

undercurrent®

THE PRIVATE, EXCLUSIVE GUIDE FOR SERIOUS DIVERS

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Reports From Our Readers

—*Depressing Reefs, Rude Guides, And A Tiny Paradise*

HAWAII: I made my first trip to Hawaii in 1974—a year before we began Undercurrent. During that visit I stumbled across two impressive dive operations; ten years later Undercurrent readers remain equally impressed.

Tom and Lisa Choquette (Dive Makai) offer highly personalized service on Hawaii, the Kona Coast of the Big Island, Hawaii (805/329-2025); they take but six divers and readers always remark at their ability to find the most unusual critters. Steve Craven wrote "better small creatures (shrimps, nudibranches, etc.) than I've seen elsewhere. Lava tube diving exciting and unique; excellent photo opportunities. Tom and Lisa quickly came to seem like old friends." Last year M.R. Nickerson wrote: "Dive Makai was everything your article (June 1982) said, and more. Not only did we have great diving, but between dives we watched whales!" Frank Amoroso (Santa Ana) said: "At depth Lisa's breathing technique is phenomenally efficient. When my gauge red-lined after an hour on the bottom she still had 1200 psi; she handed me her octopus and we swam, arm in arm, toward a school of butterfly fish. Wow! Next time I'll huff and puff and make it happen even sooner." . . . There has been little else to recommend for the experienced diver on Kona, but we've learned that Mike McIlvenna is now running photo classes and charters. We found him an excellent guide several years ago at the Kona Village. You can reach Mike at POB 3005, Kialua, Kona, Hawaii.

On Maui, Central Pacific Divers (808/661-8178) has been the premier operation for years. Their operation is efficient, safe and prompt. After reader Susan Scott had a bad and disorganized dive at Scuba Schools, she switched to CPD for "a wonderful three-tank dive. Three shop people on board helped us off and on with our equipment and fed us a decent lunch. (It's about time—Ed.) They knew exactly where they were going and told us what to expect to see." John Schweyen (Rochester, NY) said that "dives to 110-130 feet were made daily, but deeper diving was discouraged and no-decom limits adhered to. The range of sites was limited, but nonetheless quite interesting." (R. Lauterbach

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BYE BYE BLUEGILL

One of the more thrilling dives I've made in the United States was down deep to the *U.S.S. Bluegill*, a deliberately sunken submarine near Lahaina, Maui. The frequent current means that one must use the anchor line as a guide down and back. More than once, when I let go of the line, I either missed the submarine on the 130-foot bottom or surfaced a half mile from the dive boat. The sub itself provided an eerie, exciting, and, for most tourists, a moderately tough dive.

But the *Bluegill* is no more. It's been raised by the Navy in a salvage exercise, then dropped into the deeper sea away from limits of exploring scuba divers.

The *Bluegill*, you see, was just too dangerous a dive. In 1982, for example, seven divers were sent to the chamber after dives down to the *Bluegill*. Dr. Steve Strong, who works at the Maui Memorial Hospital said that 80% of their bends cases result from *Bluegill* dives, and several spinal hits have led to paralysis from the waist down.

For the tour operators, the removal of the *Bluegill* is bittersweet. Peter Hilley of Lahaina Divers explained that feeling in an interview with the *Honolulu Advertiser* prior to the salvage exercise. "I'll miss the dive, but I won't miss having to lead the dive. It's deep and potentially dangerous. It's a love-hate relationship. We're thinking about throwing a party."

-C.C., travel editor

(Studio City, CA) said "the people were superb. I was alone so the guide paired up with me and hand petted eels so I could take photos. Groups were organized by dive experience and air usage." But Greg Joy (Eldorado, CA) found CPD too popular and too impersonal for his tastes and discovered nirvana with Ed Robinson (808/879-3584) in Kihei. Though Robinson charged \$70 for two tanks, he gives no more than four people a highly personalized tour of terrain he's been visiting for many years--originally with CPD.

David Lewis (Dallas, TX) made his first ocean dive ever with Lahaina Divers at the Kaanapali Shores Hotel: "Mike and Pete, the dive masters, really work to explain the basics and put new divers at ease." Lewis also dived with Fathom Five Divers on Kawai, at Poipu Beach: "They were great; they made a sincere effort to help me enjoy my dive--and made up for the lackluster dive sites." . . . On Oahu Steve Craven says that South Seas Aquatics is "an excellent operation staging dives off the Waianae Coast. Some good ledges; an excellent wreck dive on the Mahi, a sunken minesweeper. Mark Goldstein (Baltimore, MD) writes that "the owner of Aloha Divers and the dive masters were quite helpful and gracious."

ROATAN, HONDURAS: The big operation here is Anthony's Key Resort--most readers feel that it's not all that it's cracked up to be. It's a beautiful setting, so romantic and tropical, and the locals and staff get high marks for their friendliness and personal attention. It's a somewhat rustic resort, perhaps in need of a bit of upgrading to maintain its image, with good but not great cuisine (although it seems to be noted for "gourmet" meals). The problem is with the quality of diving. Dr. E.M. Taylor (Denton, TX) says that the reefs near AKR "have been totally harvested of every kind of fish that's anywhere near eating size. The dive facilities are very convenient and it's easy to dive at AKR, but the vacant reef is depressing."

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Riding Rock

—The Salad Days Are Over

In our last issue of *Undercurrent*, we reported that several readers were dissatisfied with the once-popular and excellent resort, Riding Rock Inn, San Salvador, Bahamas. We asked in our report, "Are the salad days of San Salvador slipping slowly by?"

Indeed they are. And they have. As we went to press last month, we learned that on December 8th, the Riding Rock Inn closed its doors. Owned and operated by the Columbus Landings, Ltd. (a Bahamian land development company) the resort is now on the block for \$1.25 million.

Apparently a combination of financial pressures forced the closing. Although the Inn was operated to serve divers, it was part of a larger plan to aid in the sale of land, homes, and time-share condominiums. People would be brought to San Salvador and housed at the Inn for sales presentations. Divers would learn of the opportunities to get land on San Salvador. But the market changed and sales declined significantly. Columbus Landings had insufficient revenue from sales to meet the increased costs of operating the Inn.

And those costs were increasing. Low wages in the Bahamas and in many Caribbean outposts become an inducement to investors. But workers can't be expected to remain servile for ever. The Bahamian Hotel, Catering and Allied Workers Union organized the employees of the Inn, and labor costs accelerated. Furthermore, the electric bill jumped 50%, from \$10,000 to \$15,000. An additional deposit of \$75,000 was demanded just to continue service.

Taken one at a time, Columbus Landings might have been able to overcome these problems. In combination, the financial loss became too great.

Atvantage Travel/AT Reef ventures, which served as booking agent and wholesaler of travel packages to the Inn, has made an effort to repay lost deposits. But Atvantage President Dick Batchelder is not happy about it. He told *Undercurrent*:

"Unfortunately, many people believe I work for Riding Rock Inn and Columbus Landings because of my long association with them. I don't and haven't for several years. Deposits sent in by my customers were sent on to the Riding Rock Inn—which is standard procedure. Now I have to pay these deposits out of my own pocket. It hurts."

Island Divers, the dive operation at the Riding Rock, is not owned by Columbus Landings. The dive masters and most of the equipment have been moved to Spanish Wells. One boat, a compressor and several tanks have been left on Sal Salvador for the home owners and time-share owners. For those people, the blessing is mixed. The reefs are now devoid of tourist divers. But there is no longer a convivial gathering place for dinner, drinks and socializing. That is, until the next investor comes along.

Richard Tash (Deerfield Beach, FL) says "tropical fish density and eel count are poorer than I've seen in South Florida or elsewhere in the Caribbean." But then, everyone has different impressions; Dr. Alice Friedman (Roanoke, VA) says "no dive was bad" and gave it five stars for old pros! TAN/SAHSA airlines service continues still to be unpredictable, with the divers often losing a day coming or going due to service interruptus. Many people report allergic reactions to the ubiquitous sand fleas (although they spray regularly) and some complained of digestive tract problems during their visits. Folks, Roatan is primitive territory, regardless of the glossy ads, and when you head off to a tropical island paradise you take what you get.

ST. LUCIA: A beautiful island with diving still in its developing stages. The best spots seem to be near the romantic little Anse Chastenet Hotel, (now a PADI diving operation) at the base of the spectacular Pitons, which rise directly from the ocean. For people staying near the town of Castries, Junior Alcee operates Dive St. Lucia, and regularly--well, sometimes regularly-- makes the rugged 40-minute run to these reefs.

ST. THOMAS, U.S. VIRGIN ISLANDS: In January, 1983 we wrote well of the underwater photography class taught by Jim and Cathy Church at the Villa Olga on St. Thomas. But many of our readers complain of the dive operation when the Churches aren't using it for teaching. Tatnall Starr, II (Philadelphia) writes: "I had the misfortune to spend a day diving with the St. Thomas Diving Club at the Villa Olga. They have a second-hand ferry boat, the Caribe Sunrise, which is ill-equipped, slow, and so large that only a few employees are qualified to land it. If none of them happens to be available when the boat returns, the boat and its contents simply sit and wait. The rear deck area is so small no more than two divers can don their gear; it took forever to get 21 divers into the water, and the whole process was repeated for a second dive. Although the personnel were safety-conscious, they were cocky about their organization and unconcerned about the caliber of service."

Dr. Robert Hill (Houston) dove the Club's Mohawk II, which was fine, but explained that there was heavy backsurge and limited visibility, and when the divers got below the guide left to spearfish. The second dive in clear water was fine, making the purpose of the first indeed questionable. The St. Thomas Diving Club operates diving out of other resorts, as well, and they continue to get criticism. One diver who stayed at the Bolongo Bay Club wrote that "they had no time for anyone who needed time to clear their ears; they just took me back to the boat and wouldn't let me dive, although my husband, an experienced diver, had good experiences, I found their personnel extremely rude." And they're rude to the reefs, as well. We have a copy of a letter, written last year to Armando Jenick, of the St. Thomas Diving Club, by Frank Hoheb of the USVI Department of Conservation and Cultural Affairs: "My office has received numerous complaints regarding what might be considered willful carelessness or disregard for the coral population around the shorelines of the Virgin Islands. Boaters and divers alike have reported seeing you or a member of your crew blatantly dropping your anchor in the corals in an effort to secure a better grip in anchoring your vessel. . . . Immediately discontinue this practice. Failure to do so would result in legal action. . . ."

Nonetheless, St. Thomas Diving can be quite good, and even the St. Thomas Diving Club pleases some people when they're "on." Dr. Alice Friedman of Roanoke, Virginia, said of her December trip, "good number of boats, dive sites to choose from. Excellent reef life, numerous turtles and other species." But there are other options. Readers cite general approval of: Garry Deering, Watersports Centre, POB 2432, St. Thomas, 00801 (809/775-0755); Dave Fredebaugh, Caribbean Divers, Box 93, Red Hook, St. Thomas, 00801 (809/775-1935); Joe Vogel, POB 7322, St. Thomas, 00801 (809/774-2321).

--C.C., travel editor

The 1983 DEMA Show

—Lots of Gossip, Lots of Gear

Thank your lucky stars that the people who put on the film festival at the Diving Equipment Manufacturers Association (DEMA) show in New Orleans last January don't make your regulators. The evening was a mess. At least 1500 people turned out at the Marriott Hotel, and more than 500 of them split long before the last frame was flashed.

The main problem was technical. The projector broke down repeatedly and, in fact, burned a hole through Jack McKinney's film, *Treasure Hunt*. Not that it made a difference to most of the audience—the acoustics were so bad in the Convention Center that the back third didn't know that McKinney's picture was a talkie. I sat midway back

and couldn't see the bottom half of the screen, to boot. As for *Off The Wall*, a movie by Stan Waterman, I wish I had been sitting even farther back. Waterman, a premier cinematographer, muffed this one. The quality was no better than my home movies, and it was such a puff piece for Spanish Cove and other Cayman resorts that it would be highway robbery to charge anyone to see it.

I heard one manufacturer's representative at the show say if the diving manufacturers built cars the way they build diving equipment, a Chevrolet would cost about \$50,000.

But the organizers of the rest of the DEMA show did one fine job. The purpose of the show, of course, is to introduce new lines and peddle them to dive shop owners, wholesalers, or anyone in the business. In the past, products have been introduced which never made the market—Dacor must have spent in the high five figures to trumpet its Dive Decomputer a few years back, but it never got out of the laboratory. Many products which are promised arrive years later. The Tekna underwater scooter was introduced last year—who knows where it is? In fact, I heard one manufacturer's representative at the show say "if the diving manufacturers built cars the way they build diving equipment, a Chevrolet would cost about \$50,000." Perhaps that's why something as simple as a BC or a wraparound can run to \$200 or \$300. Nonetheless, this show seemed more devoid of products based on wishful thinking than in the past. Let's hope so.

Of all the major manufacturers, I was most impressed with Scubapro's line, and with the excellent briefing provided by Gordy Heck. They have a new set of instruments which can simply be screwed into each other to form their own console. Some of the best ideas are the most simple, now, aren't they?

Included among their new offerings are a bottom timer, an improved AIR II, a new line of masks for hard-to-fit small faces and a Mark X regulator. And they've got a couple of new tanks: a 96 cubic foot tank which can be pumped to 2400 psi, and a 76 which seemed no larger than the standard 71. You can count on Scubapro for innovations.

Which brings to mind another product, touted last year, but never on the market place: a 99 cubic foot, 4000 psi, stainless steel alloy tank which, reportedly, did not get DOT certification, and, even if it had, it was most likely too expensive (at \$300+) to interest dealers.

But some dealers seemed to be interested in the Scuba Sextant, which was being pushed heavily at the show. It's not a sextant, of course, only a plotting grid for one to keep track of his direction under

water. I really can't imagine anybody using this thing. If the water is so murky that you need to keep track, then you're better off tethered, of course. Some people use it just to give them something to do under water. I suppose if I were diving in a quarry or a barebottom lake, it might be a way to occupy my time. But then, if I need something like that to occupy my time under water, I'd just as soon stay home and read.

I suppose that before the end of this decade dive computers will be as essential to the sport diver as regulators. At least that's what the industry hopes, because a bunch are already on the market—EDGE, the Deco-Brain, the Tekna Digital Dive Timer, the Vanguard—and this summer a new gauge by Aquacraft designed to tell the diver how much time he has left at a depth given the residual air volume in his tank.

I heard a couple of people say that with these devices one can leave home his depth gauges, watch, and tables—but I think that is malarky. Airplanes have an automatic pilot, but if pilots didn't know how to land with standard instruments they'd be in deep dung. I'm not about to throw in my lot with any dive computer. What if I forgot to charge the battery or put in a fresh one?

An interesting question about ascent rate cropped up at the conference. EDGE gives a 40-foot-per-minute rate, and the Deco-brain provides but a 33-foot-per-minute rate. Both manufacturers say there is a science behind their individual rates. At the same time, a little Dive Bubble is being marketed which a diver carries with him and releases when he is ready to ascend. It rises at a rate of 60 feet per minute and all the diver has to do is go with it. Not a bad idea, I suppose. But like too many new dive products, long after it has been released the manufacturer realized that they had not tested it sufficiently and their claims were incorrect.

The bubble is designed for fresh water, the manufacturer claims, and because it rises (only) 3% faster in salt water—one need not be concerned with that small difference. They developed the ascent rate after first testing the bubble in a salt water column in the lab, then applying mathematical mumbo jumbo. Apparently after they sold a few thousand someone decided to test it in the real ocean. I don't know what they learned, but now they're putting out two bubbles and asking everyone to put a "fresh water only" sticker on the first bubble. I've come to expect that kind of problem with just about any new product. That's probably why I'm alive and still diving.

And I'm glad I'm alive because I never thought I'd see the day that I'd get turned on by a woman in a wet suit, but that was easy enough given the beautiful models bouncing about in designer wet suits of every hue.

I suppose I'll get around to buying one of those baby blue beauties when my basic black wears out, but more people than I ever imagined are stashing their perfectly sound suits for spiffy new ones. And the cash registers ring.

Perhaps, however, the cash register is not ringing enough for Aquacraft. Rumors abound that they're considering invoking chapter 11 bankruptcy—one employee told me that it was "certainly possible." I like their stuff. I hope they hang in there.

Dry suits are hanging in there. In fact, they are beginning to dominate. I like the Offshore Suit, which is light as can be. I saw someone slip into the suit in less than 30 seconds, right over his street clothes. A buddy tried one in the Caribbean for a night dive and said that it was not too warm and great coral protection. Apparently Imperial markets a version of that suit at a slightly reduced price. I noted that many dry suit manufacturers were pushing training. However, no matter how much they push training, it is up to the shops to carry out the program. Many would rather discount the suits and forget the training, an unfortunate problem.

Of course, I owned a dry suit 25 years ago. The material was every bit as flexible as the Offshore, only I had to enter it through the front, then tie off the entry with a strand of surgical tubing. It always leaked. I also used an old ammunition belt for a weight belt and carried rocks and one-pound fishing weights in the pocket. I'm glad to see someone resurrected the idea since—sure enough a weight belt with pockets now is on the market. Probably a good place to put your old Pet Rocks. Many of the new pocket belts are made of neoprene. You probably have to sport an extra pound to overcome the buoyancy of the belt. I prefer canvas. In fact, I prefer the ammo belt which my local surplus store still sells. I wonder how olive green will look on my powder pink and baby blue wet suit?

I suppose I'll let Peter Hughes be the judge of that.

After all, it's going to be impossible some day to go to an island without finding a Peter Hughes operation. He's becoming the Ray Kroc of the travel industry; Bonaire, Roatan, Cayman... Like Ray Kroc, he'll be able to say, "We've served over 7 million divers." That's bad for the reefs, but good for Peter.

But Peter is not the only one running resorts. More than 50% of the floor of DEMA show was devoted to travel people. I don't wish to bore you with the details, but I will. The Mariah Reef resort on Ambergris Caye *looked* very promising, but remember what our readers said last month? Yuck. The Baskins of Haiti described some "fabulous" new dive sites they discovered on the island of Gonave—and others back up their claim. I dived Gonave eight years ago. It's 19 water miles from the Baskins—the terrain is quite nice, but the fish were so sparse and small I thought I had reached Jamaica. I can only presume they found sites that I never saw.

Everybody is up on the Philippines. If some good airfares ever come, that will be a hot area. No one thinks of cold water resorts for a vacation, but British Columbia folks are pushing their lot. Frankly, the diving is beautiful there and summers are quite lovely. Dry suits might become the salvation for cold water charter boats seeking tourists.

There is more, but you get the picture. Although the film festival dampened the otherwise optimistic spirit of the show, for me the Handicapped Divers Association lifted it to new heights. Here are a bunch of classy folks who refuse to let the lack of a leg or paralysis keep them out of the water. They highlight their abilities, not their disabilities. With the skills displayed on the video tape they presented, they get my vote to run the film festival next year in Las Vegas. The difficulties they've overcome prove they could thumb their nose at the minor problems of a picture show.

-- Ben Davison

Speculating On The Artificial Gill

—Will Your Portfolio Go Up While You Go Down?

If you're a long-time subscriber to *Undercurrent* like so many of our wise and steadfast readers, you may recall an article we published a few years ago titled "Diving For Dollars." It featured some small, publicly traded companies, and a large one, AMF ("Voit"), with participation in the sports-diving business. The object was to provide subscribers with an investment idea or two which might help replenish their financial reservoirs while the air in their tanks was being depleted—along with that neat little stack

of traveller's checks—at some idyllic Caribbean dive spot. A couple of the stocks we picked did quite well—well enough that in response to readers' requests we updated the article a year later. Since then, with no fresh ideas to offer, we've been silent.

Until now.

Now a new idea has surfaced, a company the brokers would call a "pure play" in diving and undersea activities. It's name: "Aquanautics."

(Continued on page 9)

Undercurrent Reader Survey

Response Requested

UNDERCURRENT is written for you, the sport diver. Not for advertisers. Not for the industry. Not for the professionals. Only for you.

Therefore, you should have a strong say on what topics we cover, what resorts we review, what approach we take to diving. On the reverse side is a questionnaire we'd like you to complete and return.

We believe there are three main areas of concern for the diver and our approach has been to address these concerns. Of course, every diver is interested in his equipment, its safety, its durability and its cost. There are good sources of information about new equipment, (Skin Diver Magazine, for example), about the manufacturer's standards for equipment, and about the construction and maintenance of your equipment. We don't duplicate those sources. Rather, we believe that independent reviews of equipment, together with surveys of divers using the equipment, provide the kind of straightforward information you, the sport diver, need to dive safely and economically. UNDERCURRENT is the only public source of this kind of information.

Second, most of our readers take at least one dive vacation a year. It is virtually impossible to get honest, straightforward information about resort diving because advertising puffery too often dominates information sources. One reason we began UNDERCURRENT is because we ourselves have been once-too-often disappointed by claims put forth about diving resorts. Our blood boils when we hear of divers who have taken their dream diving vacation only to find that the place they had carefully selected turned out to be a bust. Since we don't take free rides for our travel reviews -- we even pay for our own drinks -- and don't mention our task of reviewing the operation, we can report precisely what we see. We are dedicated to providing you with complete and factual information so that you can be certain to select your next destination knowing fully well that what you read about in UNDERCURRENT you'll find when you get there. Some stories about the dive industry never reach the diver and many facets go unreported. Equipment recalls are often an example. The inadequacies of some equipment -- e.g., the SOS Decompression Meter -- is another. So are tax breaks. Diving stocks. Air fare specials. Book reviews. Exchanging your home for a vacation home. By providing critical examination of a range of topics, we believe we can save you money while greatly enhancing your diving enjoyment and safety.

UNDERCURRENT, then, is an alternative source of information. Some people have written that the \$23 annual subscription rate is too steep, but to remain an alternative source, we must remain reader-supported. We accept no advertising -- which is how magazines traditionally support themselves -- so we are free to cite manufacturers in our articles, free to review resorts without fear of economic reprisal and free to write the facts as we see them. Sophisticated readers and serious divers understand that policy, and understand the reason for a \$23 a year subscription. An active diver should save many times that amount by reading UNDERCURRENT.

That brings us to the questionnaire. We wish to gauge whether our concerns are correct, whether we are meeting your needs as a sport diver, and to learn how we can better meet your needs. Please complete the following questions and return the answers to us.

PLEASE ANSWER THIS QUESTIONNAIRE IN TERMS OF THE ISSUES OF UNDERCURRENT YOU HAVE READ

I WOULD LIKE TO HAVE:

	MORE INFORMATION	LESS INFORMATION	ABOUT THE SAME
<u>Travel:</u>			
Popular Resorts	_____	_____	_____
Little Known Resorts	_____	_____	_____
Exotic Resorts	_____	_____	_____
Fish Life	_____	_____	_____
Coral, Sponges, etc.	_____	_____	_____
Food	_____	_____	_____
Accommodations	_____	_____	_____
Air Fare	_____	_____	_____
Guide Emphasis on Safety	_____	_____	_____
Beginners Instruction Opportunities	_____	_____	_____
Advance Instruction Opportunities	_____	_____	_____
Other _____	_____	_____	_____
<u>Gear:</u>			
Diver Surveys	_____	_____	_____
Maintenance	_____	_____	_____
Reasons for Recalls	_____	_____	_____
Industry Politics	_____	_____	_____
Personal Evaluations by Undercurrent Staff	_____	_____	_____
Cost Comparison	_____	_____	_____
Discount Purchasing	_____	_____	_____
Other _____	_____	_____	_____
<u>Other:</u>			
Do It Yourself Projects	_____	_____	_____
Ways to Save Money	_____	_____	_____
Humor	_____	_____	_____
Freeflow	_____	_____	_____
Why Divers Die	_____	_____	_____
Dive Tables	_____	_____	_____
Law Suits	_____	_____	_____
Photography	_____	_____	_____
Book, Film reviews	_____	_____	_____
Health, Medical Info	_____	_____	_____
Other _____	_____	_____	_____

Suggestions for Resorts to be Reviewed:

Suggestions for Articles:

COMMENTS:

Optional: Name: _____ Address: _____

City: _____ State: _____ Zip: _____

Return to Ben Davison, UNDERCURRENT, P.O. Box 1658, Sausalito, CA 94965

Chances are you're familiar with some of this company's products. But be warned: the stock is for the *speculator*, not the investor. The opportunity for substantial capital gain is there, all right, but so is the potential for loss. As this is written, Aquanautics is trading on the OTC market at 2 5/8. We guarantee only one thing. If you buy, say, 300 shares at 2 5/8, your possible loss is limited to \$800 plus a little commission to your cousin, the stockbroker.

If things work out as they *might*, however, who knows what you might make? So, if you're brave enough, read on.

At present, Aquanautics has two operating subsidiaries. One of them, Imperial Manufacturing, located in Bremerton, Washington, is one of the largest manufacturers of wet and dry suits in the U.S. It is also the world's largest supplier of survival suits for abandon-ship emergencies at sea. Over 50,000 Imperial survival suits are in use throughout the world. One off-shore drilling contractor has more than 4,000 to protect workers on its world-wide fleet of offshore drilling rigs.

Imperial claims that more than 230 people have been able to avoid the killing effects of hypothermia and are alive today because they were protected by their survival suits.

Wemlor Marine, Ltd., of Oldham, England, the other subsidiary, serves markets in the U.K. and Europe—they were acquired by Aquanautics last summer. Wemlor also is an important supplier of scuba and wind-surfing gear. Its new dry suit—which received favorable responses at the 1983 Diving Equipment Manufacturers' Show—is now being introduced to over 10,000 Imperial sales outlets in this country. Wemlor will provide a reciprocal benefit to Imperial by facilitating the presence of Imperial survival suits on the Common Market.

Together, the two subsidiaries produce over \$5 million in revenues for the parent company, and with the aggressive Aquanautics management which took

over late last year, are likely to do much more. Still, Aquanautics reported a loss last year, and will do so again this year.

Why in the world, then, are we wasting valuable *Undercurrent* space to tell you about a company that's losing money?

Because Aquanautics is a *development* company. What it does today has little to do with what it *intends* to do. In management's words, it means to "assemble the technological disciplines required to make the sea more hospitable to man, and to profit from man's growing relationship to the sea." *If* it succeeds, it *could* become a major corporation with total focus on underwater activities.

How? For starters, last November the company purchased (for up to \$1 million) the patent rights to produce an "artificial gill," a technique developed at Duke University's Marine Biomedical Center under contract with the Office of Naval Research. (See sidebar). With this device, working divers with an unlimited supply of oxygen could remain submerged for long periods of time *without* being tethered to the surface.

Aquanautics hopes to have a gill system that is lighter and less expensive than a conventional tank and regulator ready for testing by divers within two years.

Other, far broader, applications are possible. For instance, a hemosponge attached to a submersible vehicle should be able to extract oxygen from the sea, combine it with fuel, and release power and heat. And underwater robots, now used in offshore drilling when water is too deep and cold would no longer have to be tied to the surface by an umbilical cord.

It's a long step, of course, between the lab and the marketplace, perhaps two or three years. But Aquanautics means to move as quickly as possible

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from "R" (Research) to "D" (Development). One problem which must be overcome is providing another gas to be mixed with oxygen. Below 30 feet, pure oxygen is toxic. In compressed air, oxygen makes up only 16% of the volume. Divers headed to even greater depths use a mixture of oxygen and helium to reduce the risk of oxygen poisoning.

Company scientists are already at work with those at Duke. A contract has been awarded to Makai Ocean Engineering of Hawaii to commence work on feasibility prototypes. Aquanautics hopes to have a gill system that is lighter and less expensive than a conventional tank and regulator ready for testing by divers within two years.

No one can know how successful Aquanautics will be with its gill, but an article about the company in *Business Week* (12/26/83) reported that the discovery "may revolutionize the exploration of the oceans and the commercial exploitation of resources

that lie beneath the sea."

Pretty heady stuff, even without an extra supply of oxygen.

And that's not all. Attracted by the critical world need for low-cost, high-protein food, Aquanautics is actively investigating aquaculture. A consultant, founder and CEO of an aqua-culture company, has been hired to identify the most attractive segments of the field and to determine if Aquanautics, building on the millions already spent by some major corporations, has a profitable role to play.

Is Aquanautics management capable of carrying all this off? Based on the record of Claude Ganz, the CEO who took charge (and made a substantial personal investment himself) last fall, the answer is affirmative. As President for nine years of Dymo Industries (NYSE)—which grew during his tenure from a sales base of \$58 million to \$250 million while earn-

(Continued on page 11)

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ARTIFICIAL GILL INVENTED

One of the most unusual and creative advances in man's effort to adapt himself to the sea was announced not long ago by Duke University biochemists Celia and Joseph Bonaventura. They have invented an artificial gill which could allow a diver to breathe—and remain—under water indefinitely. If developed on a larger scale, it may even provide unlimited submersion capability for submarines.

The gill of a fish, it seems, is nothing more than an organ for respiration, which, like our lungs, is the interface between a blood system and the environment. The blood of both fish and man contains oxygen-carriers called hemoglobin, which transport oxygen to where it is needed, remove waste, and return with more life-sustaining oxygen.

The "heme" in hemoglobin is a single nonprotein iron-containing molecule which can be synthesized by chemists or refined in large volume from natural sources.

From primitive man's first glimpse of a fish swimming freely in the sea, we humans have dreamed of sprouting fish-like gills to give us unlimited access to the wonders of the sea. In the last twenty years, the advances in the biomedical sciences have begun to make this notion feasible. In a survey of the literature, the Undersea Medical Society reports that most of the research deals with the fact that gas narcosis, oxygen toxicity, and decompression sickness all are related to the compressibility of gases which could be eliminated by breathing a liquid which is not compressed.

In a 1969 report by J.S. Kylstra, experiments were then being conducted with mice, rats and dogs submerged and breathing salt solutions equilibrated with oxygen at high pressures, in which survival up to 18 hours was reported. In experiments with dogs in air in a pressure chamber and "breathing oxygenated Ringer's solution," the respiration was conducted by motor-driven valves; the dogs appeared normal and even survived.

But none of these experiments ever produced any serious consequences—until the discovery of the Bonaventuras. In 1976 they learned of a new polyurethane plastic that is chemically attractive to substances dissolved in water. The husband and wife team believed that water soluble hemoglobin would be right at home in this "water-loving" substance. In November of that year, they obtained a sample of the plastic, drew blood from Joseph's arm, and stirred it into the fast-setting polyurethane foam. Bonaventura reported to the *San Francisco Chronicle* that as an oxygen grabber, "it worked extremely well. It absorbed oxygen almost as well as hemoglobin in the blood, and released it promptly."

The so-called "hemosponge" appears somewhat similar to the foam used in seat cushions. Enclosed in cylinders in a backpack that includes a tank for storing extracted oxygen, the hemosponge becomes a full-fledged gill. As sea water flows through the sponge, the hemoglobin molecules draw oxygen from the water. The oxygen is channeled into a separate chamber for storage and breathing. When an electrical current from a small battery in the backpack passes through the sponge, the hemoglobin is forced to release the oxygen.

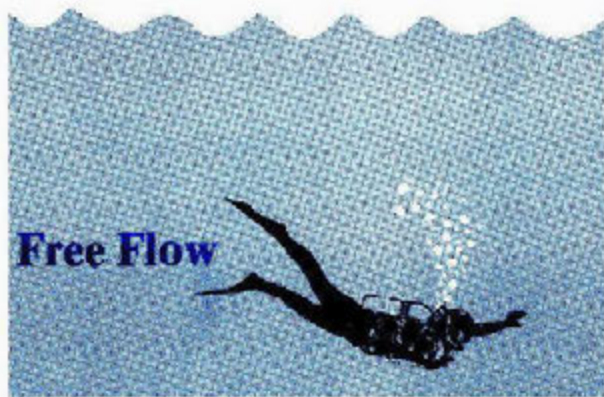
According to Celia Bonaventura, a set of artificial gills three feet across and ten feet long could provide oxygen for as many as 650 people, permitting them to stay under water indefinitely. So far, the gill has been operated only in the laboratory. But the Bonaventuras say they have identified no major obstacles to full-scale operation.

ings tripled—Ganz has been to the store and back a few times. He is a tough, skilled manager with uncommon international experience and plenty of financial sophistication—enough so that a sizeable acquisition for Aquanautics at some point seems likely, and one which could accelerate the time table.

Aquanautics Corporation. An interesting gamble, but should you decide to invest you won't be the only one pulling for its success. Of course, the U.S. Navy is deeply interested, not only because they sponsored the original research, but also because they want a working gill. And you can rest assured that the Bonaventuras' interest did not end when

Aquanautics bought the patent rights. Aquanautics will split royalties from the patent with the Bonaventuras and Duke University. The Navy will get to use the technology royalty free.

The author of this article, Albert Haas, Jr., is the author of Bulls, Bears, and Dr. Freud, and has had financial articles in several publications, including The New York Times and California Living. During the researching of this article he became sufficiently interested in Aquanautics to purchase a few shares and, upon reading his article, our dear editor was likewise motivated. Neither is holding his breath.



Al Catalfumo, of the Bonaire Scuba Center at Hotel Bonaire, was escorting a group of dive store owners around the island when they came upon a small cove where a local fisherman had caught a 70-pound sea turtle. "When I looked over, one of the women, Jeryl Voegtly, was pouring sea water on the turtle which was lying on its back all tied up. Our hearts went out to that creature," said Catalfumo. "It's not illegal for local fishermen to catch turtles on the island, but I thought of the times one of our divers latched on to the shell of a sea turtle and went for a ride." With this in mind, everyone chipped in and bought the turtle from the fisherman for \$70. They took it back to the hotel, untied the ropes and placed it at the water's edge. "We waited but the turtle didn't move," said Catalfumo, "so we nudged it a little; then all of a sudden, it began to move, and within seconds it was 40 yards offshore."

It never even occurred to us to combine diving and amateur radio, until we read this report by Englishman Kevin Collerton. "Sitting on the propeller of the wreck of the Rhone (in the British Virgins) at minus 40 feet, I managed to hold a conversation with a friend shivering in a minus 40° blizzard in Greenland. I did this by using ultrasonics to the surface, thence via Single Side Bend on 21 MHZ."

People who dive in polluted water risk getting gastrointestinal disease. In a study of 55 New York City Fire and Police Department divers who conducted diving exercises in New York's Hudson and East Rivers, 21 reported cramps and diarrhea following the dives. The training exercises have been switched to cleaner water since the divers found there was no way they could avoid swallowing small

amounts of water. More than 188 million gallons of raw sewage are dumped in the two rivers each day.

When a diver gets a PADI basic dive card, he is notified that "the enclosed certification card specifies Alternate Air Source Required. This means that both you and your diving partner are to be equipped with alternate air sources when diving... If you wish to eliminate this limitation on your diving credentials it will be necessary to achieve the PADI Open Water Diver rating." We wonder just what divine guidance—or divine mutation—a diver gets in the Advance course to permit him to eliminate the Alternate Air source. Is it the artificial gill?

A subscriber recently sent us this tidbit by John Allen from an issue of *Sea Secrets*. "While cruising off the coast of Honduras, I saw something new to me. There were several large schools of fish (albacore, I think) being worked by sharks. In one school one shark was standing on its tail with only its head out of water and its jaws wide open. The head did not make the slightest movement for a period of at least three minutes, possibly longer. The school was frenzied about the surface and, by the law of averages, a certain number of the frantically leaping fish fell in that great mouth."

The U.S. Navy has released results of its test of Color Underwater Closed-Circuit Television Systems. Although the systems were judged by thirteen criteria, one criterion tends to sum up the other twelve: the test teams subjective ranking after considering performance in all other areas. In that category, the system manufactured by Sub-Sea was top-rated, followed, in order of preference, by systems produced by Kinergetics, Hydro Products, Rebicoff, Aqua-Air, and Ise Gulf.

Everyday, PADI is looking more and more like NASDS as it moves into a tougher relationship with retailers. There are even rumors about that John Cronin is going to leave U.S. Divers to head the PADI Retail Association. Though everybody in the industry seems to find one fault or another with John Gaffney, they sure are quick to copy him when the chance arises.

Undercurrent correspondents are located strategically in the major diving areas of the world as well as on all coasts and major inland waters of the continental United States.

The editors welcome comments, suggestions and manuscripts from the readers of *Undercurrent*.

Editorial offices: P.O. Box 1658, Sausalito, CA 94965.