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## Papua, New Guinea

### -- An Unparalleled Adventure, Diving Or Not

Dear Reader,

I apologize for a late issue. The assignment was Fiji, but because of airline confusion for several weeks after the coup, I killed the story, uncertain how long the trouble would last. I hear now much of the mess has been sorted out, but Fiji will have to be visited some other time. So, let me tell you about another South Pacific nation where both the reefs and the people remain pristine -- Papua, New Guinea. It's a new and pricey destination for North American divers, yet worth it. But the real reason to visit PNG, in my book, is to mingle with the unusual people in isolated regions. I'll tell you about the diving, but let the touring be your motivation for a trip. It'll be a once-in-a-lifetime adventure. Guaranteed.

Papua, New Guinea, which sits directly north of Australia nearly on the equator, occupies half the island of New Guinea and includes several large and small islands of the Bismarck and Solomon groups. A little larger than California, it has about 1/7 the population -- 3.3 million. Its people are mainly Papuan and Melanesian. Scattered about the country in diverse and unique cultural groups, only a small percentage live in the handful of westernized towns -- some as woolly as the wild west. There are only two full-fledged diving resorts; day boats are available in three other towns. Visibility varies because the waters are rich with plankton; rains and rivers bring silt to some areas. But there are big fish and great reefs, intact wrecks from World War II and some truly wild and woolly diving. Liveaboard dive boats are the best way to see the variety -- and escape turbidity.

In July I spent several days in Rabaul, a port on the island of New Britain, where several Japanese ships were sunk in World War II. My dives were led by Rob Hogan, an Australian ex-pat there on a peace-corp like assignment, who uses his

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spare hours to help out at Rabaul Dive and Tour. An amicable chap, Hogan loved to explain the history and culture of the area, and took my partner and me on a brief village tour. One night we joined him at the Rabaul Yacht Club, where 100+ ex-pats swig beer and eat barbecue while gossiping endlessly about one another. Next to diving, that's the main form of entertainment in this isolated outpost.

The WW II Japanese wrecks of Rabaul are legendary and spectacular. I made a splendid dive onto the 422-foot Hakkal Maru, ten minutes from the boat mooring. We anchored near the buoy marker, then dropped overboard, past the bridge and down to the deck at 110 feet. Cruising along, I noted just how intact the wreck remained; a thick hawser still hangs from its winch, encrusted with growth; a three-inch cannon stands ready for battle, an empty sake bottle alongside. Most railings and decks remain firm. Inside a hold a school of bait fish swam about, while outside two enormous angels picked at barnacles. For a well-trained wreck diver, the penetration possibilities would be superb. I also dived Georges wreck, whose soft-coral coated bow is accessible at 50 feet, and the remainder slides down to nearly 200. Elsewhere, a Mitsubishi bi-plane sits in 80 feet of water. Virtually intact, its hanging coral growths make it appear to be decked out with crepe paper for a fourth of July celebration. It's a tight fit, but one can even squeeze into the cockpit for a moment's flight of fancy.

Rabaul Dive and Tour makes two dives a day, with night dives on demand. For gorilla divers who want to cover the dozen plus wrecks in the area, that schedule can be limiting, but a group of four or more could most likely write ahead and arrange more bottom time. And some people hook up and dive with the ex-pats. I found the reef life good -- but not spectacular -- with plenty of hard and soft corals and a reasonable representation of south pacific fish life. In one case, however, I traversed a virgin reef, to come across a patch of coral which itself looked like World War II remnant. Rob explained that the locals find unexploded World War II shells which they use to blow up patches of reef, not only to get the fish, but to also get coral to pulverize into lime to mix with betel nut for an intoxicating chew. He's trying to persuade the government to preserve certain reefs. Locals told me of spectacular reefs a bit farther away than Rabaul Dive and Tour normally travels, but with a little negotiation one can, no doubt, arrange those trips with this friendly and informal operation. They can also arrange a number of interesting land tours for a reasonable fee, but aside from that, there's little else to occupy oneself.

There is no beach to walk to in Rabaul. I was told, swimming in the harbor is not advised. I stayed at the depressing Kavieuna Hotel, which had mediocre food, funky accommodations, infrequent water and a noisy local bar. Nearby is the more cheery motel-style Travel Lodge, with a far superior kitchen and accommodations. And there is an exemplary local market, PNG best, I am told. But as a diving destination, Rabaul is mainly for people who are nuts about WW II wrecks. And liveboard boats are beginning to discover it.

On the same island, but an airport away, is Walindi Plantation, a four cottage retreat on a coconut plantation. One correspondent reported to me that

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## Crocodile Kietzman, Part II

In a previous issue, we reported on a fellow named Gustav Kietzman who, while spearfishing in a lake in Zambia, was attacked by a crocodile and chased up a tree. We also contemplated running an item about a lady who was snorkeling off her sail charter along the northern coast of Australia who was attacked by a saltwater crocodile, but decided it seemed a bit too fanciful and distant.

Then we came across an item right here in our own backyard -- from Sanibel Island, Florida, to be exact. It seems that in mid-April, two divers were making their regular collection of golfballs

from one of the lakes at the Dunes golf course. As one diver surfaced from a shallow ledge, an alligator closed its massive jaws on his neck.

Sanibel City Manager, Gary Price, reported that as the alligator let the diver go as soon as he began to struggle. Other reports indicate the diver delivered a hefty whack to the 'gator's snout. The diver was not injured, but his wetsuit hood was toothmarked.

Price theorized that the drumming of the regulator may have sounded like the thrumming noise made by lake bass, an alligator diet staple.

this may very well have some of the best reef diving in PNG -- the fans and gorgonia are gigantic -- with very pleasant nativelylike accommodations and friendly innkeepers. I've heard nothing but positive comments about Walindi and, in hind sight, I wish I had visited it. I met many ex-pats who claim that diving at Port Moresby, the largest city, is excellent, although Port Moresby itself has little, if anything, to offer a tourist.

As for the rest of PNG, let me rely on the reports of three Undercurrent correspondents:

\* \* \* \* \*

Jais Aban Resort, Madang: As advertisements begin to appear for this pleasant, sixteen-unit, legitimate dive resort, I can say right off it's not enough for a primary diving destination, though it may serve quite nicely as a three- to four-day leg in a larger tour. It is set up for divers -- I was able to make three daily boat dives and night dives at will, if the excellent cuisine didn't impose. The location of Jais Aban is its downside; nearby rivers can drive the visibility below fifty feet -- for me it was 60 to 80 feet; from June to October it is reputed to often run to 100, but some readers who have visited there those months did not find that sort of clarity.

Of the 25 dives I made here, some were poor, most were good to very good, and a couple were terrific. On Banana Rock a 30x40 foot oval depression was entirely filled with clown fish and anemones, growing together in a huge mat. At most sites I encountered small and unusual sea dwellers, including yellow and blue faced angels, scorpion fish, crocodile fish, a variety of unusual nudibranchs and large tridacna clams. But I saw no sharks, turtles or rays as one does at other PNG sites. Magic passage has beautiful red and white gorgonia, cuttlefish, and garden eels, but the turbid water put the damper on the beauty. I dived a WWII B-25, in 50-70 feet. Despite poor visibility, the intact cockpit, guns and engines make this a fine dive. To dive the Boston wreck it's a 30-mile drive, but this WWII command ship is just 200 feet offshore and the visibility was super. As I approached, half a dozen bumphead parrots beat away, as did several bathtub-sized groupers. In the hold of this wreck, a small school of flashlight fish lit the way.

I found the staff and manager quite friendly and helpful and though it's



currently staffed by a NAUI instructor, it's likely that new staff will be on board by the time you read this. Hired dive staff last for 6-12 months in this part of the world, so one can never be certain who will be running the store. Overall, Jais Aben (pronounced Jays Ah-bin) is a very pleasant place. The nearby town of Madang has an interesting market and crafts, but tourists are cautioned to be on the lookout for "rascals" who commit any sort of crime. The resort is fenced in and guarded and, indeed, quite secure, enough to feel comfortable and enjoy a few unique dives for part of a week.

\* \* \* \* \*

The Reef Explorer: Based in Cairns in Northern Australia, this fine liveaboard craft is now making trips to the Bismarck Sea, north of the main island of PNG. A 63-foot cruiser built for exploring distant reefs, it has six double cabins, a comfortable dining salon and a large rear diving deck with a water level dive platform. My trip began at Wewak, near the Sepik river, with an overnight cruise on rough seas to the Niningo islands.

My first dives were at Block Point, a shallow drop-off with trees of black and tan coral as tall as 20 feet. Although I saw few sharks on this trip, here a pair of frisky white tips made a series of high-speed passes at me. I decided to exit and come back later. Nearby one reef slope was home to great numbers of uncommon flame angelfish; I found several lion fish along one wall, and, on another dive nearby eight huge tridachna clams, up to five feet across. At night

## Technisub Fin Problem

Dear *Undercurrent*,

I've been a diver for 31 years. In February I purchased a pair of Technisub Nasa Carboflex Dive fins at the All American Sports Club in San Bernardino. I took the new fins on my April diving trip to Cocos Island, 300 miles off the coast of Costa Rica.

Three times during the week I was suddenly without use of a fin because a strap came out of its clasp. The first time, in a rather heavy surge at 65 feet and nearly out of air, I was able to reattach the strap and get to the surface safely. The next time, at night, I was unable to reattach the strap and had to be guided to the surface by my partner. I then secured the bindings with tape, but it happened a third time, again at night.

I took my fins back and got a full refund. But, I consider these fins to be extremely dangerous and should be pulled from the stock of stores and recalled by the manufacturer before a serious accident occurs.

Donald M. Shasky, M.D.  
Redlands, CA

Dear Dr. Shasky,

You're absolutely right. That sort of problem can be extremely dangerous.

We called Tom Litchfield, sales manager for the

distributor, Aquacraft II, who told us that they had had a problem with the buckle, but "it seemed to be a spotty occurrence, usually when a diver made an exerted effort. We found out about it a month after we shipped out the first batch. Technisub redesigned the buckle and we sent enough to all dealers for the stock on hand and to take care of those which were sold."

Litchfield told us, however, that the replacements were sent out in March, 1986, nearly a year before you bought your fins. We asked him whether the All American Sports Club, a large merchandising operation, might have had old stock on hand, but he doubted it, saying they get between one and two dozen at a time and put them right out for sale.

So, if it's not the old buckle (which we can't tell because you returned the fins) is it the new buckle? Litchfield says he's been diving with it and hasn't had a problem -- and hasn't heard of any from the purchasers of the 8000 which have been sold.

This year gap between the replacement and your purchase leaves us puzzled so we can't close the book yet on your problem. We'd like to invite anyone who uses the Technisub Nasa Carboflex fins to let us know of any problems -- and send along the buckle that doesn't hold.

Ben Davison  
Editor



I ran head-on into a huge Maori Wrasse. At Liot Island I dived a great wall beginning at 10 feet, with overhangs of colorful soft corals and schools of fish streaming over the wall. In the Hermits Volcanic island we made three dives with swarms of barracuda, large grouper, small sharks, eagle rays, turtles and hordes of reef fish. And at Haynes Channel we hit eight manta rays in formations of 2-3 and several gave high-speed exhibitions for us.

This was great diving, indeed. But at Purdy and Bagabag Islands it became quite average. Visibility varied, as much as 100 feet in some spots, much less elsewhere, especially if the skies remained overcast, which they did on many of our days. There is so much sea here with varied conditions, that the Reef Explorer tailors each trip according to weather and wishes. Whether you get what I got cannot be guaranteed. But you will get a great boat, all the bottom time you want -- and plenty of fine food and drink in between.

\* \* \* \* \*

The MV Telita: Ah, she's a beautiful ship, handcrafted out of local materials from Boroka, home village of the owners, Bob and Dinah Halstead. The Halsteads have been diving these waters for years; both are instructors, both authors and photographers and both can skipper the boat. It's a first-class operation. Although the Halsteads run a dive shop and day boat in Port Moresby, we boarded the Telita 550 air miles away, at Kavieng, on the island of New Ireland, thereby avoiding the rough overnight passage to the Bismark sea.

My trip was a real corker. At Eagle Ray Pass, seventeen of the critters were in one swarm, mesmerizing me on the spot. Bob's Bonnie was a garden reef so colorful it looked like the palette of Gauguin. At one site we came upon an unusual coral garden at 110 feet, protected on three sides by large coral trees over grown with feathery orange, lemon yellow and green crinoids, strawberry trees, all in ballet with the current as a conductor. While looking around I almost stepped on a sizeable shark, snoozing on his belly. Sharks appeared on virtually every dive. In fact, there are all sorts of enormous fish, since it's far away from commercial fishing boats, or any boats for that matter. Most of the days the sea was all ours.

One day the sea became black with hundreds of bottle nosed dolphins, cavorting around our ship. Another day a sixty foot humpback whale surfaced. But not every day was spent entirely on the water. We visited occasional villages. At one, women clad only in faded wrap around skirts sat weaving mats. May I take your picture, I asked. They shook their heads, then scurried away, only to return with clean skirts, their breasts still bare and their tattooed chocolate skin indicating their tribal origins. Now, they indicated, I could snap at will. Indeed, this was a first-class cruise in all respects, and a highly recommended way to dive the waters of PNG.

With fine diving, it's a long schlepp to PNG (via Australia for the best fares). So I would be hesitant to recommend it for diving alone. But add a land tour for a week or so and you'll see the most incredible people anywhere. You see, it was just fifty years ago when the first white men climbed over the central mountains of PNG to discover great valleys of people. Since then, missionaries have converted many of the people to Christianity, and today a few white people search for oil. In the highlands town of Tari -- with only a handful of western homes -- a small airstrip receives three flights a week. Most of the people wear at least one piece of western apparel, but it is common to see bow-and-arrow-toting warriors walking along roads clad in leaves and feathers, their faces painted in rainbow colors. And tribes still war with one another.



The only hotel -- the first-class Ambua Lodge, with 20 individual units blended beautifully into the hillside at an elevation of 7000 feet -- was built less than two years ago, so tourists are a great curiosity for the people. Here, I traveled back to the days when the white man first came. Our driver took my partner and me to a village where the local minister told us we were only the third white people ever to visit. More than a score of villagers came out to greet us, following us wherever we went. When we left they formed a line to shake hands, then moved to the end of the line to shake hands again. One villager brought us three pineapples as a present, an impressive gift since pineapples and other fruits don't grow in the mountain climate.

This is the land of the Huli wigmen, people who fashion elaborate flower and feather decorated wigs out of their own hair. On market day -- and even daily -- scores of wigmen strut about, showing their fine wigs and painted bodies. So proud are they that virtually anytime I



I pointed a lens at one of these warriors, they would stop to ensure that I would get a proper photograph. On one day our driver took us to view a feast where 52 pigs were to be roasted; a warrior had been killed by a neighboring tribe and in compensation they had presented their adversaries with the pigs. Scores of decorated tribesmen toted pigs about, prepared vegetables and passed their condolences to the widow. Another day we visited a village where perfectly sculpted men with faces painted splendid blues and yellows and whites, and adorned in traditional dress and wigs performed traditional dances and shook hands with the tourists. Villagers stared as much at us as we stared at them.

In another part of the country, a small grass airstrip serves the beautiful and very comfortable Karawari lodge, the only non-native settlement in a sixty mile radius. There is no road here, only a river on which boats from the lodge carry their visitors to any of several villages. Walking through one village, I noticed that the only visible signs of westernization were the clothes on most people's back, perhaps a tin or two for cooking, some photos displayed from a Spiegels catalogue and shards of mirrors use by the villagers to help make themselves up. Bare breasted, grass-skirted women fished from dugout canoes. Naked children slid down mudbanks, keeping a watchful eye for crocodiles (which allegedly take a dozen or so people a year) and men walk the forest in search of game. In some of the villages as well as in the lodge we viewed performances, but, for the most part, I knew that I was viewing a culture relatively untouched by western ways. All in all, the wilds of New Guinea was alone worth the trip.

I write of this because we divers like to consider ourselves adventurers and if one is considering a dive trip to some distant port, nowhere I know of can the adventure above and below be so astonishing. My land trip was organized by Transnuigini Tours which, I must say, performed superbly. We were met at every airport, I was able to change the itinerary during the trip without a hassle; they confirmed all flights and never missed a beat. I met other travelers who used other tour agents -- including diving agencies -- and most had serious complaints to register about the inexperience of their agent. One trio arrived at the Tari airport and since the Lodge had no reservations from their U.S. agent, they waited six hours until, by chance, they flagged down a car. There is no way to call or even radio the lodge from the airport. Dive agencies often



combine their trips with land tours, but I still recommend letting them handle only the dive and intercontinental flight component -- unless they themselves use Transniugini tours or you're traveling in a group. Because Transniugini's central office is in PNG, they can solve problems -- and there will be some in this very third-world country -- on the spot. I should add, however, that the lodges themselves handle the tours, so once you get to the lodges -- and there are more than just the two I've mentioned -- you'll have no trouble visiting the people.

If you've got the time -- let's say three weeks, minimum -- and the money -- let's say about eight grand for two people -- take this trip in the next couple of years. Otherwise the stone age may give way to the age of Exxon. One oil company already has two helicopters at the Tari airport. The people, who speak pidgin (as well as their tribal languages) call them "mixmasters bilong Jesus." Once they start calling them helicopters, Tari will just be another town with an airport.

One final note: This is primitive country. Tourists are advised not to walk the streets of any PNG town at night and to stick with groups -- much as you're advised in districts of many American cities. But one morning at Ambua a tourist rushed into the lodge, having just been held up on a trail by two natives, one with a machete and one with a bow and arrow. They took his shoes, his glasses, his coat, but left him his Nikon. The guards fled after the "rascals", as they are called, with bow and arrows, most likely meting out such punishment that no one will ever again threaten an Ambua guest. Nonetheless, when you step off the plane in the highlands of PNG, you step into adventure.

-- C.C., travel editor

Divers Compass: Transniugini Tours, 408 E Islay, Santa Barbara, CA 93101 (805/569-0558) ... For a list of other PNG tour operators contact Air Niugini, 500 Birch St., Suite 3000, West Tower, Newport Beach, CA 92660 (714/752-5440) ... The Reef Explorer can be booked by See and Sea Travel (50 San Francisco St., SF, 94133; 415/434-3400) ... The Telita can be booked by La Mer (823 UN Plaza, Suite 810, NYC, 19917; 212/599-0886) ... Sea Safaris (3770 Highland, Manhattan Beach, CA 90266, 800/821-6670 or 213/546-2464) books PNG diving ... Rabaul Dive and Tour, PO Box 1128, Rabaul, PNG ... Walindi Diving, PO Box 4, Kimbe, PNG ... The MV Telita and the Halstead's Port Moresby shop (PO Box 1644, Boroko, PNG) ... Jais Aben, PO Box 105, Madang, PNG ... malaria prophylaxis is essential (more about that next issue) ... only American Express and Diners Club are accepted...

## Stress, Anxiety, And Diver Performance

### -- A Look At The Literature

Dr. Tom Griffiths, the director of Aquatics at Penn State University, has become a leader in diving education, devoting most of his research time to studying fear and anxiety in divers.

His work is having a substantial impact on diver training and is especially helpful to experienced divers who find, for one reason or another, that as their anxiety about diving increases, their frequency of diving decreases.

The following is a rundown of significant studies about diver anxiety prepared for *Undercurrent* by Griffiths.

During the early 1970s, while enrolled in graduate study in sport psychology and teaching scuba diving at the University of Maryland, I ran across a stimulating series of articles in *Psychology Today* called "Stress: In the Air...and Under the Sea." The works of Art Bachrach, Ph.D., of the Naval Research Institute in Bethesda, Maryland and Glenn Egstrom, Ph.D., of UCLA, relating to diver stress further stimulated me to review and conduct psychological research about scuba divers. What follows is a compilation of work I have read and written during the past fifteen years.



### The Unexpected Consequences Of Fear

Christine Morris, a 40-year-old woman from Sarasota, Florida, was taking her first open water certification dive on Sunday, May 3, in the Gulf of Mexico near her home. Diana Daughters, her instructor, reported that Morris felt uneasy, but she began the dive, only to resurface and grab the anchor line of the diving boat. Daughters tried to help Morris out of the water when a wave swept Morris against the boat. She did not hit the boat hard enough to knock her unconscious. But, she suddenly collapsed. Daughters tried cardiopulmonary resuscitation in the water, but there were no signs of life. Morris died in her instructor's arms.

The associate county Medical Examiner, James Wilson, reported to the *Tampa Herald Tribune* that Morris died of heart failure, probably brought on by her apprehension of going underwater. "Her heart stopped beating effectively," he said. "It just lay there quivering. The blow to the head was an inconsequential injury."

Art Bachrach (1970) projected that although properly controlled anxiousness prior to a dive can make the diver more aware of the problems and procedures of the dive, overwhelming anxiety during a dive can disable the diver and may lead to panic and drowning.

Bachrach and Glen Egstrom (1971) concluded that panic is the leading contributor to scuba fatalities. Bachrach emphasized that the levels of anxiety and stress for students should be monitored during diving classes. Additionally, he suggested assessing the students' underwater performance in class during progressively increasing stressful situations. It was Dr. Bachrach's belief that measuring students' performance under stress was extremely meaningful in determining their readiness for sport diving. He also stated that *heart rate* and *underwater respiration* appeared to be very suitable measures of stress in beginning sport divers.

Weltman and Egstrom (1966) found that novice sport divers in stressful situations had narrowed visual perception -- they could not recognize experimental visual stimuli in the periphery of their vision. The subjects were asked to perform a fine motor task underwater while at the same time they were tested on their reaction time to a light source in the periphery. As stress increased, the reaction time to the light source worsened. The authors hypothesized that if the effects on perception were appreciable, it could directly influence performance.

Robert Rubin and others found considerable chronic stress in 32 participants in the U.S. Under-

water Demolition Team training program. The investigators monitored physiological response to stress by analyzing serum uric acid, cholesterol and cortisol samples and used psychological paper and pencil tests to measure anxiety. *They found that peer group pressure and the introduction of new equipment and new dive procedures kept anxiety and stress levels extremely high.*

While studying 30 professional divers working in the U.S. Navy Sealab II Project, Radloff and Helmreich (1969) found that the major psychological stress placed on the experienced divers came from the constant danger of death, both in the water and inside the capsule. The researchers used several personality inventories which indicated that a *diver's self-rating of fear strongly related to his diving performance. Additionally, those who reported themselves most frightened spent the least amount of time in the water.*

Deppe (1969) found in a study of novice and experienced divers that the *more highly stressed novice divers showed significantly greater variations in time perception under conditions of sensory deprivation.* To create stress, the divers were required to perform two underwater tasks while their face masks were completely blacked out. The subjects were required to search for coins on the bottom of the pool while swimming blind, and to tap on the pool floor once a minute. Divers under high levels of stress did not perform well.

Fenz and Epstein (1969) conducted studies concerning anxiety and skydivers which might apply to scuba diving.

They found that increased denial to anxiety associated with jumping reduced anxiety which might be useful in handling some critical situations in parachuting and many cause inappropriate actions in other situations. The authors concluded that while participating in risky activities, a little anxiety and stress is useful and necessary for motivation and attention to the tasks at hand, but excessive anxiety and stress may lead to poor physical performance which might be harmful to the participant. The authors suggested that anxiety and stress must be regulated, not eliminated, in the presence of danger to ensure optimum performance of the subject.

Griffiths et al. (1978) examined the anxiety levels of 29 beginning scuba diving students prior to three underwater performance tasks. Students did not show much anxiousness during the two swimming pool tests, but they did show significant increases at the open water dive. Even under the most stressful situation, the open water dive, the subjects underwater were not shown to be significantly more anxious than the normative group under resting conditions. If, as Egstrom and Bachrach reported, most underwater deaths are caused by diver panic, the results of this study suggest that the tests used in this teaching sequence may not allow instructors to see



students under high enough stress to evaluate their performance under conditions of emergency.

And additional study by Griffiths et al. (1979) examined the effects of high levels of anxiety on underwater performance of beginning sport divers. Students displaying high levels of anxiety performed poorly on the performance tests when compared to those students who remained calm. As the complexity of the skill tests increased, anxiety levels of the subjects also increased accordingly. And, those students who dropped out of the scuba course possessed significantly higher level of anxiety than those students who completed the course. These nervous students (who were apparently "potential drownees") used excuses such as lack of money, illness or a death in the family to gracefully bow out of the course before making the open-water dives.

Realizing the adverse effects of anxiety and stress on scuba diving performance, Griffiths (1985) then attempted to find out what relaxation training would do for divers. *Subjects who participated in relaxation training -- EMG biofeedback and mediation -- reported significantly less anxiousness in the pre-dive situation.* However, biofeedback and mediation did not help to improve underwater performance.

Griffiths and Allen (1983) then designed an audio-cassette tape program specifically aimed at calming nervous divers. When tested in a research setting, the relaxation tapes for divers were found to significantly lower pre-dive anxiety, improve underwater skill performance and increase bottom time by lowering respiration rate.

Griffiths (1982) and his colleagues then sought to determine exactly *why* sport divers became stressed. Using a multidimensional approach, Griffiths found that diver stress is not caused by fear of possible danger, equipment failure or drowning. Rather, *diver stress is caused by social evaluation -- that is, how the diver's performance is perceived by his/her peers.* This type of stressor was found to be especially significant for females.

While working with underwater archaeologists in the Mediterranean, Griffiths (1986) studied stress in experienced divers, finding that as trait anxiety -- how they generally feel as opposed to feel "right

now" -- increased in divers, their bottom time decreased.

Another finding in this study was that trait anxiety in experienced divers correlates positively with age -- as one gets older, trait anxiety increases. This was found to be true especially for older divers *not diving on a regular basis.*

Steven R. Heyman, Ph.D., a clinical psychologist, and Ken Rose, a scuba instructor, both at Southwestern Oklahoma State University, recently sought to learn what personality traits affect diving performance. They used several psychological tests in combination with the complex scuba "bail-out" in the pool and measurement of performance buoyancy control, bottom time, communication, etc. on the first open-water dive. Their research suggests the following *tendencies:*

- \* *Students describing themselves as being less anxious performed better and accumulated more bottom time.*

- \* *Individuals with higher than average ratings on the Sensation Seeking Scales were more likely to enroll in SCUBA diving. Those with very high sensation seeking levels might have performance problems.*

- \* *Those having instrumental or traditional male attitudes were more successful divers.*

- \* *Students with an internal locus of control were more successful than externals.*

Heyman strongly suggests, however, that open-water conditions are probably still the best predictors of open-water diving performance.

Using Indiana State University subjects, Heyman and Griffiths collaborated in an attempt to replicate the earlier findings in Oklahoma and found that the same tendencies appeared in that study.

Griffiths and Heyman also found that highly anxious students performed poorly on bail-out tests. Those performing poorly on the bail-out were less likely to go on the open water dives. Poor "bail-outers" who participated in open-water training did not perform well.

Females were not as successful as males in the Indiana State and Oklahoma studies.

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Although the research reviewed has tremendous application for sport divers and scuba instructors, it must be emphasized that most of the subjects studied came from special populations -- college students, military and research divers.

Understanding diver stress and how to control it would indeed help to reduce panic and senseless drownings. Griffiths, who is now at Penn State University, is attempting to develop practical programs centering on the causes, symptoms, treatments and prevention of diver stress.

Specific research methodology and statistics were not included for the convenience of readers. More detailed information is the list of references, which you may obtain at no charge by sending a self-addressed stamped envelope to Undercurrent, PO Box 1658, Sausalito, CA. Practical information on diver stress can be found in Griffith's college text on SCUBA, *Sport Scuba Diving in Depth*, available for \$14.50 from Princeton Book Company, Box 109, Princeton, NJ 08540.

## The Harvard Report, Part V

### -- Growth At The Expense Of The Consumer?

This is the last of the five-part series condensing the "Harvard Report", a study of the diving industry commissioned last year by the Diving Equipment Manufacturers Association. As we have reported before, once the report was completed DEMA decided not to release it. When *Undercurrent* received a copy we decided to publish it to shed light on problems facing the American industry and ways that people may follow to correct those problems.

In the next issue we will comment on the report, quoting industry leaders:

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Long-term industry growth has a price. U.S. manufacturers will sacrifice profits and cash flow in the short term for long-term real growth and good profitability.

One philosophy in the industry is that by increasing the number of divers, there will be an increase in the amount of equipment purchased, and that by increasing the amount of equipment sold, U.S. manufacturers will automatically benefit.

This logic is weak in two respects. First, what matters to the manufacturers and retailers is not just the number of divers, but the number of divers who purchase equipment and maintain an interest in diving.

If a dive store recruits twenty high school students who do not have the resources to purchase equipment, there is a real cash cost to that store. Although the certifying agencies benefit from a pure increase in the number of students, the manufacturers and retailers benefit from divers who buy equipment and stay active. The best approach to generating growth is to combine recruiting large numbers of divers with targeting those people who are likely to make a financial commitment to diving.

During the last five years, equipment revenue per new certification has dropped dramatically, due, in part, to cross-certification and, therefore, double-counting of new divers. But, as diving certification has become easier and quicker, less committed people have entered the sport. Students and "resort divers" are less likely to buy a full set of equipment, since students have limited budgets and "resort divers" may view diving as an infrequent activity. Consequently, renting equipment is a cheaper and more convenient alternative.

There is a second way in which the "more divers" philosophy is deficient. If the equipment market doubles over the next three years but it is increasingly dominated by the foreign manufacturers, U.S. manufacturers will still suffer. Simply growing the

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industry is not the answer. The first step is to re-establish and secure the U.S. manufacturers' positions. A step which was discussed in the last issue. The second step is to increase the size of the pie.

One of the chronic problems of the scuba diving industry is the inability and unwillingness of the different segments to work with one another. The manufacturers, certifying agencies, instructors and retailers each have their own goals and these goals often are not aligned.

The manufacturers rely on the retailers for sales and, yet, many manufacturers have assumed a short-term attitude toward their retailers.

The retailers are accused of being poor business managers. They are criticized for not doing more to recruit students and sell equipment. However, they have to contend with price discounting in both the equipment and instruction business and many are not trained in business techniques.

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*"One of the chronic problems of the scuba industry is the inability and unwillingness of the different segments to work with one another."*

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The certifying agencies have been criticized for training instructors who can operate independently of a store and who, therefore, teach many students at a cut-rate price. These nonstore classes pull students away from the retail shops and decreases the likelihood of developing an ongoing relationship with a retailer. Some certifying agencies make their profit from selling educational material and have no direct monetary interest in the sale of equipment. Instructor turnover is very high (every two to three years), most likely because salaries are so low and many instructors view scuba as a temporary career. Instructors are criticized for not being more aggressive on the sale of equipment, but many instructors are not trained to sell, and many prefer to teach.

The result is an industry plagued by political tensions and a lack of coordination. Resources must be pooled to raise the popular appeal of the sport; entice new divers into instruction programs and persuade them to purchase equipment.

#### *Recommendations for Growth*

*Retailers:* The retailers are best positioned for recruiting new divers. Retailers must target customers who can afford to purchase equipment and stay active in the sport. Retailers must also price each of their products and services to generate profits. Retailers should not use instruction as a loss leader. This practice can lead to decreased profitability and, therefore, instability among retailers.

*Certifying agencies and instructors:* the profession of instructor should be changed to incorporate the skills needed to sell equipment. An instructor need

not sell a particular brand (depending on the retailer), but should sell the benefits attached to owning one's own equipment. In the instruction manual of each of the agencies, there should be a module on the fit, maintenance and care of equipment. Instructors would be teaching the safety benefits associated with ownership as well as how to take care of one's equipment.

Certifying agencies should require all instructors to be associated with a dive store. This would help to discourage price discounts in instruction, help discourage "garage shop" equipment sales operations and allow the dive stores to establish relationships with all new divers. In the long term, this should help increase the number of committed divers and, most importantly, ensure the safety and quality of all instruction courses. It will also help the retailers maintain their margins on instruction.

*Manufacturers:* In addition to the retailer support seminars, manufacturers may want to use co-op advertising with retailers. Working with DEMA, the manufacturers can support efforts to improve public perceptions of diving and target likely candidates for new divers. The introduction of color into products may help to make the industry more visible. Manufacturers may want to license their name to sportswear companies in order to gain exposure.

Many U.S. manufacturers are aggressively selling their products into foreign markets, an important way to achieve growth. These sales efforts should be pursued.

*DEMA:* DEMA should continue with its public relations to increase scuba diving's visibility to the public. DEMA's efforts to fight restrictive legislation are clearly very important to the future growth of the scuba diving industry.

DEMA should increase its efforts to keep statistical data on the industry. Many companies are unwilling to provide information, but they should realize that reliable data will help them make better business decisions and better understand their market and consumers. DEMA can also help the industry target potential divers by continuing the research directed at identifying likely divers (for instance, commission a study which identifies sports that have similar characteristics as diving, then target participants of those sports).

#### **Conclusion**

Is it possible to rejuvenate the diving industry out of slow growth and into significant growth through changing the sport's equipment and image? Over the last few years, much has been done to make instruction a pleasant and fun process. Certifications have increased accordingly. Equipment has been updated and modernized. Is it possible to do more and to radically change the nature of the equipment by making it lighter, more compact, and safer?



### Hearing Loss in Divers

Professional abalone divers in Australia have significant hearing loss, report Carl Edmonds and Peter Freeman in *The Medical Journal of Australia*.

The results ought to be particularly alarming for instructors, guides and divemasters since the subjects studied had diving experiences and profiles common to many guides: they had been diving for more than six years, had dived mainly to depths of 45 to 65 feet and dived 100 days a year for approximately four hours a day. Many guides dive those depths for a couple of hours a day, but for 200-300 days per year. The Australian divers were using compressed air, but via hookah, not scuba.

The results of the survey indicated that, "even allowing for the very liberal requirements of the Australian Standard for Divers, over 60% had unacceptable sensorineural, high-frequency deafness." In half of these, it was in one ear, in the other half in both ears. In many cases, the authors say, the hearing loss was extreme in the higher frequencies and, in most cases, the divers were aware of the hearing loss or its associated tinnitus (ringing in the ears).

The authors conclude that "hearing loss is an occupational disease of compressed air divers, and its prevalence is significantly high."

An important process in the effort to achieve industry growth is to completely rethink all the possible product uses and consumer groups for scuba equipment. Is it possible that through the introduction of completely different equipment, popular appeal could be increased? For instance, could lightweight, less bulky, inexpensive gear be designed for people interested in swimming underwater down to depths of only 20 or 30 feet? Could there be a "starter kit"

to diving which would appeal to a new segment of consumers who want to experience swimming underwater but do not want to dive in deep water. Obviously, this is just an example of the type of rethinking required to find new applications for scuba equipment.

Can the diving industry improve the image of the sport? Can advertising and public relations spur an increase in the popular appeal of the sport? In order to change the overall industry image through an advertising campaign, it would require the financial commitment and cooperation of the manufacturers, certifying agencies and retailers.

### Predictions for the "Growth" Scenario

If the recommendations for survival and growth are followed, we believe that the industry could grow in excess of the current rate of 5 to 6 percent.

The U.S. manufacturers will pursue focused strategies which are driven by superior marketing programs and products. Relationships with retailers will be strengthened as retailers become more profitable and rely on U.S. manufacturers for substantial marketing and sales support. By providing excellent service, a manufacturer should be able to build retailer support and, therefore, make it more difficult for foreign manufacturers to penetrate the market. It is our belief that building retailer loyalty and retailer stability are keys to the future health of U.S. manufacturers. Foreign manufacturers will find it harder to penetrate the U.S. market, especially in life support equipment.

U.S. manufacturers should expect low profits and higher growth in the short term and moderate profits and growth in the long term. The short term, higher costs are due to increased marketing and R&D expenses.

In this scenario, only the profit-oriented certifying agencies and retailers will benefit from more growth and profits.

## Cutting Photography Costs

### -- And Not Sacrificing Quality

If you're an underwater photographer, you know that the real cost of photography is found not in the equipment you buy, but in the quantities of film you purchase and process.

Take a typical live-aboard dive boat trip with say eight days of diving. You make three dives a day and shoot up 24 rolls of film underwater, not to mention a roll or two on land. You're shooting slides because the reproduction quality is better than print film and because you'll save money since you won't print

more than a few shots from every roll you shoot.

So let's look at the economics. Our local camera shop sells a 36 exposure roll of Kodachrome 64 for \$6.89 and charges \$5.99 to develop it. That's \$309 for 24 rolls, or a cost per roll of \$12.88. A roll of Ektachrome costs me \$6.53 and another \$4.93 for processing it. Twenty-four rolls of Ektachrome developed will cost me \$275 or a cost per roll of \$11.45. Are there ways to cut costs without sacrificing quality? I think so.



### Professional V General Film

To many professional photographers, the difference between professional and general films is significant. As the accompanying story indicates, some professional photographers use professional films, while others find general film up to the task. Here's why.

Kodak states that both their professional and general picture-taking films with the same film-speed rating have similar color quality. But, as films age, their color balance and other characteristics may change slightly, so Kodak makes different allowances for this aging process during manufacture to provide films that meet the needs of both professional and general photographers.

The professional doing critical work for commercial clients needs to know that a particular film is near its optimum color balance at the moment it is put into the camera. Kodak professional films are close to optimum color balance when they are manufactured and packaged and they will stay near this balance when stored at 55°F or lower, until the "Process Before" expiration date printed on the film carton.

The higher cost of professional films supports the testing involved in providing products with differing aim points, additional formats and specific reporting of such factors as film speed ratings (with 1/3 stop) for batches of some films.

Because general picture film is normally stored at room temperature and used a few months after manufacturing, Kodak build a small bias to the films to compensate for changes that occur as the film will age. Over time, the film matures to its aim color balance and speed. Because of the exposure latitude of Kodak films and typical conditions of use, exposing the film at the nominal film speed -- indicated on the carton -- will produce good results for general, picture-taking situations. However you must keep them away from heat. You can refrigerate general picture-taking film if you wish to keep it at the balance it has achieved.

Under identical conditions, the stability of professional and general picture taking films is essentially the same. If they are stored at the same temperature, both films will age at the same rate. In tropical conditions -- 75°F or above -- Kodak recommends refrigeration for all films. After refrigeration, do not open the vapor tight packages until the film has returned to room temperature -- about 2-4 hours after storage.

### Buying Bulk Film:

Ektachrome "amateur" film, the kind we buy over the counter, can be purchased in rolls of 100 feet. ("Professional" film must be kept frozen and processed immediately after exposure.) Kodachrome is also available in bulk, but a minimum of 40 rolls at 100 feet each must be purchased. So, we'll price things out for the amateur film.

Bulk film has to be wound on to cassettes, but it's a relatively simple task. You need a bulk loader, which runs about \$20, and a sleeve bag, which runs another \$20.

One hundred feet of film, which will give you thirty, 36 exposure rolls, costs \$73, or \$2.43 a roll at my local camera store. Add 33¢ for the cassette to wind it on and my total is \$2.76 a roll. Since I'm paying \$6.53 a roll in the camera store, I'm saving \$3.77 a roll or a total of \$90 in film costs for this eight-day dive trip.

To load the film, no dark room is needed and it's not messy. I can take care of 30 rolls while watching *60 Minutes*.

### Prepaid Processing

The second possibility for cutting costs in photography is buying Kodak film with Kodak prepaid processing. Before you sniff that such a process is only for the amateur who takes snapshots, hear me out.

Whether you take your film to your local camera store or your drug store for Kodak processing, it is most likely being processed at the same plant by the same people. Kodak is Kodak. And many of the best professional underwater photographers, folks like Carl Roessler and Chris Newbert, let Kodak handle all their processing.

It's the print making that makes the critical difference. Once the film is developed, the cropping, the burning, the spotting and so forth that makes all the difference between a good shot and an excellent shot. That's where a good amateur photograph gets separated from a professional shot. That's why you can stay with Kodak mass processing and save yourself a bundle.

Today, in many countries you can readily buy Kodak film with prepaid Kodak processing. It's marked clearly on the box (Prepaid Processing) and there is a checkerboard pattern on the cassette. You return it to any store selling the film to get it processed by Kodak.

You can purchase this film from large American companies like 47th Street Photo, which have purchased it from foreign Kodak suppliers. You see, years ago, other firms in this country wanted into the processing business, so they sued Kodak for restraint of trade. They won and Kodak no longer can sell that film in the U.S.. Retailers, however, can buy it from foreign suppliers, and Kodak is permitted to honor



the processing.

That suit means that you can get less expensive non-Kodak processing at many stores, generally at a lower price. Some non-Kodak processors are excellent, others are less consistent. You have to learn that locally. But watch for one gimmick: some non-Kodak processors give themselves the Kodak cachet by advertising that they use Kodak paper for prints.

The prepaid processing most of us are familiar with comes with an envelope that you use to mail your film to Kodak. For some film, the prepaid envelope is provided separately. Other Kodak film has the prepaid mailer enclosed in the box. It can be identified by the "P" in the serial number (for example KM135-136 P). Either way, the result is the same -- you pay in advance, mail your film for processing and you save 25 to 40 percent on the cost. For example, our local camera store offers a roll of film with a Kodak prepaid mailer for \$8.80.

Better savings are available from the large mail order firms like New York's 47th Street Photo which shop the world for the best deals on Kodak film. Today, because of the weakness of the dollar, they're selling film made in the U.S. with a separate mailer, but tomorrow it might be film from Canada with the mailer in the box or from England with processing included in the price and no mailer at all.

For several years, I've used B&H Photo in New York. They currently sell 36-frame Kodachrome and a prepaid processing mailer for \$7.50/roll, which would total \$180 for my 24 rolls. I've just saved \$95. (Kodachrome savings are similar). And I've saved three trips to the camera store for buying film, for dropping it off for processing and for picking it up. I did all that while sitting at my desk. And, since they're in New York and I'm in California, I saved the 5.5% sales tax as well.

What about the quality of the film? Larry Clemons of Eastman Kodak told me that "we can't control the shipping conditions of film once it is in the hands of an exporter or importer, so we can't guarantee the quality of film purchased in this manner."

The major concern is twofold: is the film fresh and has it been harmed by excessive heat? Either can cause a color shift rendering the shot untrue.

Quality is best insured if the film is kept refrigerated, which exporters don't do -- and neither does my local photography store. So, I can't be sure what conditions the film I buy anywhere has faced. But I do know that Kodak film, whether made in Rochester or on the Rhine, meets the same exacting standards. If film is used a few months prior to the expiration date, you can be sure of freshness, regardless of the country of manufacture.

Photographers hoping to get a shot in *Skin Diver* or an award from the local underwater photography society should get all the results they need from Kodak processing, mail order or not. If you're still

not a believer, let me add that in eight years of paying for my Kodak processing up front, I haven't had a single bad roll of film and the expiration differs by no more than a month from locally purchased film.

Furthermore, Paul Tzimoulis, *Skin Diver* publisher, has assured me that photographs published by nonstaff photographers in his magazine have come from all sorts of film and processing. "We can use almost anything that is sharp and has color. We have even had good consistent results with print firm. If the shot is in sharp focus and has good color, we can use it."

#### What the Pros do

Chris Newbert, author of *Beneath the Rainbow Sea*, uses Kodachrome 25 and 64 professional film. "I buy the professional film because it's aged to its peak performance. I don't refrigerate it, because I have never noticed any discernable difference in the quality. I have it processed by Kodak. The quality is consistently good and I can get overnight service here on the Big Island (Hawaii).

Tzimoulis himself uses Fuji 50, buys it from a local dealer, and takes it to a nearby lab that specializes in developing film for publications. "That way I get overnight processing, but the place I use isn't exclusive. Anyone can walk in," Tzimoulis says.

Carl Roessler (*Coral Kingdoms*), buys 300-roll lots of Kodachrome 64. "I don't use professional film because I don't want to put up with the hassle of carrying coolers everywhere I go. I shoot 500 rolls of film a year and the time that the film spends in my storage room is just along enough to age it. When I get back I send it to Kodak."

So, if Kodak is a preferred processor of many professionals, if *Skin Diver* can make just about any sharp image work and if you want to cut your film costs by 35%, buying Kodak film with a prepaid Kodak mailer might be just the ticket.

And since it seems that only the giant photo operations offer Kodak film with mail order processing, here are three reputable firms with very similar prices. For others, you simply check the advertisements in the back of the monthly *Modern Photography*, available at any newsstand.

47th Street Photo 36 E. 19th St. N.Y., N.Y. 10003 800/221-7774 (orders only)	B&H Photo 119 W. 17th St. N.Y., N.Y. 10011 800/221-5662 (orders only)
Executive Photo & Supply Corp. 120 W. 31st St. N.Y., N.Y. 10001 800/223-7323 (orders only)	

Although the 800 numbers are for orders only, most companies will give you quotes. Film will generally arrive in 7-10 days, but you can pay extra for overnight delivery.

Ben Davison  
Editor