

Undercurrent®

The Private, Exclusive Guide for Serious Divers

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M.V. Kirio, Solomon Islands, South Pacific *—the best of wrecks and reefs*

In 1987, I first dived the waters of the Solomon Islands, a picturesque group of lush South Pacific islands, east of Papua New Guinea, northwest of Fiji. I praised them heartily in these pages for their beautiful and wild diving.

In April 1990, we provided a full review of the Solomon's first liveaboard, the Bilikiki. Our reviewer was enthusiastic about the vessel and its operation, awarding it a Five Star rating. At \$1883 for the week, it's pricey, so owners Ric and Jane Belmare have brought a second boat to the Solomons (the MV Kirio), smaller and less classy, but priced much less for an Aussie market unwilling to pay US prices —\$1155 for a full week (everything but drinks). We sent a new reviewer to compare both operations.

C.C. travel editor

* * * * *

I can still recall my first dive many years ago. Covered from head to toe in quarter-inch black neoprene, I and my fellow classmates plunged into a cold quarry. In the murky water, we saw old autos, rusting bedsprings —basically junk. After the dive, we shared our experiences over hot spiced rum. We had fun!

Over the years I've had great dives with hammerheads at Cocos, with sharks at Palau, and in kelp forests in California. I've had a lot of fun. It seems there are a growing number of arbitrary, arrogant leaders hell bent on screwing up the fun. Look at the arbitrary depth and time limits some divemasters impose on experienced divers with computers. What about Australia's government-mandated "maximum of four dives a day" rule, regardless of depth or time? How about boat captains who forbid wearing of gloves and then tell divers to descend down an anchor line covered with stinging hydroids — after, of course, dropping anchor smack on a coral head. Consider the "no diving without a buddy," too often applied in absurd circumstances. And, I remember a no-joy divemaster on Rangiroa who in a snooty accent exclaimed "France does not

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recognize the computer" and refused to make a second dive through a spectacular shark-inhabited pass - a dive easily within the limits of my Edge.

For me, an October trip on the Kirio in the Solomons brought back the days of fun diving. Based out of Guadalcanal Island and owned and operated by the same folks who run the justly praised Bilikiki, the Kirio is a no-frills liveaboard dedicated to the proposition that divers can enjoy the wonders of the South Pacific, have fun, and do it at a reasonable price. I joined a group of seven Aussies - including a commercial pilot and a physician specializing in tropical medicine - who understood that diving was to be fun

The Kirio, a refurbished steel boat, was brought from the Philippines and put into operation by the Belmare's in 1991. With a 15-foot beam and 65-foot length, it's maneuverable in and out of many channels. But, to say that Captain Jackson's bridge is unsophisticated is an understatement. Instruments were a compass, binoculars, the wheel, power controls and a two-way radio. No LORAN or NavSat here. But, Jackson has captained intra-island freighters in the Solomons for many years and knows the waters intimately. He frequently talked with Island Dive services at home base and the Bilikiki to get the current dope on various sites after the Bilikiki visited.

On the main deck is the wheelhouse, the dive area, the galley, and the salon, with an L-shaped table for meals. Usually, however, we carried our plates to the awning covered area on the upper deck, for al fresco dining. It was also a great place to gather to schmooze or snooze in the hammocks.

Below decks are two four-person staterooms and one two-person stateroom, none with portholes, but all air conditioned. Each has a sink, is carpeted, and made up daily, and plenty of fresh towels were available. One inconvenience: the two heads are up the stairs on the main deck; but there was plenty of water for showering thanks to a village where we anchored overnight that filled our tanks mid-week.

The dive area is what you might expect on a budget cruise: there are no dive lockers or camera platforms. We kept our gear in mesh bags; there was a line to hang our skins, but all in all, it took courtesy and common sense to keep out of each other's way. The tanks are double-lined on a platform in the middle of the area and readily filled between dives with air hoses running from the compressor below decks in the engine room.

The "Tinnie Taxi," an aluminum tender manned by Kipson, a cheery chap, ferried us to dives. He took pride in his ability to meet each of us as we surfaced. Prior to each dive, crew members kitted up our tanks and placed them in the tinnie; we boarded and sat for the short ride to the dive, where we were assisted in donning the tanks. After the dive, we handed up weights and tanks to the waiting Kipson, and boarded from the stern ladder. The Kirio usually circled off the dive site awaiting our return. This was an easy way to dive, for me preferable to chasing after the mother boat. For most of the drift dives, use of a taxi would be mandatory.

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The manager and divemaster was another Ric - Ricky, in fact - an Aussie who has dived the Solomons for years. He took the job to heart, working hard to ensure that we got the best diving. He set the tone for the trip quickly after I boarded, saying that this was not a hand holding operation and he expected that I would observe the limits dictated by the Edge and my own good judgment. On the first dive, he kept a discreet eye on me until he seemed confident of my abilities. His briefings were informative and he was always available to answer questions. He accompanied the group on nearly all dives, and several times during the week, he volunteered to show me interesting sights - the ghost gun on the Hirokawa Maru, stonefish on the Karumolun wall, and boxes of dynamite at White Beach Dump. An active participant in our evening conversations, he had as much fun as the rest of us.

The Kirio spends most of its week in the Russell Islands Group, where I found the diving exquisite. It couldn't be better. Several dives off Karumolun Island in 82° water produced giant bumphead wrasses, turtles, lionfish, large sweetlips, tuna, sharks, unicorn fish and hundreds of jacks feeding off the walls. The number and size of Maori wrasse was astounding, as was the large number of Queen and clown triggerfish. Sea fans and hard and soft corals were abundant and beautiful.

The "Cut" at Leru Island was spectacular. Here, long ago, some great force cracked the island in two. A giant split full of crystal-clear water leads to a small lagoon surrounded by jungle. Floating face-up and looking up from the bottom of the cut into the sunbeams streaming through the trees was like reliving an "Indiana Jones" movie.

On this trip, there were no photographers so the lack of a camera table and darkroom posed no problem. Instead of post-dive complaints about failed strobes and missed photo opportunities, all we could do was rave about the diving. With no TV and VCR, night time was devoted to chatting about the world - sort of like college bull sessions, years ago.

Now, on such a basic craft, one might expect meals of Spam, Vegemite and canned beans. Not so. Chef Jim Selo, an elderly Solomon Islander from an isle known in days of yore for headhunters, prepared tasty and nutritious fare. He labored in the galley from sunup to sundown, baking breads and cakes and ensuring that there was plenty of bananas, papaya and pineapples all day long. His menu featured lots of exotic vegetables purchased from Islanders who visited the Kirio in dugout canoes. Lunches generally consisted of a large salad and a casserole. The dinner meals varied from baked chicken to chops, with an emphasis on fresh fish, either caught by the crew or purchased from the villagers. There was plenty of juice, tea and ice water, soft drinks and beer. Mid-morning and mid-afternoon snacks were always provided.

ORCA Repairs

Electronic Instrument and Technology Corp. (EIT), the Sterling, Virginia company that took over the failed Orca Industries, is now able to provide repairs, performance checks and parts for the Edge, Skinny Dippeer, SD Mark II and Marathon dive computers.

Phil Mays, EIT Marketing manager, told *Undercurrent* that they will not be repairing the Delphi. It is being replaced by the "Phoenix" which should be in the marketplace by June. The Phoenix, which will retail between \$670 and \$795, will be offered to current Delphi owners for \$250 in exchange for their old Delphi, Mays says.

EIT has begun manufacturing the Marathon, but will not manufacture the Edge, unless the demand picks up; if so, the case will be plastic, not aluminum.

The Edge, Delphi and Phoenix use a 9v lithium battery, which can be obtained from the Orca Service Center (two for \$25). The batteries provide about 600 hours of underwater operating time. Manufactured by Ultralife, these will soon be available at most camera stores.

For service, return your units to your Orca dealer or contact Joan Newlin, Manager of the Service Center (located in Kennet Square, Pennsylvania) at 215/444-9080 or fax 215/444-9106.

Riding Turtles

Did you know that, in U.S. waters, it is illegal to catch a ride on a sea turtle? As endangered species, they're protected by the Endangered Species Act of 1972.

The purpose of the Act is to ensure that endangered animals don't suffer from human contact. Chasing and riding turtles may be harmful, and if we're to protect these endangered animals, we must keep away.

Many key members of the diving community are unaware of the key elements of the Endangered Species Act. For example, both Carl Roessler of Sea and See and Ann Davis of the Aggressor Fleet both confessed that they did not know the Act's ramifications. Davis did say, however, that "we do mention not bothering the turtles in CoCos and in Kona. The turtles at CoCos are very friendly and we do not want to harm them by their being handled too much. In Kona, there have been \$5,000 fines for playing with the turtles. But, we thought that these were only local conditions."

If you are observed riding turtles in U.S. territorial waters or the high seas, you could be subject to a fine of up to \$50,000 and a year in jail. Some countries, especially those which are signatories to CITES (Convention for International Trade In Endangered Species) may have local laws.

Furthermore, Peter Polshik, a staff member of Wildlife Conservation International, tells us that "local civil authorities can inform U.S. authorities about any such violations and, upon return to the States, the person may be arrested under the Lacey Act."

If you decide to hitch a ride on a turtle in foreign waters, it's pretty unlikely that you'll be fingered by the law. But that's not the point. The point is to ensure the survival of animals approaching the threshold of extinction in the natural world. Turtles should not be pursued, grabbed or handled — unless they volunteer themselves.

Observe the spirit and letter of the Endangered Species Act. Watch turtles. Photograph turtles. Go ballistic over turtles.

But keep your hands off, please.

Wall and reef diving in the northern Russells was great, but the Aussies really got off when we dove "White Beach Dump" off Mbanika Island. Here, we found some of the detritus of World War II, including the remains of a PT boat base used by President John F. Kennedy. There were trucks, jeeps, pontoons, ammunition of various types and cases of dynamite sticks. Diving here and on the wreck of the freighter "Ann" off Linggatu got the blokes' minds off reefs and walls and onto wrecks.

By unanimous consent, we decided to return early to Guadalcanal — the Solomon's primary island — to dive some of the wrecks left from the great battle in 1942. Ricky didn't hesitate changing the ship's itinerary and worked out the new schedule to avoid losing any diving time. The Kirio made the six-hour crossing back to Guadalcanal at night and we dove early the next morning on the wreck of the Hirokawa Maru, a Japanese transport sunk on top of an ammunition barge. In water depth ranging from 10 to 200 feet, it's a fantastic dive. At 130 feet, I got a fabulous view of an anti-craft gun pointing off into the depths. Severely damaged, the wreck is relatively open and entering the engine room is easy. The wreck is loaded with fish life, especially lionfish, and I watched the struggle between Sergeant Majors laying their eggs in giant purple patches and trying to defend them from the predator reef fish snatching them from their birthplace on the deck of the wreck. We made several dives on this wreck and could have enjoyed many more.

The Kinugawa Maru lies only 100 feet down range of the Hirokawa. Another transport hit by American planes, it was run onto the beach as the skipper desperately tried to unload his supplies and troops. Now lying partly out of the water, it allows lots of bottom time to

watch the deteriorating steel plates sway in the surge and hear creaking bones of this wreck. There are plenty of fish here, but northwest of the wreck, I found a large school of blue spotted sting rays in the shallows, many being serviced by cleaner wrasses.

These two ships are remnants of the famous Tokyo Express that ran "the slot" to provide reinforcements and supplies for the beleaguered Japanese forces fighting to hold back the first Marine Amphibious invasion in World War II. Both sides lost scores of ships.

Identifying Critters

On most of my dives, I focus on the fish. Having read virtually every fish book that comes along, I know what I'm watching.

When I look elsewhere, however, I'm not always sure what it is that I'm seeing — if I see anything at all. That's why I enjoy diving with a first class guide like Fred Good, who will point things out during a dive, and then, talk further about the creatures after the dive.

But, I don't always have such a guide, so now I've done the next best thing: I picked up a copy of Paul Humann's latest book, *Reef Creature Identification*, a superlative follow up to his 1989 *Reef Fish Identification* book, covering the invertebrates of the Caribbean, Florida and the Bahamas.

Like the previous book, it is filled with excellent photographs of hundreds of critters, each with a clear description, along with data about the abundance, distribution, habitat and behavior. Humann and editor Ned DeLoach engaged more than 30 marine scientists to help prepare the information just for divers.

Did you know that:

* there are three kinds of barrel sponges, and the

one large enough to tempt divers to climb into it — the Giant Barrel Sponge — takes 100 years to grow so large (which is why you should look, and not touch)?

* of several types of crinoids, the red and white swimming crinoid can coordinate arm movements in open water?

* there are nearly 50 distinct sea slugs, nudibranchs, and sea hares that inhabit the reefs? How many have you seen?

Humann provides superb photos of sponges, hydroid, jellyfish, anemones, flatworms, fire worms, tunicates, crustaceans — all those critters that are tougher to see, but just as rewarding, as fish.

After seeing Humann's first book on reef fish identification, I wondered what he might do as an encore. Now I know. One more volume, on coral, will be added to this series in a couple more years.

But, for the moment, add *Reef Creature Identification* to your library. I'm sure, like me, you'll find it's the next best thing to diving with a marine biologist.

It's available at most dives stores, or can be purchased through *Undercurrent* by sending \$34.95 + \$5.00 for shipping and handling to: *Undercurrent* 175 Great Neck Road, Suite 307, Great Neck NY 11021

C.C., travel editor

Winston Churchill once said that England and America were two countries divided by a common language. This trip had three common languages: the Aussies spoke their own Newcastle "strine;" the crew spoke a version of pidgin, and I struggled along with American. It was confusing. For example, the aluminum chase boat is called a "tinnie" by the crew; yet, the Aussies call a can of Fosters lager a "tinnie." I saw a beautiful lionfish, the blokes saw a butterfly cod. What they call a batfish, I call a spadefish. They saw a gray whaler, I saw a grey reef shark, but the crew saw a "bigfala, strongfala sark." When I was in the shower, according to pidgin, I was "swimming."

My favorite pidgin word, however, was "nambawan," meaning "excellent," "super," "number one." In fact, nambawan would be an excellent way to describe the entire trip. A fun group, a fun trip and fun diving. To sum, the diving in the Solomons is as previously reported in *Undercurrent*. Great walls, pelagics, reef fish, hard and soft corals, crustaceans, mollusks and sponges — and nambawan wrecks. It's all here. And, at these prices, the *Kirio* is a great way to get there for the diver who isn't concerned that his liveaboard may not be Nambawan. But, if that's your desire as well, read on about my next voyage.

Bilikiki

Dear Reader,

I am preparing this update in my cabin as the *Bilikiki* makes a six-hour run down "The Slot," returning to the island of Guadalcanal after a super week. *Undercurrent's* April 1990 report and my dive log notes are beside me on my queen-sized bunk. I must admit that, prior to this trip, I was skeptical of the Five-Star rave our last reviewer gave the *Bilikiki*.

I'm no longer skeptical. This is indeed a first-class operation - quite in keeping with the spectacular diving in these waters. Any reader wanting the full details should get that April, 1990 issue (\$6 from Undercurrent, 175 Great Neck Rd., Suite 307, Great Neck, NY 11021; 516-466-7788).

Last time, our reviewer was surprised when this 127 foot vessel sailed with only four paying passengers (she holds 20); but this week, she sailed with only three due to a late group cancellation. Jane Belmare informed me that even though they would be losing money, their policy was to keep their promises. And, indeed they did, in spades. I felt like Aristotle Onassis on my private mega-yacht.

Jim Light, having previously captained the Kona Aggressor, is an enthusiastic and personable host. He enjoys his diving, handles all the pre-dive briefings, and accompanied us on most dives. Kay Nevin, assistant divemaster, hostess and bonnie Scotswoman, is equally friendly. Both were especially responsive to requests for personalized dives.

On the first day, they asked our wishes for the week's menu. Although the freezer had an ample supply of meats, we asked for, and received, fish and chicken at almost every meal. Our last reviewer praised the dining and so do I. Chef Marlin, his assistant, and Kay provided meals, nav, repasts, that would put many expensive restaurants to shame. Plenty of fruit, vegetables, and fish - all purchased fresh from the local islanders - and prepared with variety and style. Not a trip to count calories by any means.

Reviewing this week's log book vividly brings back some of the best diving I've ever done. We dived the Russell Islands in Central Province and Marovo Lagoon in the New Georgia Island Group. All offer typically excellent South Pacific wall and reef diving. From a surfeit of wreck diving this year, and to accommodate the professional photographer in our trio, we skipped wrecks. Ruth, the photographer, shooting wide angle and macro, had no complaints about subject matter. The walls all looked virgin and were draped in canopies of hard and soft corals, sponges, sea fans, sea whips, and anemones. Marovo Lagoon, called by novelist James Michener "the Eighth Wonder of the World," is where we spent most of the dive week. One dive site there in particular stands out - a place called Hawkfish Wall off Minjanga Island. This site is world-class and features a plentitude of small spotted hawkfish perched on huge sea fans everywhere. (Make sure to keep an eye seaward to view the turtles and sharks cruising by). NJapuana Island (also at Marovo Lagoon) offers tremendous tridachna clams at "Clam Cove at Roger's Reef" and a fantastic wall called "Silvertip Wall" - Adrenalin Alley for me!

Probably our best dives were between the Russells and Marovo at a tiny speck of land called "Mary Island" (Mborokua). At Barracuda Point, I found pelagic heaven. Hanging in a stiff current at 90 feet, the five of us spent a lot of bottom time observing schooling barracuda, jacks and hungry sharks milling back and forth in a scene reminiscent of a mob of hungry freeloaders at an all-you-can-eat smorgasbord. Jim confided that this is one of author/photographer Chris Newbert's favorite sites, and I can well understand why.

Kirio and Bilikiki

Diving for Advanced	★ ★ ★ ★ ★
Diving for Beginners	Forget It
Crew	★ ★ ★ ★ ★
Accommodations	
Kirio	★ ★ ★ (★)
Bilikiki	★ ★ ★ ★ ★
Food	
Kirio	★ ★ ★ ★
Bilikiki	★ ★ ★ ★ ★
Money's Worth	★ ★ ★ ★ ★

★ poor, ★★ fair, ★★★ average, ★★★★ good, ★★★★★ excellent

The Bilikiki provides dynamite diving, comparable to anything in my travels to Palau, Indonesia or Papua New Guinea. Totally stoked! I saw virtually every fish from books on South Pacific underwater life in abundance. Indeed, I can understand why Newbert block-books this vessel for weeks at a time - and fills his trips months in advance. This is a photographer's dream operation with plenty of rinse water, camera work space, and daily film development. And divers are treated as adults here and a lot of freedom is granted. We made four to five dives daily - about all we could do with the depths and times we were inputting to our computers.

Now, for rating both. Diving is top drawer, five stars, indeed, on the Pacific scale (and seven compared to the best in the Caribbean), and so is the crew. The Bilikiki is surely the better craft, five stars for every experienced diver; the Kirio? five stars for the youthful, four stars for the picky and two stars for photographers. But, you save \$600, a good discount for a star or two.

Diver's Compass: Trips on either craft vary from 1-3 weeks, airfare, connecting through Fiji, normally runs \$1600, but, through Qantas, it can currently be had for \$1300; in a few months, they will add yet another boat - the Spirit of the Solomons, more a cruise vessel for ecotourists, with some divingThe Kirio operates on a Friday-to-Friday schedule. . . .A beer for lunch? Not on these boats; uptight rules ground you for the day once you've imbibed. . . .Early arrival in Guadalcanal gives you time to dive good wrecks with Island Dive Services. . . . For the Aussies, the voltage on the Kirio is 245 50 Hz, but there are 110 volt charging stations. . . .Book through Island Dive Services (Ric and Jane Belmare) P.O. Box 414, Honiara, Guadalcanal, telephone 677-22103, FAX 677-23897, or one of the U.S. agencies, such as Poseidon Ventures (800/854-9334 or 714/644-5344) or Sea and See (800/348-9778 or 415/434-3400). . . .The Solomons are a malaria area, so see your physician for prophylaxis.

J.G.

Diver Damage to Reefs: Part II

— *Is urine a culprit?*

Florida's reefs are dying. Some scientists are predicting their demise in less than a decade.

Many of Grand Cayman's reefs are in serious trouble, as are reefs in the Bahamas and elsewhere throughout the Caribbean.

In an effort to protect reefs, many a dive guide will tell us divers not to touch the coral. Some go further. We have received letters from some readers who, at times, have been refused subsequent dives because they have inadvertently touched the reef - after the boat captain dropped his hook smack in the middle. We have gotten horror stories out of Cozumel, where arrogant and childish guides have behaved rudely, then prohibited further diving. Reader Stephen Chandler (Walnut, CA) had this experience a couple of years ago with Aqua Safari:

"On one dive, a second group of 15 to 20 divers was dropped directly on top of our group, resulting in a commingling of divers from both boats. Absolute total confusion resulted. Rather than swimming against the strong current, I held onto a large rock until the two groups separated. Touching a rock, coral, or anything dead or alive for any reason whatsoever, I was later to find out was absolutely forbidden. . . .On the last day,

Patricio was our divemaster. He was not friendly and ordered divers about rudely prior to our dive. After the dive he confronted me. 'You touch coral. I tell you no touch coral. You no do second dive.' . . . 'What,' I said, 'you must be kidding.'

"I no kidding,' Patricio replied. 'I tell you no touch coral. You touch coral two, maybe three times. You no do second dive.' . . . 'Did I break or damage the coral?' I asked. 'No, you no break or damage coral, but you touch coral. You no do second dive.' . . . I apologized and said that it was possible I may have touched the coral, but my apology was to no avail. Patricio offered a full refund.

"That evening, I called the dive shop owner, and what had been stated by Patricio as touching the coral 'two or maybe three times' had changed. I was now being accused of causing major reef damage and diving with reckless abandon. I explained that I had been certified for 27 years, and that I had believed in and practiced coral reef protection long before it became popular. I never got a refund."

Are these sorts of penalties based on science? Or, is it that supercilious leaders like to power-trip over unsuspecting divers?

In the previous issue of *Undercurrent*, we brought you part one of this study on diver-caused reef damage, in which marine biologist Helen Talge observed the behavior of more than 200 divers on Florida Reefs. The average diver touched, kicked or bumped the reef seven times in the course of a dive.

The question she answers here: what difference does it make?

Most scuba divers stay in the sand grooves and cross over the spurs in areas of low or no relief. In an average dive trip (two dives, 45 minutes each), the average diver touches corals 5 times and fins corals 4.8 times. Assume a dive population of 50,000 divers consisting of 55 percent male divers and 45 percent female divers, then four percent of the corals would be touched or finned each week. To what extent, though, does this contact harm the coral? In 1989, I conducted controlled studies of touching and finning to understand the effect of these behaviors.

Touching Study

At Looe Key, three colonies of each of 11 species of corals were selected, mapped, numbered, and photographed. Once a week, for ten weeks, selected head corals were "touched" and "finned." Head corals were touched in one place six times and in another place two times. Branching corals were held for one minute or 10 seconds. "Finning" entailed brushing each coral with a piece of fin approximately 11 cm wide with six back-and-forth motions and, in another place, two back-and-forth motions.

Corals were photographed monthly to document their condition during the experiment and at several intervals up to eleven months after the conclusion of the experiment. Tissue samples were collected for histological study.

Because mucus is removed from coral when touched, it was anticipated that repeated touching might induce several physiological responses. But, I found that weekly touching of specific areas (more than the corals in even high impact areas are likely to experience) had no detectable lasting influence on the health of 11 species of corals, either visibly or histologically. In all species, the epidermis was normal and intact, the mucus secretory cells were normal and the gastrodermis was normal and filled with zooxanthellae. No conclusions could be drawn regarding the effect of the touching study on reproduction or parasites or a decrease in growth rates.

During the experiment, no reaction was seen after light impact, but subtle color changes were seen after heavy impact in some corals. In most cases, normal coloration returned within 24 hours, but in a couple of cases, the discoloration remained eleven months after the completion of the experiment.

Since the histological study showed no abnormalities in the epidermal layer, the reason for the color change is unknown and may have been the result of removing some of the mucus layer, which the coral was able to replace

within 24 hours. Another explanation could be that coral polyps tend to contract quickly and tightly into their calices when touched. Additional touching might cause the coral to pull in even further, causing an apparent color loss.

All corals exhibited normal feeding responses when observed either during the day or at night. The *Dendrogyra cylindrus* displayed a variety of responses to being touched: in the beginning, the coral withdrew affected polyps within seconds of being touched; on 7 July, it was unresponsive to touch and did not withdraw its polyps at any time during the manipulation, but turned white on another section of the colony; on 14 July, it withdrew polyps after 20 seconds; on 21 July, the entire colony turned white on the second touch and spawned; on 29 July, it withdrew polyps normally; and on 4 August, it retracted polyps after one minute of touching.

"...weekly touching of specific areas (more than the corals in even high impact areas are likely to experience) had no detectable lasting influence on the health of 11 species of corals..."

On the follow-up dives of 15 September, 28 November 1989 and 4 July 1990 to view the condition of the experimental corals, all the corals appeared healthy; the areas from which tissue samples were taken had been grown over either by polyps or algae and were not visible.

My conclusions do not imply that regulations against touching should be relaxed. Rather, they mean that in protected areas, where divers are discouraged from interacting with the reef, the rate of touching does not appear to be sufficient to harm corals. Divers on Sanctuary reefs seem more careful and less apt to touch than divers at unregulated areas; therefore, the government should increase the amount of reef under Sanctuary control.

Secondary Diver Effects

So, divers directly touching corals are not responsible for degradation of corals in Looe Key Marine Sanctuary. Nonetheless, reefs are deteriorating especially in heavy use areas. I believe that secondary or diver-related effects are an important component of the decline. Diver-related activities that could seriously impact reefs include physical damage from boat groundings and anchors, as well as deterioration in water quality.

Private and rental boats are more apt to run aground or cause anchor damage than concession or commercial boats. In regulated areas, installation of mooring buoys and vigilant patrols by Sanctuary officers have reduced

The Birth of Environmental Disasters

Killer Algae, Dying Algae

A killer algae is proliferating in the Mediterranean off the Riviera, foreboding a major ecological disaster, reports the Associated Press.

First seen in 1984, this algae (*caulerpa taxifolia*) has spread to the French-Italian border, smothering all forms of plant life and choking the delicate sea grass that feeds most Mediterranean fish. Alexandre Meinesz, a marine biologist and caulerpa specialist, compares the effect of the algae to pouring bleach into the water. He said it could eventually threaten humans if edible species of fish begin to consume it. The algae is so toxic, a group of sea urchins consumed their own waste and pieces of plastic in their aquariums rather than eat it.

When found in tropical waters, including the Caribbean, the algae, says Meinesz, is usually covered by other algae, and less toxic; it is consumed by fish.

No one knows for sure how it found its way into the Mediterranean, but some marine biologists believe a strain escaped from tropical aquariums at the seaside Jacques Cousteau Oceanographic Museum in Monaco. With graceful, fern-like leaves, the caulerpa has been a decorative staple of the museum's tropical aquariums since the early 1970s.

"If you dive under the Oceanographic Museum, where the caulerpa was first found, there is nothing — no animals, no marine plants, no fine sand, no star fish, sea anemones or mollusks," Meinesz said. "All that's left is a thicket of stems and leaves from the surface

down to about 150 feet," he said.

Museum director Francois Doumenge has denied the charges, hypothesizing that the weed has been around for years but lay "dormant" until recently, or that ships brought it in.

Meinesz sounded the first alarm in 1990, warning that the algae threatened the balance of the Mediterranean's ecosystem. But few listened. He blamed museum officials for delaying Mediterranean rescue operations by denying responsibility and playing down the toxicity of caulerpa. "The scientific community has long been aware of the toxicity of caulerpa taxifolia — it's like a cancerous tumor that can't be stopped, destroying everything in its wake," he said.

Now while this deadly algae is spreading, good algae is dying. Researchers at the University of California at Santa Barbara report in *Science* the first evidence that the hole in the ozone is having an adverse effect on living things. The ultraviolet light streaming through the Antarctic ozone hole appears to be reducing the growth rate of algae around that continent by 6 to 12 percent during the season when the hole is open. Oceanic plankton forms the base of the Antarctic food chain, which supports not only local marine life but whales that migrate into northern waters. In these waters, algae blooms occur in the uppermost layer of the sea water, where they are most vulnerable to harmful short-wavelength UV radiation.

breakage due to boat groundings and anchor damage. But, many popular dive locations in unregulated areas are without mooring buoys and the damage continues. Larger boats with deeper drafts that carry more divers at one time foster the resuspension of sediments that could drift over the reefs. They also resuspend nutrients and organic matter trapped in the sediments, thereby promoting algae growth. A diver problem even more serious?

"300 divers urinating in the water over the reef could increase the nitrogen and phosphate concentration of the water by 25 to 50 percent."

Because concentrations of fixed nitrogen and phosphate are very low in reef waters, the question arises whether divers and their boats significantly affect water chemistry, thereby promoting algae growth and coral destruction.

Some dive boats don't have heads and those that do seldom encourage divers to use them. Boats with heads are required to have holding tanks so that fecal material is not injected into the water over the reefs. This law is not stringently enforced and, as a result, some boats do discharge fecal material over the reefs. However, commercial dive boats are allowed to dump their holding tanks in the channel, which they usually do on the return trip to their docks. The water in the channel is then carried oceanward onto the coral reef.

Emptying holding tanks creates one sort of problem, but the urine of submerged divers may be creating another serious problem.

For example, on a single day, more than 300 divers may use the 1200 by 200 meter core area of the Looe Key Sanctuary. Since reef waters are naturally nutrient poor — and urine has more than a million times more nitrogen and phosphate than an equal volume of reef water — 300 divers urinating in the water over the reef could increase the nitrogen and phosphate concentration of the water by 25 to 50 percent. Fertilizing a reef can reduce rates of coral calcification while stimulating algal growth and clearly, more and more algae is appearing on Florida

reefs. In addition, sunscreens, lotions, insect repellents and fish food (soft cheese, bread and cut bait) further add nutrients to reef waters.

How long do these highly concentrated nutrients linger? Longer than we might imagine. At least one study has shown that neutrally buoyant material or parcels of water can remain on or near reefs for one day to several weeks. A study at Looe Key found that neutrally buoyant matter has a residence time as long as 25 hours. This may indeed be long enough to effect the health of the reef and needs further investigation.

One may wonder how such a small quantity of nitrogen or phosphate can affect a reef? To understand, one only need learn that the rainforests of South America receive their phosphorus from the dust of the Sahara! Great winds lift these tiny particles, carry them across the Atlantic, eventually depositing the equivalent of one pound per acre on the Amazon jungles — enough to

fertilize its lush vegetation. Yet, 50,000 divers per year on Looe Key can deliver 2.5 pounds of phosphate per acre!

If divers are damaging corals by chronically and inadvertently fertilizing heavily used reefs, this problem can be reduced by educating divers and concession operators that metabolic wastes should be disposed of in sewage treatment systems. And, realistically speaking, since many divers will indeed urinate during a dive, they should be advised to move away from the reef or rise to the surface where waves and currents can rapidly dilute the urine. Their urine may be a far more significant enemy to the coral of heavily dived reefs than inadvertent kicks and touches.

The author, Helen Talge, has lived in and dived the Florida Keys for more than 30 years. She has studied coral bleaching on the Reefs of St. Croix and is completing her Ph.D. at the Department of Marine Sciences, University of South Florida.

Getting the Bends out of the Closet

—the problem of denial

Decompression sickness (DCS) or “bends” is a statistical inevitability in diving. It has no conscience and rarely abides by any set rules.

What concerns many of us in the business of treating divers is that too many sport divers absolutely deny the possibility that they might have been bent, even though the symptoms they experience are clear to others and should be clear to them. Almost all of us know individuals who have surfaced after a dive and exhibited DCS symptoms, but steadfastly refused further evaluation or even basic surface oxygen.

The bends stigma

For many divers, there is such a stigma attached to announcing that one may be experiencing symptoms, that the bent diver simply ignores or denies the symptoms. Yet, any delay in reporting symptoms and seeking treatment only leads to a poorer prognosis for recovery. Why, flying in the face of all common sense and logic, would any intelligent adult ignore symptoms with the knowledge that DCS manifestations get worse with time?

Why? Because divers have come to believe that they, personally, have erred if they get DCS. They can expect to be blamed for bad profiles, criticized for screwing up, blamed for drinking a beer or exercising, or get labeled as a “bad diver”. Rather than report seemingly insignificant symptoms and get immediate treatment, too many divers would rather dodge embarrassment, by hanging on to their pride until the pain gets too great. Such a delay can mean that greater and perhaps permanent damage, once preventable, will occur.

It's time for diving leaders — and even typical sport divers — to stop pointing fingers and using antiquated analogies (“he screwed up and got bent, the idiot!”), or continued reluctance to report symptoms will prevail.

We have to remove the “blame” that is so improperly tied to DCS reporting. With very few exceptions, it is no one's fault that he got bent; a diver can follow his dive plan precisely by the book and still get hit. Likewise, a deliberately high risk dive profile may not produce symptoms. Although we can identify certain factors predisposing divers to DCS, it is still impossible to explain the exact mechanisms of physiology that allow one diver to be bent while his partner escapes unscathed.

*“It's time for diving leaders
— and even typical sport
divers —to stop pointing
fingers...”*

Where bends is seen as normal

In the commercial diver ranks, a different attitude prevails. Divers are trained to report symptoms as soon as possible and the attitude of diving supervisors is one of accident “containment,” not accident “crisis”. Bends is regarded as an occupational hazard that will occasionally occur; commercial operators and the more progressive

sport diving facilities regard DCS as a manageable scenario. For the best outcome, divers and chamber supervisors work in a partnership of honest reporting of even slight symptoms with prompt evaluation and treatment.

If DCS is promptly reported and evaluated with ensuing on-site treatment, then the prognosis for complete resolution is often excellent. The attitude of many chamber operators is "No matter what the problem, if reported and treated quickly, we can clean the diver up."

"Because of the potential cost of treatment, no doubt many divers denied their DCS symptoms, hoping they would simply disappear."

Type I DCS (mild symptoms, pain only) affords less risk than Type II DCS (serious symptoms, central nervous system involvement), but, in either presentation, aggressive oxygen therapy and prompt recompression has produced nearly a 98 percent success record.

In March of 1991, a DAN/AAUS/NOAA Multi-day Repetitive Diving Workshop held at Duke University included representatives from the sport, commercial, and scientific diving communities. Some interesting statistical patterns developed as the workshop unfolded. The overall incidence of DCS for commercial divers was approximately 1 in 1000 dives; for the sport divers, it was 1 in 10,000 dives; and the scientific diving community rated an extremely low 1 in 100,000 dives.

With this rather startling multiplier of 10 between groups, it would be tempting to draw the too obvious conclusion that the scientific diving group is 100 times safer than the commercial diving group. Rather, a clearer pattern of diving "attitude" seems to be the reason.

Most scientific diving projects are planned from inception to eliminate as much risk as possible. This is accomplished by strict training and supervision and a markedly conservative discipline in dive profiling. At the other end of the spectrum, the commercial diving community must deal with a job performance/task completion goal motivated by economics. Per capita DCS rates may or may not reflect the effectiveness of either approach to accident management, but the commercial operators are steadfast in their opinion that immediate evaluation and treatment are an acceptable alternative to a lesser incidence rate.

Of course, no bends hit is a good one, especially if you are on the receiving end. Terry Overland of Oceaneering International made this point: "While most sport and scientific dive operations would like to reach zero percent DCS incidence, in commercial diving, this is simply

unrealistic. Ideally, we would like to reach a zero rate on Type II hits, but we still feel that our protocols allow us to treat DCS effectively enough that Type I hits are essentially manageable.

"What I'm saying is that we accept that if we give a worker a hammer, he will eventually hit his thumb and when he does we'll treat it. We have the technology to handle DCS hits and we feel that this is a more responsible outlook than attempting to unrealistically eliminate the malady. It's going to happen. Let's be prepared to treat it. Importantly, our divers feel that our system works and it's their butts on the firing line."

Oxygen is the key

First and foremost, we have to encourage reporting of symptoms at the earliest observation.

Second, the importance of surface oxygen by demand valve/mask cannot be overemphasized. A significant percentage of symptomatic DCS patients may be relieved following a 30-45 minute, 100 percent oxygen breathing period, if delivered by demand valve/mask immediately upon experiencing symptoms.

During the year I was in charge of diving operations aboard the Ocean Spirit, I observed nearly a dozen cases of symptomatic DCS clear completely, following demand system oxygen during transit to our chamber on the ship. We were successful in encouraging divers to report any symptoms and had a 100 percent resolution rate on every DCS case we treated. Our overall incidence came out to be approximately 1 case in 12,000 dives; this is significant since we allowed an unlimited diving program with respect to depth and numbers of repetitive dives daily. In the space of one year, we conducted almost 80,000 dives!

Until recently, there were few operational recompression chambers in remote resort sites, and divers who manifested DCS symptoms were faced with expensive medivac transportation and significant delays. Because of the potential cost of treatment, no doubt many divers denied their DCS symptoms, hoping they would simply disappear. Thankfully, we are seeing more and more fully operable field chambers coming into use. Grand Cayman, Cozumel, Roatan and even some liveaboard vessels feature state-of-the-art treatment facilities that would have been unthinkable only a decade ago.

With the advent of affordable medical insurance such as that available through DAN, the financial deterrent to admitting DCS and seeking help should be removed.

It's time divers woke up to the fact that bends is an injury like any other and common sense dictates its treatment. Finally, the encouragement of prompt reporting with no associated peer or professional blame will vastly improve the safety of a sport infamous for symptom denial.

Bret Gilliam, who resides in Brunswick, ME, has helped set up chambers in the Virgin Islands, Belize and Roatan, as well as on the dive vessel Ocean Spirit. His company, Ocean Tech provides consulting services in the diving and marine industry. He is the author of *Deep Diving: An Advanced Guide to Physiology, Procedures and Systems*.



■ The animals of the sea are not silent, as any diver knows who has paused to listen. But new computer-based research has discovered extraordinary communication — pulses, clicks, squeals, and hums — between fish at frequencies and decibels previously undetected. *Pacific Discovery* magazine reports that Philip Lobel, a Woodshole biologist, has discovered new meaning in the sounds. “Damsel fish make two types of pulsed calls. At first they seem very similar. But analyzed subtly, we see very consistent differences. One is romantic and one is aggressive.” The female yellow bellied hamlet squeals just before releasing her eggs, signaling the male to release sperm. And, Lobel says, the character of a male’s “voice” may be central to female mate selection. Males appear to advertise their size and degree of enthusiasm with sounds, most occurring at frequencies not detectable by the human ear.

■ Carl Roessler (See and Sea Travel) found a full page Sea World ad in the Delta Airlines magazine that, in all its sensationalism, said: “Sharks. Barracudas. Moray eels. They are some of the sea’s deadliest creatures and now you can find them all together in one killer attraction at Sea World in Orlando — New Terrors of the Deep.” Roessler fired off a letter to Sea World saying that “The ignorance and greed this represents are shocking. Moray eels and other creatures are not bloodthirsty monsters and your sensationalized misinformation does a disservice to the public....A million divers know that this ad is nonsense. Anyone in the diving community who sees this ad will have nothing but scorn and contempt for Sea World’s marketing. The public should get an apology for this irresponsible information.” Roessler received no response.

■ One reason computers have taken hold is that most sport divers forget how to work the tables. In Australia not long ago, questionnaires were mailed to 1565 divers asking them to figure out two simple dive profiles; 380 responded. Only 44 percent completed the first profile correctly and 37 percent completed the second without error. This is corroborated with data from an American study conducted a few years ago in which 2576 divers were asked to complete five decompression problems

similar to situations that might arise on charter trips. Only 49 percent got them all right. In another study of 1000 active certified divers, only 20 percent could correctly answer a single repetitive dive problem.

■ So, are computers the answer? Not in Scotland, anyhow. David Greenwood, one of the leaders of the Scottish Sub Aqua Club (a training and membership organization) reports in the magazine *Scottish Diver*: “By and large the Club has not been convinced that [computers are] in the interest of its members and having taken the opportunity to try out some of these ‘machines,’ I am now convinced they are right. . . .Use a dive computer both as a depth gauge and timer, but not as a decompression meter. . . .Make sure you dive the tables, even though these computers give you less time.” You figure it out. Maybe their members can handle the tables better than the Yanks and Aussies.

■ In the first extinction of a species attributed to ocean warming, a type of eastern Pacific coral (a variant of a *Millepora*) was wiped out by a periodic shift in sea currents that heated coastal waters off Central and South America, reports the UPI. The 1982-83 El Nino — a recurrent alteration of Pacific Ocean currents — caused the coral’s demise by bringing warmer water to the coast of Panama, the only place the species had ever been seen. The temperature increase of 3.5 to 5.5 degrees F. lasted 5-6 months, inflicting lethal stress on the coral, which has a particularly high sensitivity to sea warming. Many scientists believe that the widespread disease and coral die-off (coral “bleaching”) observed on many Caribbean and Pacific reefs are caused by rising water temperatures that stem from El Nino currents or, possibly, from global warming. Corals can recover from bleaching, but repeated episodes can kill. Species restricted to limited habitats can be rendered extinct.

■ Jacques Cousteau has just warned the House Foreign Affairs Committee that global warming is contributing to the destruction of the world’s coral reefs. “I’ve been all over the world and, from what I can see, warming temperatures are affecting coral reefs,” Cousteau told the . “It’s the first scientific statement I’ve heard saying the temperature change has an adverse effect on the reefs,” said Rep. Dante Fascell, D-Fla, committee chairman and author of legislation establishing the Florida Keys National Marine Sanctuary. Hopefully, Fascell has heard his wake up call. Many scientists believe that global warming is running out of control and could lead to total ecological collapse. Greenpeace sent questionnaires to 400 climate scientists; it had responses from 113, of which 13% believed a runaway greenhouse effect was probable, 32% thought it possible and 47% thought it improbable.

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