didn't call for room service, and "room service" knocks, call the hotel desk. Remember...there is no such thing as a free lunch. Be wary of men who offer free, private dive tours. They may have something else in mind.

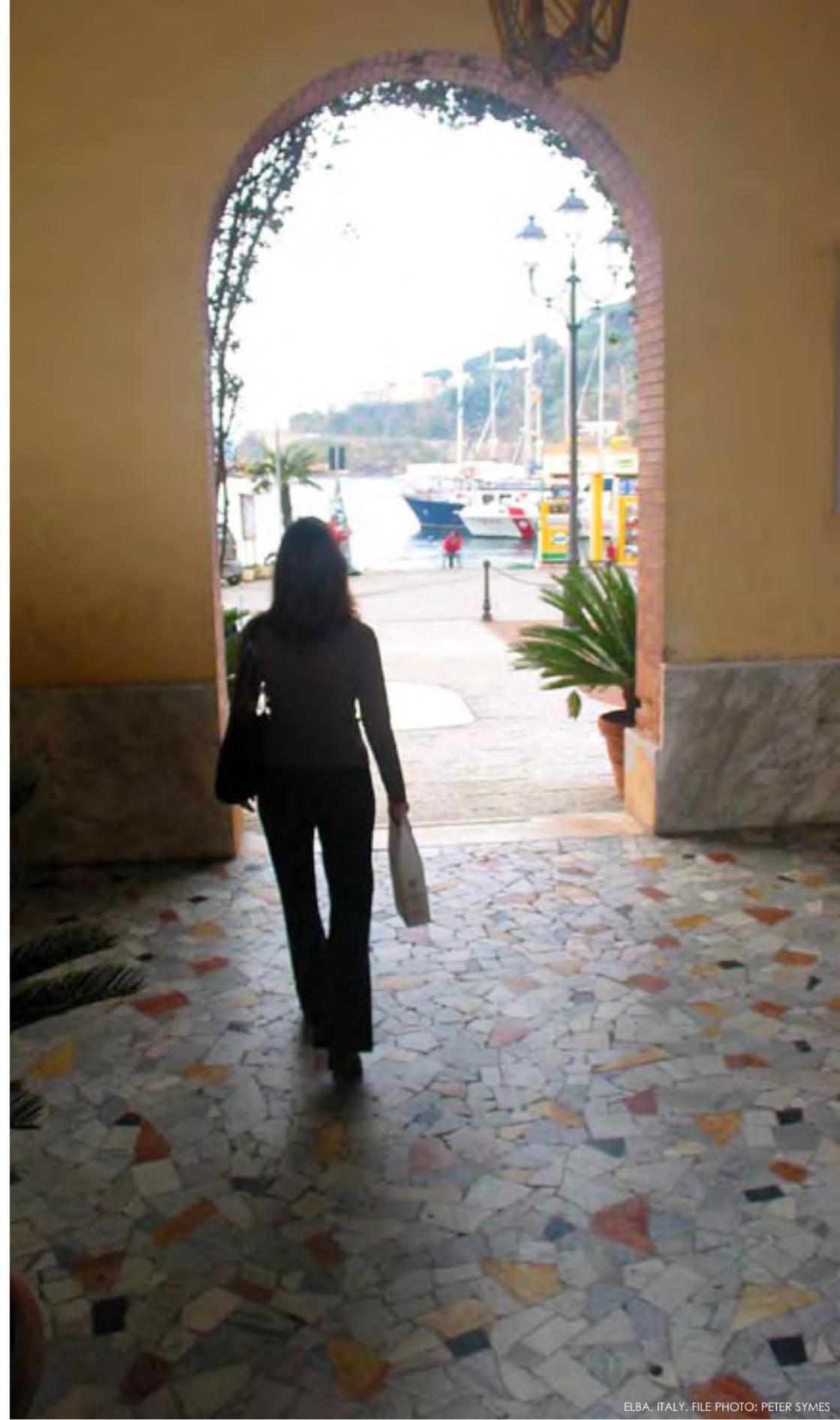
So, what do the "bad guys" look like? Yes, there really are men who set out to prey on women travelers. They typically fall into a few basic categories that will help you to pick them out.

The Silent Type: This man is the one who seems to be constantly where you are. They'll trail you for a couple of hours, trying to make eye contact or get recognition from you. They may even try to start a conversation. This gentleman can be annoying, but normally is not a danger. To deal with Mr. Silent, ignore him and avoid eye contact, while keeping an eye on the situation



FILE PHOTO: PETER SYMES

A woman diver explores the wreck of the *Island* in Storebelt, Denmark



ELBA, ITALY. FILE PHOTO: PETER SYMES

The world is your oyster if only you take just a few savvy precautions...

mermaid matters

at large. If this doesn't drive him away, consider going to a police station or hotel, and chances are he'll not follow.

The Crossing Boundaries Guy:

This man will start with questions. Maybe in multiple languages, if needed, until he finds the language that you speak. Again, if you ignore him, he'll probably go away. Note here, that not all gentlemen who try to engage you in conversation are dangerous. Brilliant stories abound about women meeting the love of their life on holiday. Just be aware that if the questions get too personal, dealing with where you are staying, are you traveling alone or other questions that make you feel uncomfortable, you should simply stop talking to him.

The Guide: This is the local native who offers the free boat ride, jungle exploration or simply a car ride. These types usually inhabit touristy destinations and can be easily dissuaded, as there are many other travelers for them to focus their attention on. Trust your instincts...if they seem creepy, they probably are.

If you find yourself the target of unwanted attention, you'll want to deal effectively with it. First, intuition is a gift that we have been given...embrace it. If that little voice says something's wrong, it's usually right. Don't let someone talk you into something you don't want to do. You are ultimately responsible for your decisions, make sure your decisions are the responsible ones for you.

Don't be afraid to ask for help

Worldwide, most people are eager to help travelers to their country, especially women going solo. If you're being followed on foot, the local police station or hotel front desk will gladly give you assist-



FILE PHOTO: PETERSYMES

Diving diva explores the wreck of *Dr Eichelbarn* in Storebelt, Denmark

ance. On a bus or train, ask a fellow passenger or driver for help. Men like playing the part of hero. It's in their wiring, no matter where they are from.

Leave your polite self at home

If you're being harassed or encroached upon, stop talking and ignore the person, while being aware of their actions. If you need to say "NO!", say it repeatedly and loudly to get your point across. If you're attacked, be loud and aggressive to show that you're not an easy target. Remember, the bad guys are not a hard working lot, and they like victims that don't require a lot of work.

Passport

The crown jewel of Canada, Vancouver Island, was only a quick trip across the border just a year ago. However, with the new passport regulations, I have found

that I need to have my documentation in order, to keep that trip fast and carefree.

Post 9/11, the tightening of border security and new passport requirements mean that as a traveler, you don't want to overlook pertinent details of the passport policies, only to find out when it's too late.

Mexico, Canada and the Caribbean were travel destinations that only required a birth certificate if you were from the US. However, the new Western Hemisphere Travel Initiative goes into effect on December 31, 2006. At that time, all US citizens traveling by air or sea, to or from Canada, Mexico, Central and South America, the Caribbean and Bermuda will need to possess a valid passport. And on December 31, 2007, the initiative will be extended to include land border crossings to these countries as well. So, the Caribbean cruise or ski trip to the popular Canadian Rockies will be accompanied

with a passport.

Without a passport, you will still be able to travel to US Territories, such as Puerto Rico, the US Virgin Islands, Guam, the Northern Mariana Islands and American Samoa. However, if you plan on hopping from a US Territory to a foreign region, such as from the US Virgin Islands to the British Virgin Islands, you will need a passport.

The State Department hosts an entire website dedicated to information about applying for passports, as well as the appropriate forms and a search engine to find a passport acceptance facility in your area. You can also find details about international travel and visa regulations. Or, you can call 877-4USA-PPT (877-487-2778) to request further information.

Cindy Ross is a dive instructor and writer dedicated to promoting the scuba lifestyle for women of all ages worldwide. For more information, please visit: Girdiver.com ■

A vertical advertisement for Scuba Seraya Resort. At the top, the text "Scuba Seraya" is written in a white, serif font. Below it is a circular logo featuring a red and white coral reef. Underneath the logo, the text "Resort" and "Tulamben - Bali" is displayed in a white, serif font. The middle section shows a photograph of a tropical resort with palm trees and a building. Below this photo, two bullet points are listed: "- Private beach, pool & luxury Villas" and "- Seraya Secrets hotspot for photography". The bottom section shows a photograph of a bedroom with a white canopy bed. Below this photo, two more bullet points are listed: "- In the heart of Tulamben's best dive sites" and "- Dedicated dive centre with 2 dive boats". At the very bottom, the website address "www.scubaseraya.com" is written in a white, sans-serif font.



Edited by
Michael Arvedlund, PhD

ILLUSTRATIONS BY PETER SYMES

Text by Michael Arvedlund,
Tyge Dahl Hermansen and
Peter Symes

The biology of **Stingrays**

Can they be handled?

*There are more
than 500 species
of rays and skates*

Stingray kills television host

The headlines soon spread all over the world when the famous Australian philanthropist and television host, "crocodile hunter" Steve Irwin, was recently killed by a stingray, also known as a whiptail stingray.

During the filming for a documentary, Steve Irwin was swimming along with the ray and apparently spooked it, causing it to raise its tail in defence. In a terrible instant, the sharp and serrated barb on the tail went into Irwin's chest inflicting a lethal injury by perforated his heart. Steve Irwin just managed to pull the denticle out before he lost consciousness, and soon after, he died.

Steve Irwin often took chances, yet, somewhat paradoxically, risk taking didn't lead to his demise. This time, he didn't do anything other than swim. Based on these and other similar conditions, it may be worth revising the belief that stingrays are harmless.

The 'sting', which gives these fishes their common name, is a modified dermal denticle mounted near the base of the tail, about one-third along its total length. The sting consists of a blade-like barb with serrations along both edges and a venom gland at the base. (see figure next page)

What kind of fish are stingrays?

Stingrays are rays, i.e. cartilaginous fishes related to skates and sharks. Rays and skates comprise a scientific so-called super-order of cartilaginous fishes named *Batoidea*.

Cartilaginous fishes do not have a skeleton of bone. Instead, it consists of cartilage, a type of dense connective tissue. It is composed of collagenous fibers and/or elastic fibers, and cells called chondrocytes, all of which are embedded in a firm gel-like ground substance called the matrix.

Over 500 species

There are more than 500 species of rays and skates in twelve families, including stingrays, skates, electric rays, guitarfishes and sawfishes (Box 1). The Batooids are closely related to sharks. In fact, in the early part of the Batooid life cycle, they look much alike young sharks. It is interesting to notice that there while there are only approximately 370 extant species of sharks—which is

over 100 less species than rays and skates—sharks have received considerably more attention than rays and skates, both from the general public and from the scientific community... at least until now.

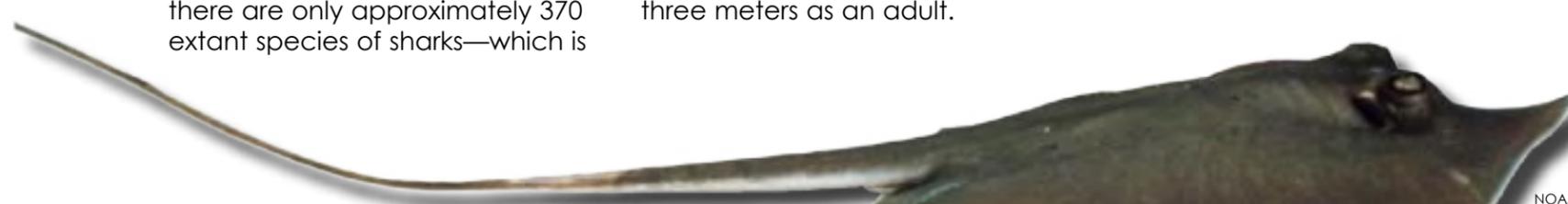
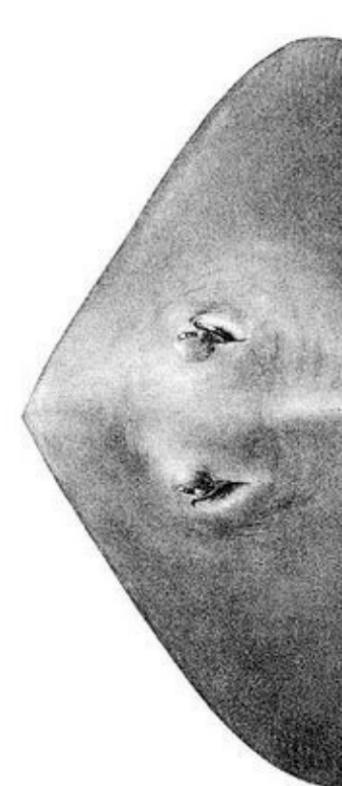
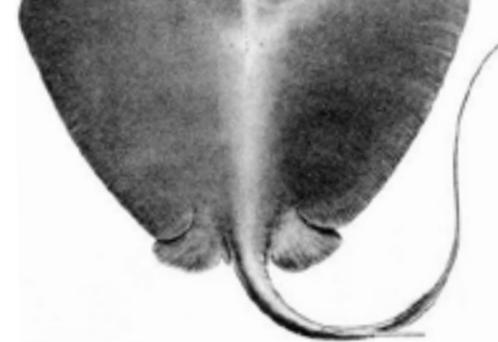
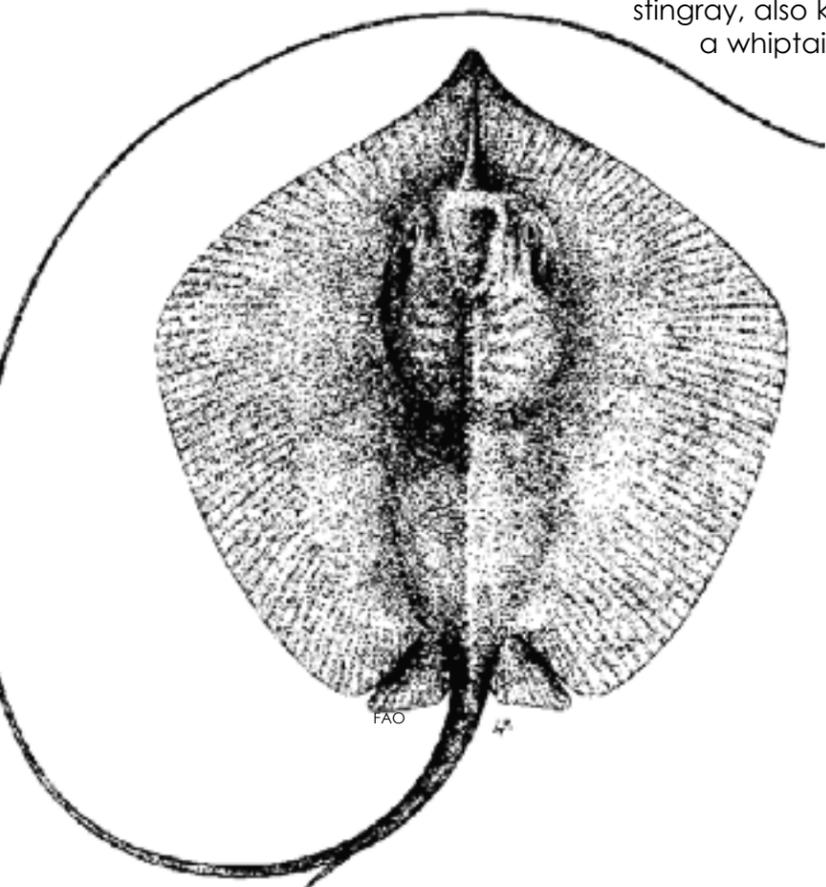
The Dasyatids

The scientific name for the family of stingrays, or whiptail stingrays, is *Dasyatids*. They are common in tropical coastal waters throughout the world. Freshwater species are also known from e.g. Asia and Africa. The species of the genera *Potamotrygon*, *Paratrygon*, and *Plesiopygion* are thus endemic to the freshwaters of South America.

Rays range in size from just a few cm to several meters wide. The smallest ray is probably the short-nose electric ray, which is the size of a pancake; it is only 10 cm across and weighs about half a kilo. The biggest ray is the manta, which can reach a width of over three meters as an adult.

Their habitat

Most species live on the sea floor, in a variety of geographical regions—many in coastal waters and a few species live in deep waters. Most batoids have a rather cosmopolitan distribution in tropical and subtropical marine environments or temperate waters. Only a few species, like manta rays, are oceanic, i.e. they live in the open sea. A couple of species are confined to freshwater. Some batoids can live in brackish bays and estuaries. Bottom-dwelling batoids breathe by taking water in through so-called spiracles, rather than through the mouth as most fishes do, and passing it outward through the gills. Their mouths and gills (like almost all rays) are located on the underside of their flat bodies making breathing an issue if you lie on or are more or less buried in sand. To overcome this hurdle they have developed extremely large



NOAA

The biology of Stingrays



PETER SYMES

A whiptail stingray lies buried in the sand, keeping a watchful eye on matters

has reached the point where they will eagerly accept scraps straight from the hands of tourists. Although these interactions have altered the stingrays natural behavior, there is no evidence that they have lost the ability to hunt on their own.



PETER SYMES

Stingrays are crawling all over visitors in Stingray City on Grand Cayman. This location is probably the island's biggest tourist attraction

spiracles (spiracles are the openings positioned just behind the eyes through which a shark or ray can suck in oxygen rich water to flush over the gills). Through this mechanism rays are able to remain motionless for hours at a time.

Many whiptail stingrays are restricted to marine habitats but some are known to migrate into brackish estuarine environments. A few species can live year round in both fresh and salt water. Whiptail stingrays are benthic. They spend much time buried with only their eyes sticking out. This is a defensive strategy rather than a stealthy way to surprise prey. Because they tire easily when swimming, remaining buried is the ideal way to avoid becoming lunch. Whiptail stingrays are heavily preyed upon by a number of shark species (especially by hammerheads). An exception to the benthic lifestyle is the pelagic stingray *Dasyatis violacea*. Although this ray can also be found on the

substrate it is a free swimming ray that preys on oceanic squid and mid water fishes, which it manipulates by holding them between its pectoral fins. Because of its unique behavior the Pelagic Stingray is sometimes categorized in its own genera—*Pteroplatytrygon*. Whiptail stingrays usually inhabit shallow coastlines down to 100 or 200 meters, but some species can be found at 600 meters or even deeper.

Diet

Most batoids have developed rounded teeth for crushing the shells of snails, clams and crustaceans and some fish, depending on the species of ray or skate. Manta rays are plankton feeders. Whiptail stingrays known to eat mollusks, crustaceans, jellyfish, and bony fishes. The recorded stomach contents of one honeycomb stingray included: eight threadfin bream, three mackerel, eight ponyfish, eight cardinalfish,

three sardines, three anchovies, two flatfish, one mojarras, four flatheads, three pufferfish, five squids, two crabs, and two mollusk shells!

Whiptail stingrays are known to gather at fishermen's fish cleaning stations to take advantage of the scraps that end up on the seabed. In some locations, such as Stingray City in Grand Cayman and Hamelyn Bay in Western Australia, their tolerance towards humans

Stingray City tours are now a multimillion dollar industry that attracts hundreds of tourists daily. Although the large Southern Stingrays get quite aggressive while they are competing for handouts of squid, they rarely harm the tourists, preferring to back off when trodden on rather than use their defensive tail stings. Traditionally, stingrays were feared by fishermen and beachgoers alike, so the positive press that the rays receive from these encour-

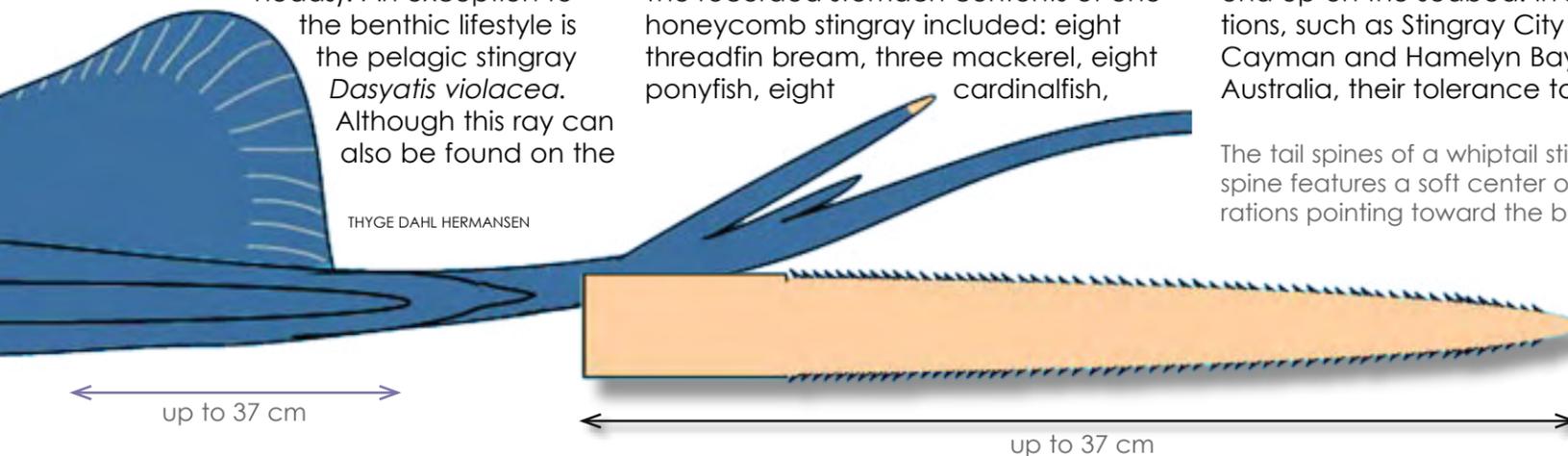
ters is a welcome change that may be a critical factor in their future survival.

Reproduction

The batoids are extraordinarily varied in their mode of reproduction. Most rays and skates are benthic, lying on the substrate for extended periods, often to some extent buried. Some forms, however (particularly the eagle, cownose, manta and devil rays) are secondarily pelagic, swimming strongly in mid-water and rarely resting on the bottom. Mating season occurs in the winter. When a male is courting a female, he will follow her closely, biting at her pectoral disc. During mating, the male will go on top of the female (his belly on her back) and put one of his claspers into her vent. Most rays are viviparous bearing live young in "litters" of five to ten. Therefore, batoid eggs, unlike those of most other fishes, are fertilized inside the female's body. The female holds the embryos in the womb without a placenta. Instead, the embryos absorb nutrients from a yolk sac, and after the sac is depleted the mother provides uterine milk. Skate egg cases are often rectangular with extended tendrils at each corner, which serve to anchor them to bottom growth (washed ashore, the empty cases are known as "mermaid's purses"). Fetal electrical rays (Torpediniformes) are nourished by protein-rich secretions from the uterine wall, while fetal stingrays (Myliobatiformes) get their nourishment delivered to them via secretions from pseudo-placentae that enter their bodies through the spiracles.

Are stingrays dangerous?

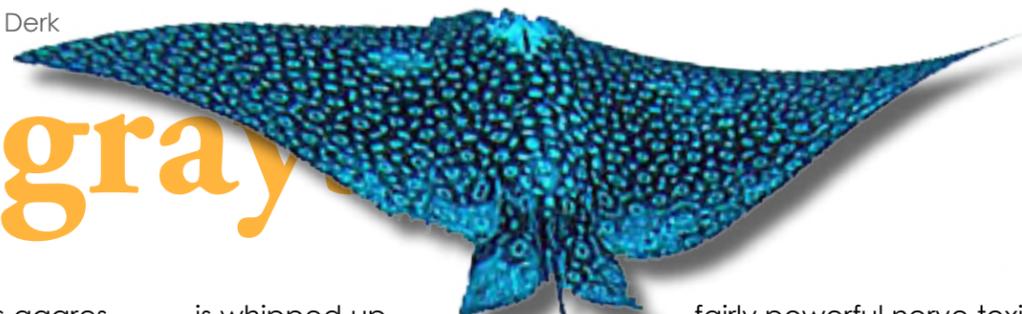
Stingrays are not, as their close relatives, the sharks, known for being dangerous. While sharks through history have worked up quite a reputation among other things thanks to their impressive denture, large



THYGE DAHL HERMANSEN

The tail spines of a whiptail stingray are actually highly modified dermal denticles. Each spine features a soft center of venom-producing tissue and an enameloid casing with serrations pointing toward the base. This is a feature that makes removal hard and painful for the unlucky victim. Like other dermal denticles, such as shark teeth, these stinging spines are replaced continually. Most stingray species have two such spines, each stemming from its own site on the tail and with its own cycle of development, growth and replacement. Substitute spines usually interchange between loci spread out by about half a cycle, so that one spine (the older) is typically larger and more worn than the other.

Stingray



bodies and sometimes aggressive behaviour the rays have rarely made much headlines and for a good reason. Rays do not present a direct threat to humans venturing into the water. Unlike sharks, they can't eat or bite us, nor do they usually display any aggressive behaviours but tend to mind their own business. But that doesn't mean that stingrays are not dangerous at all.

Like so many other animals, they can become defensive if they feel cornered or bothered and their stinging barb, a cartilaginous spine situated on the root of their tail, can inflict some nasty wounds.

Self-defence

Stingrays use their stinging spines only in self-defence. Dasyatids generally do not attack aggressively or even actively defend themselves. When threatened, their primary reaction is to swim away. However, when they are attacked by predators or stepped on, the barbed stinger in their tail

is whipped up. This attack is normally ineffective against their main predator, namely sharks. Humans are usually stung in the feet (depending on the size of the stingray). The stinger often breaks off in the wound, which is non-fatal to the stingray, and will be re-grown. Contact with the stinger causes local trauma (from the cut itself), pain and swelling from the venom, and possible later infection from bacteria on parts of the stinger left in the wound.

The 'sting', which gives these fishes their common name, is a modified dermal denticle mounted near the base of the tail, about one-third along its total length. The sting consists of a blade-like barb with serrations along both edges and a venom gland at the base. The serrae point toward the base of the spine, making removal difficult and very painful. The venom is a

fairly powerful nerve toxin which affects the heart in complex and dangerous ways. World-wide, several stingray-related fatalities are recorded every year - as sometimes occurs when a diver swims too close over a partially buried ray and is stung in the neck or chest.

As regards to Steve Irwin's fatal accident, it is widely regarded as an unlucky combination of unfortunate circumstances—a freak accident in other words—but it goes to show that divers and snorkellers should always keep a minimum distance from stingrays of one to two meters.

References

Hamlet, W.C. 1999. *Sharks, Skates, and Rays: The Biology of Elasmobranch Fishes*. The Johns Hopkins University Press.
 Froese, R., Pauly, D. Eds., 2006. *FishBase*. World Wide Web electronic publication. www.fishbase.org, version (07/2006).
 Nelson, J.S. 2006. *Fishes of the world*. 4th Ed. John Wiley and Sons Ltd. ■

Ray and Skate Taxonomy

Rays and skates (Batoids) are divided into three orders:

(A) Order *Rajiformes* (true rays)

Within the order *Rajiformes* are the stingrays (Family no. 2). They are named for the venomous spines along the tail; these contain a poison that causes pain and may cause symptoms such as nausea, vomiting, fever, chills, muscle cramps, tremors, paralysis, fainting, seizures, elevated heart rate, and decreased blood pressure (depending on the species). Some species' toxins and, or, sting can be fatal to humans.

1. Family *Anacanthobathidae* (smooth skates).
2. Family *Dasyatidae* (stingrays).

3. Family *Gymnuridae* (butterfly rays).
4. Family *Hexatrygonidae* (sixgill stingray).
5. Family *Myliobatidae* (eagle ray). The largest of rays, including the giant manta ray. Most eagle rays have one poison-carrying spine.
6. Family *Plesiobatidae* (deepwater stingrays).
7. Family *Potamotrygonidae* (river stingrays).
8. Family *Rajidae* (skates).
9. Family *Rhinobatidae* (guitarfishes). Contain a body structure similar that of the sawfishes, but are not thought to be closely related.

SEEING IS BELIEVING! NASA Puts More Ogle in Your Goggles!

Flat masks block over 75% of your natural field-of-view. Enjoy natural panoramic vision. See almost 5X more through a Double-Dome™ lens perfected with NASA technology. NanoFOG™ coating, applied at the factory, ensures fog-free dives. Only naturally nearsighted divers (broad Rx range) can use the MEGA® 4.5DD mask with their naked eyes. But over 700 divers around the world with 20/20 vision wear disposable contact lenses to use this mask. These divers become temporarily nearsighted. The incredible view is worth the effort. Endorsed by 1,000 eye doctors worldwide. **Older divers love the Magic Bifocal phenomenon. Seeing is believing!**

HydroOptix.

www.HydroOptix.com



Skate



Lesser electric ray

10. Family *Urolophidae* (round rays).

(B) Order *Pristiformes* (sawfishes)

Sawfishes are shark-like in form, having tails used for swimming and smaller pectoral fins than most batoids. The pectoral fins are attached above the gills as in all batoids, giving the fishes a broad-headed appearance. They have long, flat snouts with a row of tooth-like projections on either

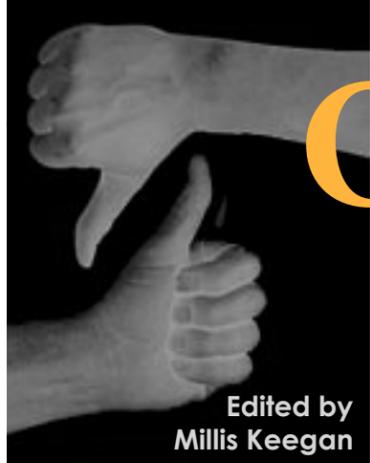
side. The snouts are up to 1.8 m long and 30 cm wide, and used for slashing and impaling small fishes and to probe in the mud for imbedded animals. Sawfishes can enter freshwater rivers and lakes. Some species reach a total length of up to 6 m.

1. Family *Pristidae*.

(C) Order *Torpediniformes* (electric rays)

Electric rays have organs in their wings that generate electricity, used to immobilize prey and for defense. The current is strong enough to stun humans.

- Family *Narcinidae*
 1. Family *Torpedinidae*



Edited by
Millis Keegan

Opinions Letters &

All perspectives expressed in this section are those of the individual author and do not necessarily reflect the views of X-RAY MAG, DiveGuru.Net, or their associates

Right or wrong?

We would like to think that divers bring to the water the notion of "take nothing but memories, leave nothing but bubbles". Traveling as much as we do here at X-Ray Mag, we find that that is not always true, and in many cases, bad behavior is encouraged by the dive centers and dive resorts. This time, we at Diveguru.net and X-Ray Mag want to bring up the subject of feeding fishes while diving, a popular activity to bring the marine life to the divers/snorkelers in a misguided attempt to enhance the under water experience.

At DEMA, we came across a few vendors selling the latest in fish feeding equipment—a squirt bottle with fish food. The sales pitch was that the food is safe for the fish, and the squeeze bottle promises

a safe encounter since it squirts the food away from you, which keeps the fish from nibbling at you by mistake. All sounds good in theory, but we divers, we know better, right? We know that feeding the marine life teaches fish to associate human beings with food, which disturbs that very important balance on the reef, essential to the survival of species.

Our viewpoint is clear: only under a very few and specific circumstances, is it okay to feed the marine life.

What's your take on this?

Is it right or wrong to feed the marine life? Is it right or wrong for dive centers and dive resorts to enable fish feeding by selling these kinds of products?

Let us know what you think

Millis Keegan, editor



Good or bad idea? A squirt bottle with fish food meant to be brought on a dive was on display at the recent DEMA show, meant to be sold through resorts and dive centers

Thank you all, for your opinions on Terrorism and Diving and on the subject of DO WE EVEN CARE ANYMORE? Your comments show some real insight, knowledge and concern, and we would like to share some of them with you:

On Terrorism and Diving

I would intellectually agree with the sentiment that we should not let terrorism dictate nor control our lives. That being said, I personally believe diving can be dangerous enough without the added adrenaline of deliberately putting myself (or my loved ones) into a potentially dangerous arena.

One of the goals of the terrorists is to cause abject disruption of all aspects of the targeted society. The terrorists care nothing about life —yours or theirs. The terrorists care nothing about your brand-new dive wing or regulator. The terrorists care not whether you dive split fins or use the long primary hose. The terrorists want you dead.

We, the casual traveler and visitor, can do nothing to prevent the terrorists. But, if sufficiently motivated, governments might. I can choose to spend my dive vacation funds where I like, and I will not be supporting any element of a nation or a people that choose to "look the other way" where terrorism is concerned. I know this attitude hurts the "little guy", the hotelier or dive shop, whomever, but maybe, just maybe, this form of economic pressure can generate sincere local pressure from within, and maybe THAT can persuade governments to get more serious about the matter. As when underwater, I will not be holding my breath! Thanks for a great Magazine!!

Bill Hilson, professor,
Pratt Institute, New York, USA

We, the casual traveler and visitor, can do nothing to prevent the terrorists. But, if sufficiently motivated, governments might.

What do you think?

Get heard! Send us you opinion to diveguru@xray-mag.com by Jan 10, 2007, and get a chance to win these exquisite *Silver Hammerhead Cufflinks* generously sponsored by **ReefJewellery.com**



Dahab, beach promenade

I just read the letters about diving in Egypt and had to reply. My girl friend and

I were on a

trip to Egypt in February. We spent three days in Dahab, and while we were there, we ate at the restaurant Al Capones; it is one of the places where bombs went off and killed people. While we were there, we found all the people there to be extremely friendly and got to know the staff as well as you can in a couple of days. If we weren't on the beach or diving, we would be

I was asked a week after the bombing if I would return. I would have left in an instant and still would.

found at the restaurant. One of the people that was killed there, was a very friendly man that worked the entrance. He would joke around with us and was a joy to see and talk to. It is a great shame that innocent people are dying. As far as traveling back there, I was asked a week after the bombing if I would return. I would have left in an instant and still would. Yes, it is important to watch where you are going, but if I was to worry about anywhere a bomb might go off, or an act of terrorism happened, I may as well stay at home. Thanks,

Ron Cooper
TransAlta Utilities, Poplar Creek Power
Fort McMurray, Alberta, Canada

Do We Even Care Anymore?

We asked this simple and straightforward question in a past issue.

From Jim Culter:

Actually, a very complicated question. The simple answer is some care and some don't. Some readers have an altruistic response while others express the rather myopic juvenile opinion that the only thing that matters is personal gratification and anything that interferes with personal consumption is either a fallacy or a conspiracy.

The human species has a difficult time relating to global issues or even regional issues of ecology. Unfortunately, education has not enabled the general population to logically assess these issues. There is a great paradox present in the role of the human species on the quality of life on earth. The actions of a single individual on consumption of materials, food, energy, conservation, are of no consequence on a global scale. However, as a species, our combined effect is changing the fundamental nature of the earth's biosphere. So, the statements, "It's not my fault" and "It's my fault", are both true as odd as that seems.

As a species, we have not yet developed a sense of global scale. For millions of years, the human species had relatively small effects on the planet, and by most measures, the earth was infinite in size and resources. However, all of this changed with the advent of agriculture and subsequent industrialization. Suddenly, an individual in concert with billions of other individuals was capable

Opinions

Letters &

LONNIE THOMPSON, BYRD POLAR RESEARCH CENTER, OHIO STATE UNIVERSITY



Ice Core sample taken from drill

of depleting resources, creating toxic substances and causing global ecological changes. At present, the human species is the most important organism on the planet, because we are altering the fundamental ecological conditions that enabled mammals and humans

to evolve and nurtured our success as a species. It should be pointed out that the current world climate conditions have been relatively stable when compared to larger time scales. Now, we are irreversibly tinkering with and changing the climate conditions that fostered human life.

The implications of these changes are onerous, and we cannot predict the outcome. We imagine that we will be able to adapt to a changing planet,

one that could be quite different from today's conditions. This may not be possible. The latest information indicates the effect of green house gases on global warming may be underestimated. Also, the rate of change in global habitats associated with the effects of climate change has been happening faster

than originally predicted. Studies of ice cores have indicated that there may be climatic trigger points, and when these points are reached, there are profound global climate changes that happen rapidly, on the order of decades rather than centuries or eons.

Sadly, the human species is its own enemy. The basic tools needed to create a sustainable society are simple: reduce the number of humans on the planet through family planning and access to birth control, practice sustainable agriculture, utilize renewable energy sources, stop contamination of the environment with persistent toxic substances.

I do not have much hope that such things will happen. Sadly, the "Tragedy of the Commons" continues to be the norm for humanity. (If you do not know what this means, look it up. Wikipedia is a good start.)

Jim Culter, Staff Scientist
Center for Coastal Ecology Benthic Ecology Program
Mote Marine Laboratory
Sarasota, FL

Sadly the human species is its own enemy.

NASA



Hurricane Catarina as seen from the International Space Station

About Hurricanes

Living in the relatively hurricane free UK tends to make us unaware of the true suffering of those countries that suffer the consequences of a very strong blow. On a recent trip to Grand Bahama (last February), I was amazed at the destruction still very much apparent after two years of bad hurricanes. Desolate, abandoned and derelict hotels and half empty shopping malls seemed to be the norm. So many locals out of work with little or no prospects gradually slipping nearer the bread line. Yet, most of the dive sites were still in good condition. So, why all this desolation and depression? It would appear that as soon as we softies hear of hurricane damage, we immediately cancel our holidays, pack our bags and go elsewhere. Thus, island communities not only suffer from nature but from a great drop in tourist revenue, which prohibits repairs, which means less tourism, which means less dollars, and so on. I even spoke to an American friend of mine who put it: "When I vacation. I like comfort. So, buddy, repair your island, and we will return." Surely, a very cynical and selfish approach.

What these communities need is not for us to neglect them, but for us to continue as before. They still have rich natural beauty for us to see. They still have wonderful undersea sites to visit, and most of all, they still have a great population who would welcome us tourists and our dollars. Despite the damage, Grand Bahamian people showed me great hospitality and displayed great resilience.

Brian Naylor
United Kingdom

What these communities need is not for us to neglect them, but for us to continue as before.

How to Dive With a Dry Suit ... or Not

I have read several issues of your magazine and quite enjoy the articles. I have found them very informative up to now, but feel I have to write to you about the article on how to dive with a drysuit. The author of the article recommends diving with a BC, but only using the BC inflation at the surface or in an emergency. This is both incorrect and dangerous. A drysuit should have just enough gas to prevent a squeeze and allow the insulating material gas to insulate. To use the additional gas required for buoyancy especially on deeper dives results in, at best, difficulty maintaining proper trim when shifting position in the water, and at worst, makes an uncontrolled foot first ascent a very likely possibility. I do not know of ANY technical diving training agencies that recommend this technique for dry suit diving and would suggest someone look into this and submit a follow up on how to use a drysuit.

Yours Truly,
Jeffrey Mark, no adress supplied

Millis Keegan, Training Editor replies:
Well Jeffrey, as with most things, there are more than one way to do things right. While recreational dive training agencies do recommend performing your buoyancy control the way the article described it, technical diving procedures are different. But although the article did not target technical divers, I believe you have a point. There are indeed differences and they should be highlighted.

Drysuit article in X-Ray Mag #13 created some debate



We approached NAUI, PADI, IANTD and ANDI for a comment and got swift replies from ANDI and PADI. This doesn't imply that NAUI and IANTD has chosen not to comment but, in all fairness, I must emphasize that the lead time we gave everybody was very short. We thank ANDI and PADI for their reply, which I believe clearly shows the different procedures between recreational and technical diving—and may no one confuse one with the another!

ANDI, technical training agency writes:
There are different procedures on how to use a dry suit and a BCD, depending on if you dive recreationally or technical, and it is important to know the difference. Technical divers are highly trained to use extra equipment while diving and they are probably capable of handling two buoyancy devices or more. However, to adress the issue issue in question:

Recreational training agencies tend to teach the diver to use the drysuit as a buoyancy device, feeling the diver is incompetent to control two buoyancy sources. When diving with more than just a single tank, this is outright dangerous.

Think of the following scenario: You have enough gas to offset 22lbs (10kg) of negative buoyancy—this is a fairly large gas bubble. You now orient yourself away from the prone position with a head up attitude. Unless your neck seal is tight, you WILL burp gas out of the neck seal and quickly become negative. Using the drysuit as a buoyancy device is only done during emergency procedures IF

Opinions



FILEPHOTO: ADAM BUTLER

Drysuit and/or BCD for main bouyancy device? It all depends it seems. Photo is of Leigh Cunningham and Mark Andrews during their record dive to locate the *Yolanda* wreck

*The proper procedure (...)
is to just add enough gas into the drysuit to manage squeeze and manage buoyancy with the wing/BC.*

When I conduct rebreather training, we now have **three** gas spaces to manage: BC(wing), drysuit and the breathing loop. Divers who were trained to use the drysuit for buoyancy have all sorts of trouble until I can retrain them on how to correctly use a drusuit. I have trained sev-

eral Instructors from agencies like PADI that teach drysuit diving as a specialty, that I have had to retrain because they can't maintain the proper orientation and buoyancy control.

The procedure using a drysuit for buoyancy is OK as long as the diver does not have to overcome a large negative buoyancy or have a large buoyancy shift during the dive. Neoprene drysuits are especially bad here...

Joe Radomski, ANDI ITD#10

your wing fails.

The managing of two or more buoyancy sources takes a bit more work, but once mastered, the diver's buoyancy control is superior to that of a diver using just one source (such as the drysuit) for buoyancy.

The proper procedure when diving with multiple tanks (and also better even with a single cylinder—it is just a bit harder at the beginning) is to just add enough gas into the drysuit to manage squeeze and manage buoyancy with the wing/BC.

There are several reasons why using the drysuit for buoyancy is dangerous. First, the amount of gas needed to offset additional negative buoyancy calls for a large volume of gas that causes a gas bubble to move around. With additional gas, it's impossible to dive with head slightly down and feet up without ending up with too much gas in the boots. Whereas, using just enough gas to eliminate squeeze, this attitude is easy.

PADI, recreational training agency writes: There are no rules that forbid anyone to use both a BCD and a dry suit for buoyancy control while diving, but for recreational divers using a dry suit, we recommend the following:

1. **Get proper dry suit training.**
2. **Use your BCD on the surface for buoyancy, and if necessary, to help if a dive buddy in distress needs extra buoyancy.**
3. **Use your dry suit for buoyancy control while diving.**

The reason is to keep air in the suit for warmth and comfort and to avoid a squeeze. There will always be some divers, in particular before they develop more experience with dry suit diving, that will keep just enough air in their suits to avoid squeeze and use the BCD for buoyancy control. That can cause problems for the same unexperienced divers that have to deal with two buoyancy devices during ascent, which can lead to an uncontrolled ascent. If the diver uses too much air in the suit as mentioned in the letter, he/she carries too much weight, and has not done a proper buoyancy control before the dive.

About technical diving and how to use a dry suit... They might recommend other techniques that will work better for their equipment configuration and type of diving, and I leave that up to them to answer.

Michael 'Mox' Moberg, training director and regional manager for PADI Nordic



FILEPHOTO: ADAM BUTLER

Granted, it is not always that the bouyancy from the drysuit is enough, or the right means. But everything needs to be seen in the right context

And the winner is...

What is the Best Environmental Organisation we asked? Our readers pointed to GREENPEACE as their favourite. Here are some of the arguments.

I suppose Greenpeace for its longevity and international focus along with the ability to engage media coverage. I say "suppose" because I'm not sure what measures one might use to gauge effectiveness. Perhaps climactic changes will do the most to promote awareness in the long run, being so much more "in-your-face" with consequences.

Lance Evingson

No adress supplied

For me, it is Greenpeace. I appreciate the level of dedication and, at times, agressive stance they take in an effort to actively prevent environmental destruction. Case in point is the stance Greenpeace takes on commercial whaling. For their effort against the commercial whaling fleet, Greenpeace gets my vote (and my money).

Kristjan Snorrason,

No adress supplied

I think Greenpeace is the best Environmental Organization due to the fact that they are global, important (attract media attention) and extremely brave (some of them have died on operations).

Mario Mizrahi S,

Mexico

I would have to say that Greenpeace is the best and most visible environmental groups in the world and does the



GREENPEACE / DORREBOOM, LORETTA

Greenpeace's SV RAINBOW WARRIOR in full sail between Majuro and Ebeye in the Marshall Islands.

best job of protecting the environment. Although some may think Greenpeace's methods extreme, they are effective. Greenpeace is an international organization that focuses its efforts on worldwide threats to biodiversity. They have served to protect both the terrestrial and marine environments. They are highly visible in the media and their efforts spawn awareness of environmental problems from ocean dumping and whaling to clear-cut logging practices. They also encourage sustainability practices and promote awareness of global climate change.

Tom Carlson

Tacoma, Washington, US

Sharing second place is WWF and PADI

I think PADI Project AWARE does the best job as it focuses on protecting our oceans, coasts, reefs, fresh water lakes, etc. As our sport grows in popularity, more of us will become AWARE of our environment and make conscious efforts to keep it clean. This will go a long way in protecting the seas for future generations. Thank you,
Jim

PADI. Before diving, I was only vaguely aware of environmental issues. During my Open Water course, I was made aware of deeper concerns and the negative impact we have on our environment and that by following a few recommendations and respectful diving practices, we can positively influence and help reverse some of the damage inflicted.

I have witnessed many PADI professionals give advice and knowledge to hundreds of divers. I would like to believe they are thus respectful of the environment in which they exist and go on to help educate the people they interact with. I know I do.

Tony Williams
United Kingdom

My nomination for the organization that does the best job protecting the environment goes to WWF Global Network. For full explanation of this tough choice see the attached file. Here is a summary:

The WWF launches large scale operations that yield large scale returns. With thousands of world wide events and tasks yearly they have left legacies for generations to come. The mere size and reputation of WWF empowers them to be heard and influence policy and corporate behavior around the globe.

WWF works on many levels. With the help of partners WWF seems to aspire to treat both symptoms as well as try to solve underlying causes. Their environmental programs go hand-in-hand with their social programs. They also have a large educational program that teaches others how they also can make a difference in the future of our planet. These factors make them stand out amongst the environmental organizations. Luckily, they are closely followed by many other organizations.
Sincerely,
Laurits Thomsen

Other Organisations Mentioned

The Cousteau Society, The Nature Conservancy

I believe that the Nature Conservancy does the best job in conserving our environment. Not only does the Conservancy protect the lands and waters of our great country, but all around the world as well. Without a doubt, the most important aspect of this organization is that it completely shelters a special place. For instance, when a coral reef is in danger of being polluted or ruined for one reason or another, the Nature Conservancy acquires everything from the headwaters of the estuarine rivers to the reef itself, so the area is totally protected. Thanks,
David Ward
Lakeland, Florida

About the DiveGurus

Millis Keegan, owner and founder of www.diveguru.net, the homepage that answers questions for divers, snorkelers, anyone with a love for our oceans, is a new member of X-Ray Magazine. With the help of reputable experts www.diveguru.net will find the answer.

It's called
Earth Day.

That's not to say
we need to treat it
like Dirt Day.



The daily journal of life in and around water
UnderwaterTimes.com



After more than thirty years, we thought it was time that the other 72% of the planet got some attention. Which is why we're asking people to Dive In To Earth Day the week of April 22nd. So grab some friends and install a mooring, do a reef survey, or organize an underwater cleanup. Everybody into the water. For more information, visit www.coral.org or call (415) 834-0900.





whales & dolphins

Edited by Peter & Gunild Symes

Humpback Whales Have 'Human' Brain Cells

Humpback whales are probably much smarter than they have been given credit for. US researchers have just discovered a type of nerve cell called a spindle neuron in the cortex of their brains, in areas comparable to where they are seen in humans and great apes. The finding may help explain some of the behaviours seen in whales, such as intricate communication skills, the formation of alliances, cooperation, cultural transmission and tool usage, the researchers report in *The Anatomical Record*.

Although the function of spindle neurons is not well understood,

they are thought to be involved in learning, remembering and recognizing the world around oneself. The researchers found spindle neurons in the same location in toothed whales with the largest brains, which the researchers said suggests that they may be related to brain size. Toothed whales such as orcas are generally considered more intelligent than baleen whales such as humpbacks and blue whales, which filter water for their food.



"It is important to note in this context that sperm whales, killer whales, and certainly humpback whales, exhibit complex social patterns that included intricate communication skills, coalition-formation, cooperation, cultural transmission and tool usage," the researchers wrote. ■

Manatees May Also Be Smarter Than We Think

Manatees have generally been viewed as cute but somewhat dimwitted creatures incapable of doing anything more complicated than chewing sea grass. But new



Whales And Dolphins Show Many Distinctive Human Traits

More scientific evidence is piling up that whales, dolphins and porpoises are truly extraordinarily intelligent creatures. According to a new review of the scientific literature by Mark Simmonds, director of science for the Whale and Dolphin Conservation Society. A growing number of studies strongly suggest that whale and dolphin brainpower is matched only by the higher primates, including man,

For instance, captive animals have been shown to be able to recognise themselves in a mirror, which was previ-

ously known to be the domain only of humans and the great apes.

Dolphins can also "point" at objects with their heads to guide humans to them, and they can also manipulate objects spontaneously, despite their lack of fingers and thumbs.

There is a well-documented use of tools in an Australian population of wild Indo-Pacific bottlenose dolphins, which are often seen carrying sponges on the ends of their beaks, probably to protect them whilst they forage in the sediments on the sea floor where

spiny sea urchins might otherwise cause puncture wounds.

They show remarkably human-like emotions, ranging from joy to grief to attentive care of the hurt. Mr Simmonds quotes a case of a 30-strong pod of false killer whales which remained with an injured colleague in shallows for three days, exposing themselves to sunburn and the risk of stranding, until the injured animal died. And there is an "emerging but compelling argument", that some species exhibit culture—information or behaviour that is acquired through social learn-

ing. This may range from the complex songs and calls to foraging strategies.

Where the jury is still out, Mr Simmonds says, is on whale and dolphin language. "What were previously regarded as 'living marine resources'—and typically, widespread species distributed across an inexhaustible sea—should now be recognised as unique individuals, communities, societies and cultures and valued as such."

It means that the potential impacts of whaling may be far greater than they appear, and we should make a new approach to the conservation of these species which takes into account their intelligence, societies, culture—and potential to suffer. ■

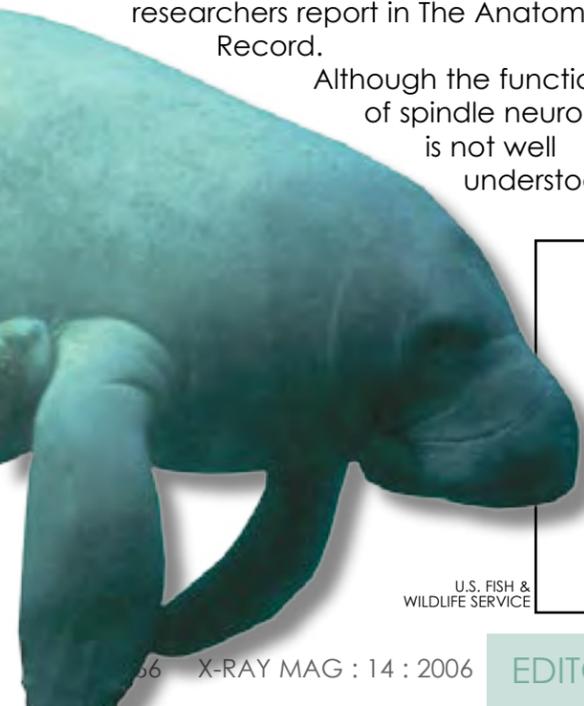


research under way at MOTE Marine Laboratory suggest otherwise.

Here, manatees in tanks have been trained to respond to whistles and stop at underwater targets. At the sound of a buzzer, a 1,300 pound manatee will aim his whiskered snout toward one of eight loudspeakers lowered into the water. Pointing out the correct speaker earns him treats—sliced apples, carrots and

beets for correct test responses—revealing that manatees aren't so stupid after all. The buzzer experiments are hearing tests in which the tones gradually grow shorter and softer. The researchers want to know: At what distance can the manatees hear a boat's propeller churning in the water and can they determine where the sound is coming from? Despite recent findings that suggest the

animals hear well enough to avoid boats, researchers are not sure why manatees keep getting hit. They could be surfacing to breathe while sleeping, or they may have grown too accustomed to the sound of boats. At least 75 manatees have been killed this year in collisions with watercraft, according to the Florida Fish and Wildlife Conservation Commission. ■



U.S. FISH & WILDLIFE SERVICE



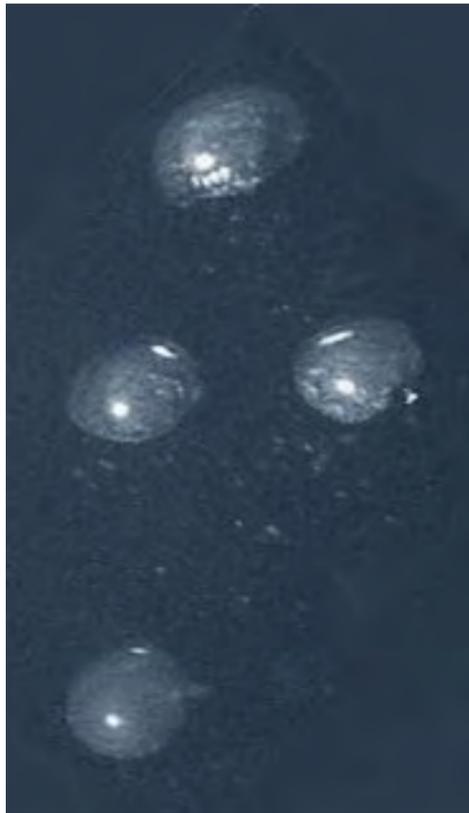
PHOTO COURTESY COLIN D. MACLEOD, UK, CETACEAN SOCIETY INTERNATIONAL

Deep Diving Beaked Whales Suffer The Bends

New research reveals that beaked whales dive deeper than any other air-breathing creature, yet can experience decompression sickness when diving in shallow water. The medium sized toothed whales can reach lengths of 4 to 14m and can dive as deep as 1,900m for up to 85 minutes.

The research funded by the U.S. Office of Naval Research and Woods Hole Oceanographic Institution (WHOI) was important because it is thought that naval sonar exercises may contribute to the whales' decompression sickness.

A study conducted by WHOI, the University of La Laguna in Spain, the University of Aarhus in Denmark, Bluwest and the Nato Undersea Research Centre in Italy focused on two species of beaked whales, Cuvier's



beaked whales (*Ziphius cavirostris*) and Blainville's beaked whales (*Mesoplodon densirostris*) in Italian and Spanish waters using a non-invasive digital archival tag or D-tag developed at WHOI by one of the authors, engineer Dr. Mark Johnson.

Whales of these two species have been found stranded in mass during naval sonar exercises. Results of the study suggest that the extreme diving of the beaked whales does not seem to put them at greater physiological risk for sonar exposure. However, their behavioral response to sonars seems to play an important role.

Scientists say more research is needed to learn more about this little understood species in order to prevent more incidents of accidental exposure to bay sonar.

SOURCE WHOI ■

Narwhals' song explained?

Marine biologists from Woods Hole Oceanographic Institute in the U.S. have found preliminary evidence that narwhals produce signature vocalizations that set individuals apart.

In a paper published in the September issue of Journal of the Acoustical Society of America, Ari Shapiro and colleagues write that these narwhal vocalizations by might facilitate individual recognition or their reunion with more distant group members. Narwhals are found in Arctic waters and can migrate thousands of miles in large numbers with subgroups moving in a coordinated fashion.

"Many unanswered questions remain about narwhals, and understanding their vocal communication will provide insights into their social behavior," said Shapiro. Shapiro said he also plans to study vocalizations and movements of free-ranging killer whales in Norway this November.

SOURCE: JOURNAL OF THE ACOUSTICAL SOCIETY OF AMERICA. ■



NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Mapping East Africa's Dolphins

For the first time ever by the straits of Wasini, an international research body, Global Vision International, has set up base in the village of Mkwiro to study the dolphins. "There has been no research on dolphins off the East African coast," says Graham Corti, expedition manager with Global Vision International. "Hence there is nothing published."

"Our principal reason for partnership with the Kenya Wildlife Service (KWS) is to quantify our research on the dolphins," continues Corti. "Everyday, we patrol the area around Kisite-Mpunguti, and the peninsula of Shimoni and towards Funzi Bay," In total, this covers an area of about 100 square kilometres.

In the expedition are two KWS rangers going through the whole exercise. "We have KWS working with us. By training the KWS officers, we will be able to give KWS the tools to see the patterns of dolphin movement and behaviour. KWS can then use this information to base its management decisions on," says Corti.

The photo identifications and the Global Positioning System (GPS) recordings complement the surveys that record the impact of the tourist dhows on the dolphins' behaviour. "We watch how the dolphins breathe, as in do they take shallow or deep dives. We know from the shallow dives that they are passing through but when they take deep dives, they may be feeding."

Today, the impact of tourism is on the increase as more people travel globally to far flung areas of the world in search of new vistas. **Nobody can doubt the importance of the tourist dollar. However, it is also more obvious today that if we do not manage our natural resources well, then even the tourist dollar cannot bring back the disappearing wildlife or degraded natural ecosystems.** ■

Rare Dolphin's Breeding Area Discovered

A group of the rare Risso's dolphins including offspring was sighted off the tip of the Llyn Peninsula of Bardsey Island in the UK.

Researchers from WDCS said the unusual sighting suggests that the location is a potentially important breeding area for the Risso's dolphins and more investigation needs to be made to understand the dolphins habitat use, information

which can inform conservation plans to protect the species from extinction.

The research was funded by the Countryside Council for Wales' (CCW) Species Challenge Fund.

More information about the Risso's dolphins and the threats facing dolphins, whales and porpoises in general, please visit www.wdcs.org. SOURCE: WDCS/CCW ■



Risso's Dolphin, *Grampus griseus*

WIKIPEDIA

Pollution And Ocean Debris Worse For Whales Than Hunting

A new study shows global warming and pollution will have a greater impact on whale populations than hunting. An estimated 300,000 whales, dolphins and porpoises die each year from entanglement in fishing gear, making fishing gear the single greatest human-related cause of cetacean mortality, according to the National Oceanic and Atmospheric Administration.

When whales get caught in lines, their ability to swim is hindered, which can result in drowning or vul-

nerability to ship collision. The lines also can impede the whale's ability to feed, leading to starvation, or can cause physical trauma when the skin is cut, leading to infection and death.

Meanwhile, researcher Mike Iliffe says commercial whaling issues are dominating the International Whaling Commission (IWC) at the expense of the real threats to the mammals and to the point where the polarisation of the pro-whaling and anti-whaling groups is making the commission dysfunctional.

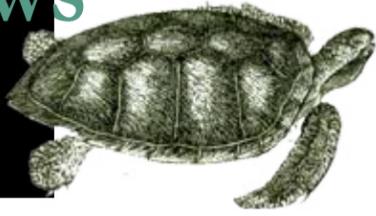
"Pollution may be killing 10 to 20 times as many whales as the Japanese, the Icelandics, the Norwegians and the aboriginal whalers together are killing right now. The debate has been impoverished because of an excess of emotion over rational argument," Dr Julia Jabour added.

"When you listen to some of the arguments that the anti-whaling countries put forward they are based on cultural or moral high ground and I would suggest that that's pretty shaky ground to be on." ■



Turtle news

By Kurt Amsler



“One is only willing to protect what one actually knows”

Author and world renowned photographer Kurt Amsler is the founder and primus motor behind SOS-Seaturtles

The Indonesian island of Bali has been known as a hub for the trade of sea turtle for over two decades. The buyers of turtle meat, shells and eggs are mainly found in the Asian markets as well as in Indonesia itself. The meat and eggs of the turtles are not meant for feeding the poor, rather they are status symbols in more affluent societies with turtle shells being

used for jewellery and ornamental objects for sale to tourists. All of which are unnecessary objects, for which hundreds of thousands of turtles have to lose their lives.

All eight species of sea turtles are threatened by extinction and therefore under strict protection as set forth by CITES, the Convention of International

Trade of Endangered Species. Nevertheless, the number of these magnificent animals—who have inhabited our oceans for over 150 million years—is dwindling. Until four years ago, in Bali alone, an annual average of 25,000 sea turtles were brutally cut out of their shells alive! As a result of several campaigns initiated by the Indonesian ProFauna and SOS-



SOS-Seaturtle Campaign **Stopping The Killing And Trade On Bali**



Seaturtles, this number has dropped to around 3,000 a year. However, as sea turtles are threatened by extinction, every single spared animal is important in order to preserve the population.

The brutal slaughter of sea turtles in Bali

The killing of sea turtles in Indonesia is more than just a national problem, it has already been decades since the local population of sea turtles in the Balinese waters collapsed. The animals now being butchered in Bali are caught all around Indonesia, Borneo, Malaysia, Sipadan and off Northern Australia. After months of grueling transportation, during which their

front legs are pierced and tied up, the animals stacked on top of each other in the hull with no food or water, they finally end up in Bali. Herded together in cages, they await their horrifying end here before delivery to the national or international market.

The brutality of the killing is unimaginable: With a sharp knife the lower tortoise shell is separated from the upper one while the animal is still alive. Next, the butchers slowly disembowel the turtle without paying any attention to the unbelievable pain inflicted on the helpless and tortured animal. The agony can last up to half an hour—a total horror, when you consider that sea

turtles have a highly developed nervous system and are unable to cry.

The new Campaign

The objective of the new campaign is similar to what we did the first time and it did work very well. With letters of protests, signatures and statements, we want the relevant authorities of Bali and Indonesia to be aware that people from all over the world will once more focus on Bali's sea turtles and call upon the government to stop their slaughter now and forever. At the moment, Indonesia and Bali are both struggling for every single tourist. Tourism is very important for their econo-





sary footsteps which allow the PROFAUNA members to put pressure on officials and police to crack down on the turtle mafia in Tanjung-Benoa. A so-called "Turtleweek" in Denpasar, the main town on Bali, with public statements and media conferences with visiting journalists and TV-crews from Europe and representatives of tour operators, is planned for April 2007.

Everyone can help

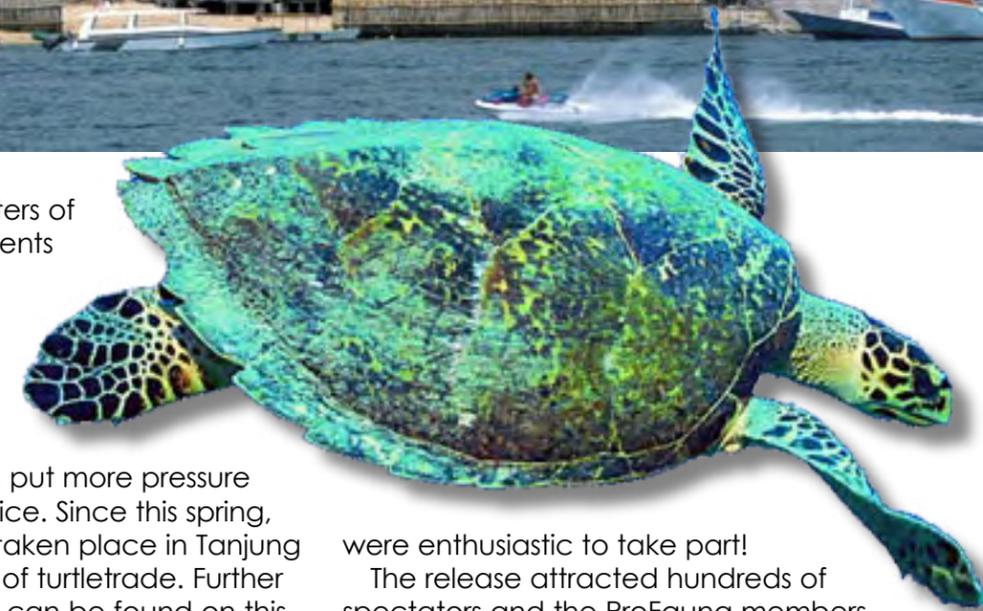
We have chosen a new, more updated means of communication to broadcast the present campaign and to transmit the signatures, statements and letters of protest. With the internet replacing the former brochures and petition sheets, everything can be done online! Everyone in the world will be able to get instant information about the the Seaturtles campaign through one mouse click on: www.sos-seaturtles.ch. Here you can sign petitions and e-mail pre-printed statements straight to the relevant government organizations. We are convinced that by these direct means of communication, we will reach far more people and therefore get more signatures and more statements.

Latest news from Bali

The new campaign was launched in March 2006. Numerous hardcover and online magazines have published articles and placed banners with direct links to: www.sos-seaturtles.ch on their homepages as well as diving manufacturers and enterprises that are related to the ocean. Until now the Governor of Bali has received



mies, and anything that may harm their image is subsequently taken seriously. This is the best leverage to obtain the full attention of the authorities, although we intend to use more pressure and less diplomacy this time. These are the neces-



more than 6400 letters of protest and statements from all around the world. As a result, the Indonesian Organisation ProFauna, which is supported by SOS-Seaturtles, can put more pressure on officials and police. Since this spring, several raids have taken place in Tanjung Benoa, the capital of turtletrade. Further details and images can be found on this webpage: www.sos-seaturtles.ch/news-seite_english%20.htm

This October a "big fish" was caught by the Balinese police. Thanks to a tip-off by of an investigator, ProFauna activists and the police confiscated a boat carrying more than 170 Green Turtles (*Chelonia Midas*) which were caught off Sulawesi and on their way to Tanjung Benoa to be killed and traded. The crew was arrested and the boat chained and detained in Benoa Port for further examination.

The Chief of the Bali Office Department, Irjen Pol. Drs. Soenarko Danu Ardanto, who personally supervised the seizure, ordered the turtles to be released back into the wild. The turtles were then measured and tagged by BKSDA Bali (Forestry Dept.). Unfortunately, three turtles were found dead due to the ordeals of the smuggling. The next day, the turtles were released in Kuta Beach under the protection of the police and coast guard assisted by Kuta villagers, ProFauna members, BKSDA Bali and numerous tourists who

were enthusiastic to take part! The release attracted hundreds of spectators and the ProFauna members took the opportunity to issue an official statement informing the people about the turtle slaughter and the illegal trade that still continues in Tanjung Benoa. Usually, protests against the turtle mafia were always heavily harassed by the traders and turtle catchers, but this time nothing happened! That alone is a strong testament to the growing strength and recognition of the ProFauna organisation. All that we have achieved since the start of the campaign proves that our policy work and our actions makes a difference. ■

Soon, hopefully, with your help, there be no more tears





The Diabetes Controversy

Diabetes ranks as one of the most controversial medical conditions affecting divers and has been the cause of heated debates worldwide for more than two decades. Traditionally, insulin-dependent diabetics have not been allowed to dive; however, the evidence supporting diabetic divers has increased dramatically in the last decade. The time appears ripe for a change in mentality.

By Thea Brolund and Anders Tychsen

Disclaimer: Information and views in this article are those of the authors and should not be taken in place of the advice of a qualified physician. In all cases, please refer to your dive doctor first for appropriate medical recommendations on diving with medical conditions.

In the mid-1970's there was a diving accident in the UK. The diver in question developed a sudden onset of decompressions illness and died. It was discovered that the diver suffered from diabetes, a chronic condition where the ability of the body to produce insulin is either diminished or lost entirely. As insulin is the hormone that allows the body to control blood sugar levels, and the treatment varies on an individual basis, diabetes can be a life threatening illness, if not treated properly. While in the concrete case there was no evidence that the divers diabetic condition had contributed to his demise, an international and complete ban

on diving diabetics was imposed, with the exception of those diabetics who could control their condition by diet alone.

In the early 1990's, the case was re-examined, and a review of the post-mortem results showed that the diver had a patent foramen ovale, or a hole in the heart between the right and left atria. Whether this, his diabetic condition or a third factor caused the diving accident, remains uncertain. However, by that time one of the most heated discussions in diving and hyperbaric (diving) medicine to emerge had already been running for 20 years.

The problem associated with

diabetics and diving is serious, because diabetes is a globally occurring condition that appears to be more and more common. According to the WHO, at least 170 million people worldwide have diabetes, and the figure is likely to double by 2030. As more and more people get diabetes, the numbers of diabetics who want to experience diving will increase.

Diabetes

The human body uses sugar (glucose) as fuel, which is derived directly from what we eat and drink. The hormone insulin, present in the bloodstream, is necessary for the cells to metabolize sugar.

Insulin is normally produced by the pancreas; however, in diabetics, the ability of the pancreas to produce insulin is lowered or gone completely. Alternatively, the cells of the body can have a resistance to the entry of insulin. In both cases the result is the same: Glucose levels build in the blood and can reach dangerous levels, which can result in cells being starved of energy. Over time, diabetics can develop damage to their eyes, kidney, heart or peripheral nerves, if they are not well-regulated.

There are several different degrees of diabetes, and the illness varies from person to person. About 90% of all diabetics have what is commonly called Type II diabetes, and can control their blood sugar levels by diet and oral medicine. Typically, the pancreas of Type II diabetics still produces insulin, but at a lower rate. The remaining 10% are called Type I diabetics. In this group, the pancreas has completely stopped

producing insulin, which means that the Type I diabetics need to get their insulin via injections of the hormone.

The risk of diving with diabetes

When diving, the body is usually quite active, depending on the conditions in question, and therefore uses sugar. Most divers, especially those diving in cold waters, will be familiar with the solid appetite a morning of diving usually builds.

For diabetics, the use of sugar during diving can constitute a problem if they for some reason start their dive with too low a level of blood sugar. This can happen if the diver has taken too much insulin before the dive, has been drinking alcohol or lacks exercise, has eaten too little or improperly. In these cases, diabetic divers run the risk of their blood glucose level falling to a level where hypoglycemia, or low blood sugar, is

YANN SAINT-YVES

precipitated. A hypoglycemia episode can, dependent on the severity, cause everything from mild headaches to weakness, tremor, sweatiness or chilling, irritability, alterations or loss of consciousness to convulsions. Needless to say, the extreme end of these effects is highly dangerous in a diving situation.

A convoluted problem

The risk of developing hypoglycemia has been the primary factor in the medical establishment having traditionally banned Type I diabetics from diving. Not only does a severe hypoglycemia episode endanger the diabetic, it can potentially endanger their dive buddies as well.

However, during the early 1990's it was gradually realized that hypoglycemia while underwater or on the surface appeared to be much less common than what was popularly believed. Furthermore, it was realized that the diabet-

Our entire pharmacopoeia has its origins in nature.... The importance of natural products for drug discovery cannot be overestimated, because we do not have the scientific capability to design drugs from scratch.

Janice E. Thompson



ics were diving despite the ban. Diabetics, already frustrated by the way society tends to view them as walking chronic conditions rather than human beings, which seems to be a common fate for people who have some sort of disability or other, basically disregarded the recommendation of the hyperbaric doctors. To back up their case, the predicted cases of hypoglycemic-induced diving accidents never materialized. A survey was carried out on diabetic divers, and this showed that none of these had suffered from an increased incidence of decompression illness, or more importantly, none suffered from hypoglyc-

emic attacks while diving.

This caused a problem for the medical establishment. On one hand, the doctors lacked sufficient knowledge about diabetes and diving (i.e. the effect of pressure change on e.g. blood sugar absorption) to approve diabetics for diving, and on the other they did not want diabetics to dive without at least proper instruction in how to handle their condition. Furthermore, as many diabetics feared being banned from diving, they kept silent about their condition.

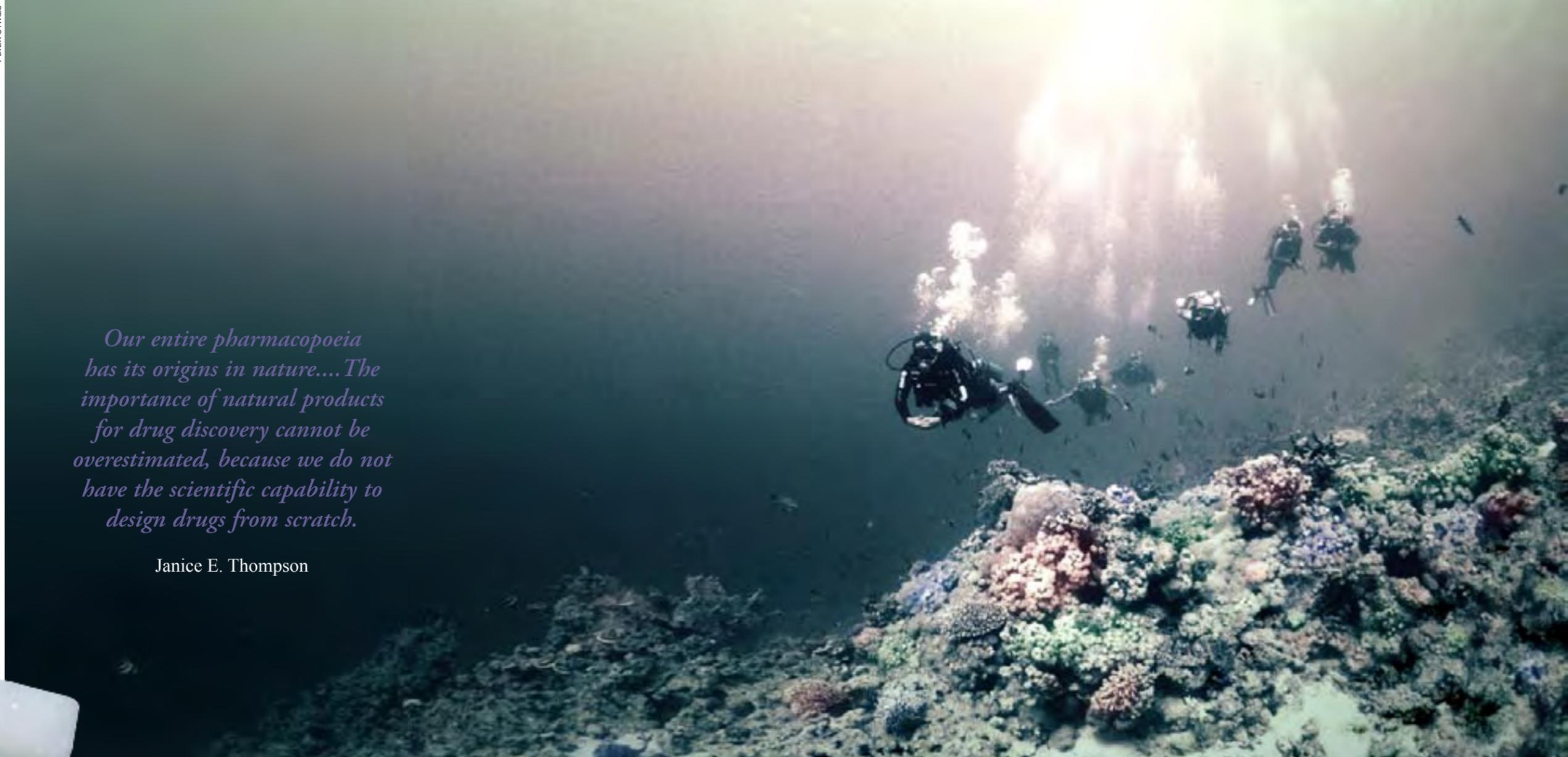
Early investigations

In 1992, the British Sub-Aqua Club

(BSAC) decided to readmit Type I and other diabetics into the club, providing that they fulfill a set of strict medical criteria, including excellent control of their blood sugar levels through insulin injections. At the same time, data from diabetic divers started being collected in the UK.

In 1996, the Undersea and Hyperbaric Medical Society (UHMS) chaired a workshop focused on discussing the issue of diabetic divers. Researchers debated the evidence at hand and discussed the possibility of loosening the ban on divers with insulin-dependent diabetes. At the UHMS meeting, Divers Alert

Network (DAN), an international diving safety organization, reported that out of 550 dive-related fatalities occurring from 1989 to 1994, seven had diabetes. However, whether their condition contributed to their cause of death was not clear. Furthermore, eight of 2,400 episodes of decompression illness involved diabetic divers. Both numbers were in line with the expected numbers in the general population, and therefore the statistics failed to show an increasing risk for diabetic divers. Furthermore, DAN carried out a survey in early 1996, where 164 diabetic divers replied. Of the 164, 129 were Type I diabetics—and



had participated in over 27,000 dives with no major complications. A few reported having experienced symptoms of hypoglycemia, but none reported the loss of consciousness that caused the ban on diabetic divers in the first place. Other studies were carried out, and e.g. the Camp DAVI project, carried out by Dr. George Burghen and Stephen Prosterman in the US Virgin Islands, reported similar positive results in detailed studies of 32 insulin-dependent divers.

In parallel with the new evidence on diabetes and diving, the medical industries had developed more effective insulin types and delivery systems. Including fast and slow-acting insulin types. While Type I diabetics in the 1970's used



ANDREY BEYUKIN



YANNI SAINT-YVES

measurements of the sugar level in their urine to calculate how much insulin they should take, modern equipment allows measurement of blood sugar directly, in as little as 30 seconds. This has facilitated unprecedented levels of control of blood sugar levels.

The ban is loosened

With the evidence slowly mounting in favor of the diabetic divers, several countries began lifting the ban on diabetic diving, including the UK, USA, Sweden and Egypt. Other countries began to inquire about the standards utilized by these countries, including Australia, Holland and Denmark. In the countries that lifted the ban on diabetic diving around this time, medical guidelines similar to those used in the UK were enforced, which ensured that only fit, well-regulated Type I diabetics would gain dive clearance. Furthermore, standards and guides were developed to assist the diabetic, outlining e.g. how to ensure stable blood sugar levels before, during and after each dive. In general, these guidelines were developed in collaboration with the diabetic divers and based in part on their experiences and solutions; e.g. DAN, UHMS and BSAC all have protocols for approving diabetic divers. As of 2000, most countries still enforced the ban, however.

New evidence

From 1997 through 1999, DAN took to the field again, collecting data from more than 500 dives by insulin-requiring divers and a similar amount of control dives by divers without diabetes. There were no adverse effects due to diving on the diver with diabetes—even with 18 hypoglycemic episodes outside of the diving.

In 2001, a group of UK-based



PETER SYMES

doctors published the experiences with diabetic divers in the UK since the lift of the ban. Due to an excellent collaboration between divers and their physicians, the UK had amassed a substantial body of evidence on the subject, including data from 323 diabetic divers performing 8,760 dives over 11 years. In that time span, two fatalities were recorded, both in non-insulin dependent divers, and only one incident of hypoglycemia underwater in an insulin-dependent diabetic was reported. The study showed that in the group of well-controlled diabetic divers, there were no serious problems due to hypoglycemia when they dived; however, the study concluded that diabetics suffering long-term complications of their conditions, such as heart problems, should not dive. More evidence accrued, and was presented at the 2005 DAN workshop on diabetes and recreational diving. The workshop resulted in the publication of a set of standardized guidelines for allowing diabetics who use medication, to dive. The guidelines consist of 19 points, and include e.g. the requirements about the age and fitness of the diabetic, with one of the primary requirements being no hypogly-

About the author

Thea Brolund is a Type I diabetic, She is a multiple-award winning PhD-candidate at the School of Marine Biology at the University of Technology, Sydney in Australia. She is a diver with several years of marine biological scientific fieldwork behind her. She manages her diabetes through a combination of insulin injections and an AustralAsian Medical and Scientific Limited Animas 1000 insulin pump (the combination is often called the "un-tethered" approach, and is used by many active diabetics).

Brolund was the first Danish Type I diabetic to gain permission to dive, and presented her initial experiences at the EUBS 2003 hyperbaric medicine conference. She fought for a year to gain the same diving rights in Australia as in Denmark, and is currently a registered diver at two different Australian research institutions. She remains actively engaged in the effort to insure diabetics the right to dive globally. ■



Scientific evidence points to the fact that the ban on diabetic diving was erroneously imposed



emic episodes, requiring intervention from a third party, within the past 12 months. Additionally, the diabetic should carry extra reserves of blood glucose with them during the dive.

The problem continues

To the continued frustration of diabetics, the absolute ban on divers with insulin requiring diabetes remains under review and country specific, although more and more countries are lifting the ban. Strangely, the problem appears to be not so much related to the question of whether Type I diabetics are at increased risk when diving or not, but rather a question of responsibility.

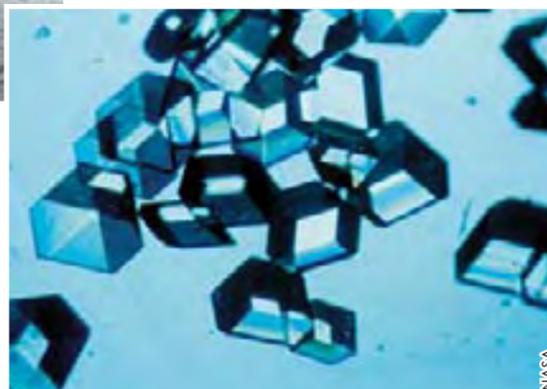
Extreme sports, like diving and rock climbing, carry with them an inherent risk for the practitioner and those he or she climbs or dives with. However, traditionally most of these sports have not required any kind of medical clearance—i.e., there is none to prevent people from rock climbing, irrespective of any health

problems. This may in part have something to do with the fact that the dangers associated with rock climbing are obvious and under the domain of common sense. The dangers associated with diving—nitrogen pressure, ear squeezes and similar however, need to be taught. Despite the obvious parallel between diving and other

extreme sports, diving has always been associated with medical clearances given by doctors. This means that divers have fallen under a “paternalistic medicine” that tells them what they can and cannot do. Needless to say, diabetics, already plagued in this regard, have rebelled against this.

It is however too easy to blame the doctors, for the problem is complex, and related to the phrase “fitness to dive” which is what a medical practitioner must agree to when clearing a diver for diving. In some countries, the medical clearance of “fitness to dive” has achieved legal standing, and this means that the medical practitioner takes a very real risk of getting blamed in case something goes wrong with the cleared diver. On the other hand, the responsibility of declaring a person fit to dive can be delegated to the dive instructor. In both cases, the involved people develop a natural fear of accepting the risk. The

problem with the situations is that the diabetic who actually wants to dive cannot take the risk upon himself—which is what a rock climber can do. With diabetic divers willing to take the risk of diving upon themselves, and practitioners of other extreme sports not having this problem, it is a valid point to ask by the divers, instructors and practitioners alike why so many countries still prevent diabetics from diving.



Insulin crystals

In summary, scientific evidence points to the fact that the ban on diabetic diving was erroneously imposed, and excellent collaborations between diabetics, medical experts and instructors have helped develop good international guidelines for diabetics who wish to dive. However, as yet many countries still in practice do not allow Type I diabetics to dive (e.g. Australia), and the diabetes controversy is like to continue with diabetics (and other groups similarly affect e.g. as reported for Australia by a study from 2002) diving illegally, and outside the ability of the medical establishment to monitor their situation, until the day that the ban is lifted in these countries. ■

... a couple of other medical tidbits

The Deep Sea Offers Hope For Cancer Sufferers

Bryostatin-1 is a promising anti-cancer drug that might also be effective against Alzheimers. It is made from a widely-distributed marine invertebrate, *Bugula neritina*, found worldwide in temperate waters and whose stringy brown colonies are sometimes mistaken for algae, often fouls boats' hulls. However, the drug only exists in small number of the organisms and have proven hard to harvest. But scientists at Sunderland University in the UK discovered that the bryostatin is not only found in the animal, but also in the sediment around it on the sea floor of the Gulf of Mexico. Now the researchers are attempting to create a synthetic version in the lab and believe it could also be discovered on their own doorstep—in the North Sea.

Dr Lyn Noble, from Sunderland, said: “It is difficult to mass-produce the drug, but if we do manage to find a way to do that cheaply, the lives of literally millions of cancer and Alzheimer's sufferers worldwide could be changed.”

It takes 14 tonnes of bugula to extract an ounce of pure bryostatin. Creating a synthetic form of bryostatin is a complex procedure, which takes 65 reaction steps as compared to the five to ten processes that are normally economically viable. Synthetic bryostatin costs £261 per 50 micrograms or £5.2 million per gram.

Research in the U.S., including a £4 million sea farm to harvest

the life form, was hit when the colony was lost in a hurricane.

Now academics are trying a different approach. They believe bacteria on the creature is responsible for producing the

bryostatin and are now trying to grow it in salt water.

If successful it is hoped that, with the help of Sunderland chemists, they will find a cheaper way of producing

bryostatin in the lab and even harvesting it from the North Sea. ■



Scientists Isolate Anti-Malaria Compounds From Mussel

Indian scientists have isolated two compounds from mussels that have been found to have anti-malarial activity. Malaria kills more people than any other communicable diseases except tuberculosis.

The molecules, named NIO-1 and NIO-2, have been discovered by the scientists at the National Institute of Oceanography. Studies have shown that the two compounds act by directly killing the malaria parasite, *Plasmodium falciparum*, rather than just causing inhibition of their growth. Importantly, the compounds were found to be non-toxic to human cells. The compounds, already patented, are cheap to obtain and can be prepared in bulk without killing the mussel. ■

Information on diabetes and diving

If you would like to know more about diabetes and diving, or if you are a diabetic who would like to know a bit more about how to avoid hypoglycemia while diving, the following links will provide basic information.

Safe Scuba Diving With Diabetes

– by Stephen Prosterman, of the Camp DAVI project

www.diabetesselfmanagement.com/article.cfm?SK=5WZ2&SID=9&SSL=n&AID=1017&page=1

DAN/UHMS guidelines

www.diversalernetnetwork.org/news/download/SummaryGuidelines.pdf

The YMCA diabetic protocol

www.chesapeakebaydiving.com/Documents/diabetic_protocol.pdf

BSAC Guidelines

www.scuba-doc.com/endmet.html#Diabetes_and_Diving