

# undercurrent®

THE PRIVATE, EXCLUSIVE GUIDE FOR SERIOUS DIVERS

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## Sea Dancer, Turks And Caicos, B.W.I.

### -- Can A Hotel Chain Run A Liveboard Dive Boat?

Dear Reader,

You and I know that the Divi Corporation can run hotels and casinos. It's proven that with their resorts in the Caribbean on both Curacao and Aruba. When it bought Bonaire's Flamingo Beach it teamed up with Peter Hughes, who had the dive operation there and then went on to other diving-oriented hotels such as the Tiara Beach on Cayman Brac. Now it's on Barbados, in the Bahamas, and expanding rapidly.

But can this hotel chain design, outfit and run a diveboat, tailored to the needs of a handful of hardcore aquanauts, not leisurely suited people who spend their waking hours beach and poolside? Divi sure thinks so, and that's why it launched the 110 foot Sea Dancer last fall, pointing it toward the virgin diving of the Turks and Caicos islands.

If successful, Divi's entry into the liveboard business marks a new era in dive travel. Ten years ago, Paul Humann's Cayman Diver and Duncan Murihead's Misty Law, in the British Virgins, were just about the only liveboards around. Whatever liveboards were available had one thing in common: they were owned and captained by a person with the love of the sea who hoped to make an income doing exactly what he wanted to. But for every good little boat out there, there were plenty which pumped noxious air -- if the compressors worked at all -- served lousy food, and were piloted by scurvy captains who didn't know the dive sites. As divers grew in sophistication, these little boats were not satisfactory.

Carl Roessler of See and Sea Travel, sensing the developing upscale diving market, scurried around the planet to locate small boats outfitted for diving which were able to guarantee good accommodations, good grub and good diving, a simple enough prescription, but not so often delivered. By lining up boats in Belize, Fiji, Australia and elsewhere, his success spurred other tour arrangers

#### INSIDE UNDERCURRENT

Star Charts .....	pg.3
Invest In Divi? .....	pg.5
<i>Sea Fans: A Video Magazine For Divers</i> <i>--Are There Videophiles As Well As</i> <i>Bibliophiles? .....</i>	pg.6
Preventing Post-Dive Hypothermia Taking Advantage Of The Green House Effect .....	pg.7
Potential Neurological Damage In Divers <i>Serious Risks Even For The Casual</i> <i>Diver .....</i>	pg.8
More Neurological Risks To Sport Diver .....	pg.9
Oceanic Datamax Depth Gauges .....	pg.11
Free Flow .....	pg.12



to follow the lead. And once they could produce the divers, boat building entrepreneurs appeared, first those who converted craft designed for other purposes into dive boats, followed later by clusters of entrepreneurial partnerships which began designing new craft exclusively for liveboard divers. Today the market is brimming with boats. And more are coming.

Diver-designed liveboards are not a new idea. In the 70's the Superboat was launched with great fanfare in Hawaiian waters, but it never made a go of it financially. Other diveboats were under construction in the shipyards of New Orleans and Miami, but most were underfinanced, poorly marketed, or just plain ahead of their times. Those that got finished went on to other missions.

Today, dive boats are hitting the water as fast as you can swing a champagne bottle. The difference today is an upscale diving market, boats financed by experienced entrepreneurs (not divers with escapist dreams), excellent marketing and management, and first class boats which deliver.

The Sea Dancer is the first dive boat to be designed and put to sea by a major hotel chain, which is fortunate to have as corporate vice president Peter Hughes, himself once a diver with an escapist dream who got tired of filling tanks for a living. Years ago, Hughes ran his own operation on Cayman, then Bonaire and Roatan, before signing on as vice president of Divi. Will the Divi/Hughes combination be as successful on sea as they are on land? In June we put our correspondent aboard the Sea Dancer to give us an answer.

\* \* \* \* \*

Now, I know there is good diving in the Turks and Caicos Islands, because I've seen it from the land based operations. But there's so much reef and wall around this archipelago 550 miles to the southeast of Miami, that I would wager that the limited diving services have access to less than ten percent of diving. Only a good liveboard can find out what is truly here.

After clearing customs at Grand Turk's little airport, I was greeted by a ship's officer in his pressed dress whites: Jack Mazza, Operations Officer of the Sea Dancer. Being the informal lout that I am, I didn't cater to his dress, just as I don't cater to Gavin McLeod and that whole Love Boat crew. I was coming to dive, not to join an Italian cruise ship. But Mazza, a cheerful chap, saw to it that my baggage was quickly snatched up and loaded and that I was underway without a hitch for the ten minute ride to the berthed Sea Dancer.

The 110-foot boat looked sharp, as a newly constructed craft ought to look. The kitchen and bar sit on the upper, partially-covered deck, where there is ample space for the full complement of 24 passengers to lounge in the sun or eat under cover. There is also a color TV, VCR, CD player, cassette tape deck and a slide projector in the lounge, which I'm not all that keen about. I come to get away from it all. The twinkling stars, the tropical breeze, a full moon and a good book is it for me. I may be in the minority.

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I was immediately impressed with the well-designed and roomy gear/tank storage and suiting-up area on the lower deck. The boat was designed with photographers in mind. There's a large table for photo equipment only and a darkroom, where the crew handles overnight E6 processing. You can even rent a strobe, should yours flood, or an Edge, if you get edgy about repetitive dives, or a Sony minicam to produce your own underwater tape.

With all this luxury and deck spaciousness, I was eager to get to my cabin ... and just as eager to get out of it when it turned out to be large enough only for Lilliputians. Storage space was so limited that some divers kept their suitcases in the companionway outside their rooms. My roommate and I could not unpack, dress, or grease O-rings in the cabin at the same time. We had to work out a time-sharing system. Sleeping in the small bunks would be difficult for anyone much over six feet; the reading light at the head of my bunk may have creased my scalp forever. Next time I would pony up an extra \$100 for the cabin with a so-called, but undersized, queen sized bed. I had a private head and shower in my cabin, but others required shared facilities. Although air-conditioned, each cabin is without separate temperature controls, so it was often quite chilly. A few shipmates put duct tape over the ventilation grill in their rooms to keep the frost off.

The Sea Dancer as a Caribbean Liveaboard	
Diving for Experienced Divers:	★ ★ ★ ★ ★
Diving for Beginners:	★ ★ ★
Accommodations:	★ ★
Boat otherwise:	★ ★ ★ ★ ★
Food:	★ ★ ★ ★
Money's Worth:	★ ★ ★ ★ ½
★ poor, ★★ fair, ★★★ average, ★★★★ good, ★★★★★ excellent	

Had the ship's quarters for 24 been reduced to quarters for 18, say, accommodations would be much more comfortable. Perhaps I'm naive about the economics of liveaboards, but \$995 bottom price for seven nights is nearly \$24,000 when the boat's filled. \$18,000 a week might not be enough to keep the crew in their whites, but wouldn't it be enough to keep Divi in the black? Anyway, travel light!

Enough carping. Other than cabin problems, she's a whale of a craft, and very pleasantly crewed. Captain Bruce Gardener is a young and affable fellow with a group of committed hands who kept the boat clean, the tables set, and the tanks filled. Chef Stanley Simmons produced delicious and varied meals. Breakfast: eggs cooked to order one day, pancakes or French toast another, with bacon, sausage, muffins, etc. Lunch was a bountiful buffet and sit down dinners were served on white linen table cloths. Barbecued steaks, home-made meatloaf, lobster, fish, mashed potatoes, and fresh tossed salads were standard fare. Rachel Running, always with a genuine, dazzling smile, and courteous Preston Dickinson efficiently served our meals and kept our cabins immaculate.

When I wasn't eating, I dived. Much of the lower deck is laid out with tanks strapped along both sides and individual gear storage spaces below a row of seats. I'd simply sit down and slip into my tank, grab my camera from the large camera-only table, and walk down the stairway to the sea level stern platform. The platform has two ladders leading down to four feet below the sea surface. All in all, it's an excellent design. Two fresh water rinse tanks are provided for dive gear, two hoses for diver's bodies, and a separate rinse tank exclusively for cameras. Sea Dancer was commissioned with a couple of Zodiacs to assist diving, but they've been damaged and not replaced. I don't think the living suffered.



A large air bank always provided quick and complete fills, never less than 3200 psi in the aluminum 80's. Two noisy diesel air compressors are in the forward part of the deck and often disturbed the tranquility of the boat. In fact, the crew wore sound-protecting "ear muffs" while the compressors were operating. To help minimize the noise, acoustical enclosures were originally built around the compressors; however, they apparently lead to heat build-up and potential compressor failure. During my trip, a compressor technician came on board to tear down and rebuild the compressors -- with no loss of diving. He had another problem to deal with as well. Some Dancer tanks were producing a build-up of flaky white deposits on some regulators' first stage sintered filters. One diver's first stage failed, but no one could be sure the deposits were to blame. The crew claimed they were "salt deposits," but they did not taste salty. The tanks were to be visually inspected next week.

This is a boat for experienced divers. There is no hand holding, so a timid novice best go elsewhere. Divemaster Nick Craig is very experienced, but he does not guide dives. Oh, he will if requested, but he assumes all divers know what they're doing. In fact, he rarely dove with any of our group. He reviewed our certification cards, and had each of us sign a standard waiver, but other than that we were on our own unless we requested assistance. But if someone did, I'm pleased to say, the crew was always right there to tighten a belt, turn on the air, or hand cameras to divers entering or exiting the water.

Nick, in his intelligent and witty fashion, did a fine job outlining the dive sites, what critters or topography to look for, and how to plan one's dive. The Dancer cruised the island of Grand Turk, where the wall starts in 40-50 feet of water and South Caicos Island, where the wall begins at 70 feet. Many dives begin quite similarly; 100-200 yards from the shore the sand slopes to about 50 feet, and the top of the coral wall, 30-50 feet wide, rises to within 30-50 feet of the surface. The coral is lush and the top and outside face of the wall is truly vertical, at times even undercut. Below 80 feet, I found plenty of black coral. Even with the bad weather at the start of my trip, visibility approached 100 feet most dives and there were no currents.

Some of my dives were doozies. At Grand Turk's "Amphitheater," large French and queen angelfish and even the black durgons showed no fear and were easy targets for my camera; with plenty of beautiful coral and virtually every Caribbean tropical, this is a super and simple dive. Here I saw one of several sizeable hawksbill turtles that we ran across at the sites, and at night I discovered a one-inch orange frogfish -- and me without my macro! At "MacDonald's", where a nice arch provides a great backdrop, the wall starts in 50 feet and goes straight down to 7000 feet. During a couple of dives here, large and friendly groupers were abundant, as were schools of large-eyed jacks and some sizeable scrawled filefish. At the Coral Gardens I pattered around with a five foot nurse shark, was followed by a couple of big barracuda, and in the coral found several lobsters and king crabs. At the "Tunnels" I dropped to the bottom and fiddled with my gear while waiting for my buddy. When I looked up an enormous manta was bearing down on me. He came within half a dozen feet, arched up to perform a perfect 365° loop, then disappeared over my head. My buddy finally arrived, so the manta returned just for him. Mantas, ten feet across, appeared three or four other times here, apparently because the plankton had bloomed (so the visibility had dropped to 50 feet). At South Caicos, it was more of the same, with the one differentiating dive on a sunken plane (a Corvair 440, once used in drug running), where the fish abound, and the opportunities to play with octopus and coral crabs were superb.

In a word or two, the combination of reef and wall diving rates among the



best in the Caribbean. Nothing, so far, beats Little Cayman, but diving from the Dancer is a pretty fair second.

Finally, I must address one bit of hype. The Dancer is not my only target, just one of them. Their ads trumpet "Unlimited, Round-the-Clock Diving" which just isn't true. Indeed, you can dive your ass off, but the moment I stepped on board I was told that because of "insurance purposes," one could only dive between 7:00 A.M. and 9:00 P.M. Why not just advertise that a diver can have all the tanks he wants during just those hours alone? Can you imagine anyone not taking a diveboat because they don't permit midnight dives? Dumb.

Regardless, Sea Dancer, I liked the shape of your ship. I liked your diving. I'm sure you got your air cleaned up. I'm not so sure I like the Lilliputian economist who designed the cabins, but I survived. Divi's venture in into the liveboard boats shows they can manage -- and they can improve. It looks like a money maker and we divers can expect to see more of them. The Sea Dancer offers an excellent foray into virgin Caribbean waters and I rate it with the best. But from a hotel corporation, it could even be better.

\* \* \* \* \*

Well, readers, I called Peter Hughes to talk about that flakey white powder. Peter says when the boat runs short of fresh water, they put sea water in the cooling tanks where the diving tanks are filled. Some salt deposit is bound to form, but it is harmless. As for the noisy diesel compressors, the Sea Dancer doesn't have the generator capacity for electric compressors, says Peter. "We put in things like a dishwasher, which normally are not found on a boat like this. So our electrical requirements were too much and we had to go with diesel." I suppose those are the kinds of gaffes one might expect when the builders of hotels build boats. At sea, life's a little different.

C.C., travel editor

Divers Compass: Pan Am (\$220 round trip from Miami), the only carrier, flies only Sunday and Wednesday, so missing a plane on either end means a 3-4 day wait for the next one; some divers have been stuck! ... that flight schedule means Sunday to Sunday trips ... you can charge your strobes on board the Dancer without a converter ... standard T&C currency is the U.S. dollar and English is the language ... Since the T&C prime minister was jailed as junkie, the possession of "recreational" drugs is severely punished ... Only tanks, backpacks, and weights are furnished ... Film, batteries, suntan lotions, toiletries are available for a price ... bring your slides or VHS tapes for

### Invest in Divi?

There are few ways for a diver to invest directly in his sport.

Divi Hotels -- which owns the Flamingo Beach on Bonaire, the Tiara Beach on Cayman Brac, and the Sea Dancer -- is a publicly traded on the American Stock Exchange and an investment there indeed puts you close to the source of your pleasure. In fact, Divi holds its stockholders meetings at its hotels, provides reduced rate accommodations and charter flights, and makes it all great fun.

We wrote last year about Divi as a potential investment (see Watching Your Portfolio Go Up While You Go Down, October 1986), at which time it was trading for 6 1/2 (October 1, 1986). On September 25, 1987 Divi was trading for 11 3/8, although it has been as high as 13 7/8 in the previous 12 months.

Divi is now the largest independent hotel owner-operator in the Caribbean, with a net profit of \$4.2 million. In addition to Bonaire and Cayman Brac, they have hotel and dive operations on Aruba, Curacao and Barbados, with plans for further expansion. Peter Hughes is the Vice-President for Marine Services.

You may get a copy of their annual report by writing to Divi at 520 West State Street, Ithaca, N.Y.



evening "film festivals" ... The price of all meals and soft drinks is included in the \$995 trip cost ... you can book the Dancer by calling 800/367-3464 or 607/277-3484; write Divi at 520 W State Street, Ithaca, NY 14850.

## ***Sea Fans: A Video Magazine For Divers***

### ***-- Are There Videophiles As Well As Bibliophiles?***

Ever since I was old enough to turn the pages, I began saving the books I read. As I write this, the book case in front of me is filled with diving and travel books: Roessler's *Coral Kingdoms*, Fead's *Easy Diver* -- and scores of Fodor's and Fieldings. The shelves in other rooms are filled with volumes old -- *The Plague* -- and new -- *The Man Who Mistook his Wife for his Hat* -- volumes intelligent -- *Politics and Vision* -- and trivial -- *Fear and Loathing in Las Vegas*. I like my books.

I've got a friend who likes his video tapes. He buys them like books and stacks them in his living room. I've got a VCR, but the idea of collecting video tapes seems quite odd to me. Once I read a book, I like to have it near, like an old friend, to recall the sweet and sour memories not only of the book, but even of where I was when I read the book. I was on the beach at Akumel when I read my first Ken Follett thriller. I didn't have my VCR there.

Now a friendly fellow named John Evans -- a Denver attorney and PADI instructor -- has bet his booty that I -- and thousands of other divers like me -- will become collectors of tapes, just as we collect books. John, you see, is the publisher of *Sea Fans* -- a ninety minute video magazine of diving with several feature stories which he sells for \$29.95 -- or \$99.95 for a four issue, annual mail subscription. That's quite a piece of change.

Three "issues" have already been published. And they are impressively filmed and edited, clearly a professional job. At times the features are overwritten and tedious, but if I found each issue better written, better filmed, and more interesting than the previous.

Filmed in a familiar *Evening Magazine* format, hosts Jimmy Ibbotson (lead singer of the Nitty Gritty Dirt Band, who strums and sings a tune or two) and Lynne Eisaguirre introduce the topics from the bow of a moving boat or the bar of an island resort. As with *Undercurrent*, the cornerstone of *Sea Fans* is travel, and a full hour is usually devoted to three destinations, which have so far included the Sea of Cortez, Bonaire, Palau, Truk, Little Cayman, Ponape, the British Virgins, and others. Although the film crew is a guest of the people they are filming and is not there to conduct a critical review, the episodes give an intelligent viewer a good understanding of the kind of diving he can expect and the accommodations and setting provided.

The Sea of Cortez is visited on the live-aboard dive boat, *Santa Barbara* (which we reviewed in 1985). A face-to-face interview with Captain Lane Larson is replete with good information about diving the Sea, including just how unpredictable diving the Sea can be. Footage of hammerheads and other critters are shown, but the narrator admits that on this trip the divers saw none of that. On the other hand, there is some fine footage of snorkeling with sea lions and informative shots of several dives. Potential divers may be surprised to see a rock-strewn bottom, with visibility lower than fifty feet, but they may be just as well surprised to see the raw beauty of the Sea and the virtually unpopulated Baja Peninsula, and the many islands replete with bird and seals.

On Bonaire, one gets a quick look at each of the hotels, gets a good interview with the legendary Captain Don Stewart, and a clear look at Bonaire fairy-land diving just the way it is. I haven't been to Bonaire for ten years, but it all rang true to me.

The land shots of Kauai are beautiful; underwater, the discriminating viewer will realize that the coral is drab, the fish colorful, the diving somewhat interesting. It's this sort of careful look that can serve the diver well.

A visit to Little Cayman nicely demonstrates the quality of the wall, the lush coral, and the fish life, but does little to help the diver select which of the three resorts he should select, since Mike Emmerman and Pirate's Point are really the focus (although that would be a good choice).

Perhaps their best piece to date covers diving the British Virgins on the *Tropic Bird* in their summer issue. By interviewing people aboard the boat, one indeed gets a feel for the kind of people you just might team up with on a liveaboard -- some you'll adore and some you'll ignore.

Each of the travel reviews give some indication of other activities one might experience during a stay, and many provide very useful information about the corals and fish. Did you know that there are as many as 600 varieties of coral in Palau, but only half as many in nearby Ponape?

One or two equipment reviews per issue -- a Scubapro regulator, a Seachute BCD, the DEMA show, a review of dive lights -- offers the sort of information one ought to be able to get from a good dive shop -- and often doesn't. A piece on dive lights



## Preventing Post-Dive Hypothermia Taking Advantage Of The Greenhouse Effect

After a day of diving, being frozen to the quick during the ride back home in a dive boat is no fun at all. At times, it's enough to make one want to cancel tomorrow's dives. The problem doesn't only occur in winter diving. Even long trips back in speedy boats on chilly days in the tropics can be very unpleasant.

New Zealander Rob Stephens, who has been diving, he says, since before World War II, has a simple and inexpensive solution he developed on trips between Auckland and the Kermadec Islands. A version of this article first appeared in the Journal of the South Pacific Underwater Medicine Society:

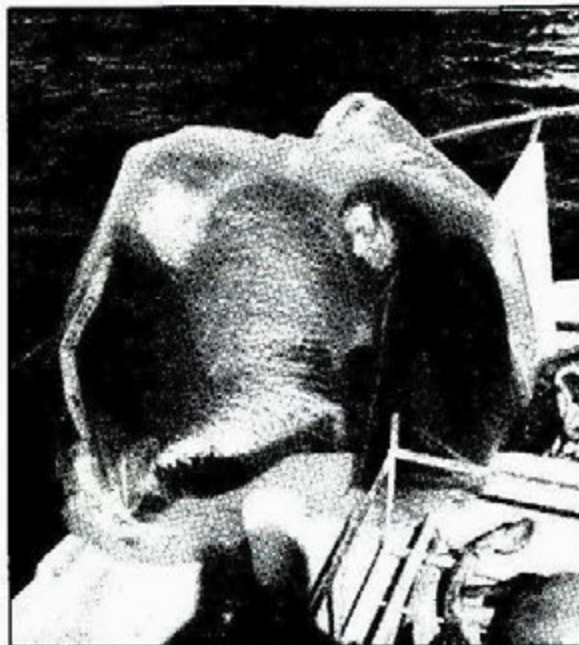
★ ★ ★ ★ ★

Perhaps the most common problem when diving from small boats such as inflatables is the cold. A winter dive miles from base means that a chilled diver must sit still in an icy blast for an hour, perhaps a couple of hours, during the journey home. Those who take "dry" clothes on such a trip usually find that instead of freezing in foam rubber, they freeze even worse in wet wool. Of course, a chill problem is not relegated only to small boats. Any boat without a cabin on a cold day can be very uncomfortable on a long trip home.

There is a simple answer -- a large transparent plastic bag. The illustration shows two adults sitting in their own private greenhouse which maintains its configuration simply by wind pressure. Once the occupants are inside the bag, they simply pull one side of the opening over a projection such as the outboard motor, leaving a generous hole about a foot across for the wind to enter and maintain inflation of the bag.

Three benefits accrue from this system:

- ★ Evaporative cooling of the wet diving suit virtually ceases because the air flow within the bag is very slow.
- ★ Body heat is largely retained within the bag's microclimate.
- ★ Even moderate sunshine produces a rapid



Keeping Warm In A Plastic Bag

temperature rise, evident from condensation on the inner wall of the bag.

It's not always easy to find transparent plastic bags, but after calls to several janitorial supply houses, I found a 49" by 50" 2 ml bag sold 100 to a case for \$32.

And another tip: on winter dives, one can carry a thermos of hot water so that on return each diver can have his suit filled with water as hot as he or she can bear it. This seldom seems hot to the person doing the pouring, but the diver's facial expression changes from tense apprehension to bliss and rapture as the water spreads from chin to toes. Some divers claim a bigger "buzz" from the warm-up than from the dive itself! Should it be necessary to remove the suit, it is worth pointing out that a warm suit comes off far more readily than a cold one due to its increased elasticity. Follow the external warm-up with a hot drink and within five minutes of return to the ship, your diver is a cheerful and efficient crew member once more.

in the summer issue, compared features of several lights and offers some useful evaluative information (e.g., the Tekna puts weight on the front of the light so your hand can get a little tired). When only a single product is reviewed, the segment seems a bit like a promotional pitch for that gear (which I doubt that it is), so I would hope to see more comparative pieces upcoming.

Each tape features a 10-12 minute interview with a well known photographer. Chris Newbert (*Within A Rainbowed Sea*) explained the technique behind a number of his winning photographs -- e.g., how to bracket with the focus in order to bring out certain features by blurring others -- that should be helpful to any macrophotographer. It's nice to get to know Newbert, a fellow as likeable as his photographs. In-



interviews with Howard Hall and Stephen Frink were less interesting, but useful for the curious photographer.

The tapes are rounded out with a filler or two -- spending the night in an underwater habitat or angel fish behavior.

I viewed the first tape several months ago and though the each tape is progressively better than the previous, my initial impressions have held.

The tapes are fun for remembering an area that I've already visited. It's nice to see the old faces and take a video trip through underwater canyons I myself once swam.

But they're most useful as a research tool in selecting a dive destination. By watching a segment on some far away place in which I may invest a few thousand dollars and a couple of weeks of time, I can get a much better sense of where I'm tossing my money -- what the rooms look like, the dive boats, and so forth.

But curiously, with the single exception of the trip on the Tropic Bird, I never did get the real "feel" for any place. Plenty of information, yes, but "the feel," no.

I think the reason lies in the intrinsic limitations of video: unlike reading, which allows one to create pictures in his mind's eye, video leaves little to the imagination. Video buffs may feel otherwise, but as I'm a reader rather than a film collector, I find that resort reviews in a video "magazine" don't provide the same depth as reviews in this publication.

I don't write this out of loyalty to *Undercurrent*. While watching the tapes I found myself tuning in and out, and feeling a bit unfulfilled at the review's conclusion. That's me, the reader. To select dive

destinations, I'd rely mainly on *Undercurrent's* critical reviewing and *Skin Diver's* general reporting and photographs, using the video of *Sea Fans* to back up the written word. No doubt, the videophiles among us will disagree.

Evans believes he can find the videophiles. He got the idea for *Sea Fans* by looking over the demographics of *Skindiver* subscribers and noting the high percentage of VCR owners. Evan's says he won't need a very high percentage of divers to make *Sea Fans* work. He needs quarterly sales of 10,000 for a fully viable product. Although initial purchases have resulted from magazine ads, dive shop purchases and rentals to their customers are spurring more people to subscribe. Currently, there are 2,000 subscribers.

Before you plunge in for an annual subscription, find a local dive store that will rent you the tape and take a look. Select one featuring someplace you've been and see if the journalism rings true. If so, and if you're a video collector -- or so crazy about diving you have to have everything published about it -- you can then spring for the subscription price.

But if you're not a buyer, consider renting a tape to review a destination before you travel to it. I don't think it would be helpful to pore through a series of reviews in search of a destination. Use *Undercurrent* and even *Skindiver* for that. But once you've narrowed it down, twenty minutes with *Sea Fans* will help you give you confidence about your choice -- or help you change your mind.

To get more information or subscribe at \$99.95 for four issues, write *Sea Fans*, 7800 E Iliff, Suite E, Denver, Colorado 80231, or call 800/622-8767.

Ben Davison

## Potential Neurological Damage In Divers

### -- Serious Risks Even For The Casual Diver

It's been our considered opinion -- and the opinion of most people in the diving industry -- that the introduction of the decompression computer, especially the ORCA Edge, makes diving safer. After all, it is more conservative than the Navy Tables and provides a continued readout of depth and time underwater as well as computing no-decompression limits and the time left for a dive.

But, in response to that, we wish to present a provocative article from William Schane, M.D., the staff physician and diving officer of NOAA's (the National Oceanographic and Atmospheric Administration) Caribbean Undersea Research Program. Dr. Schane cites substantial medical evidence to show that we know so little about the physiological consequences of breathing compressed air that any

device that gives us the ability to dive deeper and longer seriously increases the risk of developing long-term health problems.

★ ★ ★ ★ ★ ★

With all the accolades being accorded the development of decompression computers, I think major cautions need to be voiced in response.

First, it is becoming increasingly evident that there are long-term consequences to breathing air at pressures greater than atmospheric that have only recently become evident, and which are not addressed in ANY of the decompression models currently in use. At the risk of appearing iconoclastic, we do not have the foggiest idea of how the human body



handles gases breathed under pressure! One expert has called decompression theory "the worse form of black magic."

Second, no means of calculating decompression requirements, whether with hand-manipulated tables or electronic calculators, is any better than the mathematical or empirical model upon which it is based.

Since I found that the average diver hasn't learned where diving and decompression tables came from, how they were derived and tested, and how large a number of assumptions are made during their development, it would be worthwhile to address some of these issues.

Two major theories attempt to define the single-most important factor which limits inert gas transport in the human: the diffusion theory and the perfusion theory.

The diffusion theory says that tissues will accept or eliminate inert gases as rapidly as those gases can spread by diffusion through the tissues. The perfusion theory proposes that tissues will accept or eliminate inert gases as rapidly as blood flow will permit.

---

*"We still do not have the vaguest notion of how the human body handles culprit gases."*

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Over the 80 years since Haldane, scientific preference has oscillated back and forth between these two. At the present, the perfusion theory appears to be preferred. However, even such a fundamental issue as this remains in dispute.

Additionally, debate rages in the diving medicine community at present whether oxygen should be considered an "inert" gas when it is present in quantities greater than the body can use -- which is the case when a diver submerges and begins breathing compressed air. There are reasonable arguments for both views. However, all the tables with which I am familiar ignore oxygen in all calculations.

In September of 1978, the Undersea Medical Society held a Workshop in Bethesda, Maryland, assembling 23 of the world's authorities on the decompression theory. As a part of their deliberation, they reviewed the 12 major assumptions used to develop new tables. Their consensus -- nine years ago -- was that many of these 12 assumptions have been proven wrong. Nonetheless, all the tables, then and now, are based upon most of these assumptions.

At the Scientific Meetings of the Undersea Medical Society in 1982 and 1984, each attended by more than 100 of the brightest minds in the field, a similar review of the assumptions underlying the development of decompression tables was conducted. The consensus was that we still do not have the vaguest notion of how the human body handles culprit gases.

### More Neurological Risks To The Sport Diver

The results of current research into health problems of diving suggest that divers, no matter how many dives they make or how long they stay down, risk developing joint and neurological disorders.

Researchers A. Hoiberg and C. Blood of the Navy Health Research Center have published results of their ten-year study of the health problems developed by more than 2000 U.S. Navy divers.

On comparing diving officers with a nondiving Navy population, they concluded: "Diving officers [compared to nondiving officers] were at increased risk for nervous system diseases and certain musculoskeletal disorders. . . . Joint disorders accounted for the largest proportion of all hospitalizations. . . . Although the hospitalization for joint disorders and neurological conditions. . . were considered as possible manifestations of decompression sickness, an examination of both diving accident and hospital records revealed that none of the hospitalized officers had a recorded incident of decompression sickness. *These joint and neurological disorders could not be attributed to decompression sickness, but were more likely to be a consequence of diving in general.*"

The diving profiles of the subjects were not unlike sport diver profiles. The number of dives ranged from 1 to 334, with a mean of 25.7, and the number of bottom hours varied from 1 to 1046, with a mean of 20.6.

The study, published in the June 1986 issue of *Undersea Biomedical Research*, offers further support for the thesis in the accompanying article.

With this in mind, it's important to understand that to develop a decompression table, one is taking information which is known to be true in one set of circumstances and trying to predict what will occur under other and different circumstances. This is the essence of *all* science: attempting to predict the future from past events!

To develop tables, most investigators use either an empirical method or an analytical method. Both involve use of the assumptions mentioned above (which we know are very weak).

In the empirical method, the investigator accumulates a massive data base of all dive tables which have ever been used (by navies, the oil-patch, caisson workers and academia), and the incidence of decompression sickness related to each schedule of each set of tables. Then, to develop a set of tables for a new application, he reviews what divers have been able to



get away with in the past and incorporates that in the new table.

These investigators have massive computer data banks covering the outcome of every dive they can lay their hands on. If they wish to develop a set of tables for a new application, they compare thousands of dive experiences and try to devise new and desired dive profiles.

In the analytical method, a series of steps is taken:

- 1) Known information is gathered;
- 2) Certain necessary assumptions are made;
- 3) A hypothesis (we common folk call it "a guess") is proposed;
- 4) The hypothesis is reduced to a mathematical expression;
- 5) A mathematical model is expanded from the expression;
- 6) A set of tables is developed from the mathematical model;
- 7) Testing of the tables is conducted on animals in a way in which ALL variables are perfectly controlled except the dependent variable for which one is testing;
- 8) If the hypothesis is accepted from the animal tests, the tables are then verified in human testing to be sure that the animal information is applicable to humans.

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*"Every time anyone dives with a decompression meter, he or she becomes a human experiment."*

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In either the empirical method or the analytical methods, the tables must eventually be tested on humans. Although we try to select an experimental animal that responds similarly to humans, we know there are large interspecies differences.

Ask those who are so enchanted by decompression meters where the human testing of these meters was conducted, and on how many subjects, over what combination of depths and times, for single dives and for how many repetitive dives and with how many surface intervals, on males and females, in what temperatures of water, and on and on!

The truth is that every time anyone dives with a decompression meter (and on most tables, for that matter), he or she becomes a human experiment. In essence, most times we dive we are exploring unknown physiological terrain. Under these circumstances, caution, and not a cavalier approach, should be our guide.

Frankly, I do not believe the average diver appreciates how much at risk he or she actually is when venturing to the limits of any table or engaging in a diving profile (multilevel, for example) for which the table was not designed and tested.

And now, the real hooker! Over the past ten years,

a few anecdotal reports, often with only a few subjects, have been creeping into the diving medicine literature that make those of us who care for divers very uneasy.

★ In 1976 Palmer, Blakemore, and Greenwood, from Cambridge, reported that in 44 goats bent in various ways and then adequately treated, 81% with neurological findings and 33% with limb pain only exhibited permanent damage to the spinal cord at autopsy.

★ In 1978, these same investigators reported that goats that were bent and then treated with recompression, oxygen and clinically "cured", were found to have permanent damage to both brain and spinal cord. But, knowing of interspecies differences, does this occur in humans?

★ In 1981, this same group reported the case of a man who, in 1976, developed spinal cord decompression sickness after a dive to 110 fsw for 20-25 minutes (not a gross violation of existing tables). He was placed on oxygen and, by the time he arrived at the chamber two hours later, he had no symptoms, but was treated anyway. He developed recurrence, and was re-treated, which left him with only slight left leg weakness, which was resolved with repeated treatments in three weeks' time. Repeated examinations showed only very subtle neurological abnormalities. Clinically he was totally recovered. In January 1980, he met with a violent death totally unrelated to diving, and on examination of his spinal cord, massive permanent damage was seen.

★ In 1982, at the Naval Medical Symposium in Bombay, Joseph Idicula reported results of CT scans of brains in a group of veteran divers and found abnormalities resembling the findings in brains of "punch drunk" boxers.

★ In 1985, Ann Holberg reported that U.S. Navy divers who once had had decompression sickness showed higher rates of hospitalization, headaches and vascular disease than a matched sample of Navy divers who had never been bent. In 1986 she reported that U.S. Navy diving officers who had never had decompression sickness had a higher incidence of joint disease and nervous system disease than a matched group of navy officers who had never dived.

★ Curley and Schwartz, from the U.S. Navy Experimental Diving Unit, reported in 1985 that personality change, memory lapses, inability to concentrate or unusual fatigue may be the only manifestations of decompression sickness, and presented two cases to substantiate their opinion.

★ At the 9th International Symposium on Underwater and Hyperbaric Physiology in Kobe last year, Carl Edmonds and his group reported that in 30 randomly selected patients treated for decompression sickness (10 with limb pain only and 20 with spinal cord disease) several had EEG and brain CT scan abnormalities one month after symptomatic recovery during treatment, and of these, several were patients



## Oceanic Datamax Depth Gauges

Two readers wrote to us recently about problems they have had with their Oceanic Datamax depth gauge/bottom timer, both of which were purchased in 1985.

Tony Bliss (Locust Valley, NY) has had his unit replaced several times because the depth gauge reads too deep. Gary Stefaniak (Houston) had a unit in which the bottom timer just stopped working. He returned it to his shop, who quickly replaced it, but the second unit stopped too. He's now on this third unit, all replaced gratis by the shop.

Darrell Morrison, Customer Service manager of Oceanic, said that units that read too deep need recalibration. In 1985, "we used a dessicant (drying agent) that formed crystals when it absorbed moisture and it apparently affected the depth indication function. We have since changed the dessicant, but we are still not sure just where the moisture came from. It many have come from

weak batteries giving off some gas that reacted with the dessicant."

As to the failed bottom time, Morrison said that "we had some batteries in 1985 that checked out at the plant, but did not hold up." That was most likely cause of the problem.

If you own an Oceanic Datamax and have these or other problems, return it to the shop where you bought it, or send it directly to Customer Service Manager Darrell Morrison. He told *Undercurrent* that he wants to know about the problems and will see that they are taken care of.

He also pointed out that the Datamax carries a limited lifetime warranty, so to keep it in force the unit must be returned to the factory every two years for a general checkup and battery replacement (batteries last for 30 months).

The address: Oceanic, 14275 Catalina St., San Leandro, CA 94577.

with only limb-pain bends. Dr. Edmonds' conclusions are worth repeating:

- Musculoskeletal decompression sickness can be associated with subsequent brain damage, despite control of signs and symptoms.
- Control of decompression sickness symptomatology does not indicate control over the underlying pathological process.

★ Arthur Dick reported DAN findings in May 1985. He noted that mild, self-limited, neurological complaints are common after diving and most often go untreated, and that many divers with serious neurological decompression sickness did not violate USN Standard Air Decompression Tables.

★ In 1986, Peter Morris from the Lancaster University Diver Performance Unit reported that divers with more than eight years diving experience had poorer short term memory than divers with less

than four years experience.

★ Ian Calder and his group from London Hospital Medical College are now examining the brains and spinal cords of every diver in England who dies of any cause. They have not completed their study, but their preliminary findings Dr. Calder describes as "bad and clinically unsuspected."

All these studies were performed by respected investigators. Of course, each might be suspect for one reason or another, but when they are viewed as a whole, there must be some grain of truth to what these scientists are saying: "more than likely there are long term consequences to diving that we are only now beginning to appreciate."

Let's review what this accumulation of anecdotal information suggests:

★ Many divers are bent, and many of those exhibit serious spinal cord diseases, even if they do not violate currently accepted tables.

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★ If you are bent, even with minor limb pain with only minor and transient tingling or weakness after a dive, you may be left with permanent spinal cord damage.

★ If you dive frequently, you may be developing permanent brain and/or spinal cord damage even if you do not clinically bend.

Therefore, I find it paradoxical that at the very time when those of us who treat injured divers are trying to encourage more caution, shallower dives and shorter bottom times, the sport diving community and decompression meter manufacturers and advocates are saying that "technology" will allow us to dive deeper and stay longer. The meters are no better than the models upon which they are based, and wearing a meter on your arm in no way changes how your body handles culprit gases.



The lobster is rapidly disappearing from Florida waters. Commercial fisherman claim that sport divers are the major reason, and though divers like to claim the contrary, their behavior during the July lobster season was not exemplary. In the Keys alone, the Florida Marine patrol made more than 200 arrests, mainly for taking more than the legal limit or taking undersized animals. Some divers were arrested for spearing lobsters. Those arrests were made in just two days – which is all that sport divers are allowed for taking lobster. One commercial fisherman was quoted as saying, "They arrested 200, but how many others go away with shorts and egg bearing females." There is a strong move to require and limit licenses for sport divers during the short season, using the funds to further enforcement and to help replenish the depleted lobsters. Last year, 139 arrests were made and 258 warning citations were issued; warning citations in 1987 were also higher, but the exact figure has yet to be released. Violations are punishable by a maximum combination of a \$500 fine and 60 days in jail.

Divers made an unusual find in the waters off Northern California's Sonoma coast this summer: a dead 500 pound, 9 foot, great white shark, wedged

between rocks just a short distance off the beach. Speculation is that the white was chasing a seal, which dodged through an opening too narrow for the shark, which simply got stuck and couldn't get out.

There is, in fact, a "revolution in diving" occurring, but one not of the sort that you or I, as divers, want to see.

I live in St. Croix. Today, the temperature is 84° and the seas are calm. I'm going diving. As I do, however, in contrast to most sport divers, I believe I have some slight idea of the risk.

*Dr. Schane has asked us to state that the opinions expressed on neurological damage are his own, and do not represent any of the organizations with which he is connected. For those of you wishing more information, Dr. Schane has provided us with a bibliography which we will be happy to mail, free of charge, to anyone who sends us a stamped addressed envelope: Undercurrent, P.O. Box 1658, Sausalito, CA 94966.*

After reading our comments about Aqua worms, a formulated fish food that comes in an aerosol can for underwater feeding, reader Joseph Frost of San Antonio wrote: "In the Cayman Islands, Cheeze Whiz in aerosol cans is the food of choice for the fish. It can be found in any market and is a lot cheaper than the \$5.95 for Aqua worms. Although it's the British West Indies, the fish seem to prefer American cheese over the sharp cheddar." But then there are those people who don't go for any of this nonorganic fish feeding and prefer to lug a box or container of frozen peas with them. If you've got to feed the fish, that probably makes the best sense of all. Only remember, the fish sometimes feed on you. We have reports of at least two people being bitten -- one seriously injured -- while they were feeding moray eels.

#### **Yes! There Are Nearly 4000 Faulty Hoses!**

In the story last issue about the bursting of high and low pressure hoses, we misplaced a decimal point. The error had no material outcome on the story, but it needs to be corrected. We wrote: "With some 750,000 new hoses sold per year, a failure rate of .05% – a figure suggested to us by one industry person – would mean nearly 4000 hoses may be imperfect." It should have read .5% or 1/2 of one percent, which was a figure given to us by a hose manufacturer. That does mean nearly 4000 imperfect hoses or, to be more precise, 3750 imperfect hoses may be produced annually.