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Tom Morris prepares to do his final decompression stop inside the decompression bell. Photo by Wesley C. Skiles. See article, p. 11.

Underwater Speleology is the official newsletter of the Cave Diving Section of the National Speleological Society, Inc. (also known as the "NSS Cave Diving Section" and "NSS-CDS"). Section membership, which includes subscription to the newsletter, is open to all members in good standing of the National Speleological Society, Inc. ("NSS") at $5.00 per year. Newsletter subscriptions for non-members are $10.00 per year.

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CALENDAR

May 23-24 – NSS-CDS Spring Cave Diving Festival, Registration at Branford High School, Branford, FL. Pre-registration package in next issue of UWS.

June 20 – NACD Speleo '87 – Workshop/Seminar. Theme: Environmental and Scientific values associated with Cave Diving. Lake City Country Club, Lake City, FL. For more information contact the NACD at P.O. Box 14492, Gainesville, FL 32604.

Aug. 29 - Sep. 5 – International Cave Diving Camp, Cividale del Friuli and Trieste, Italy.

Oct. 31 - Nov. 1 – NACD Cavern Workshop for Openwater Instructors, Dive Masters, and Advanced Divers; Manatee Springs (Chiefland, FL) and Ginnie Springs (High Springs, FL). For registration information contact the Workshop Chairman: Steve Gerrard, NACD President, 5714 Ed White Ct., Tallahassee, FL 32301, (904) 877-8196.

Jan. 2 - 3 – NSS-CDS Winter Cave Diving Workshop. Branford High School, Branford, FL.

RESCUE/RECOVERY TEAM MEMBERS –

Report any change of address or telephone within 24 hours to the National Crime Information Center!

NCIC PHONE: (904) 633-4159

NACD - SPELEO '87 - Note Change in Location

The National Association for Cave Diving (NACD) will be holding its 19th Annual Seminar, SPELEO '87, on Saturday, June 20th at the Lake City Country Club in Lake City, Florida. (Please note that this is a change in location from those previously printed in UWS.)

This year's Seminar will focus on important issues concerning the cave environment. There will be lectures, slide and video presentations, and booths displaying the latest innovative cave-diving equipment. Scuba divers of all persuasions are invited to attend.

Registration opens 8:00 am. Presentations begin at 9:00 am.

For more information contact the NACD: P.O. Box 14492, Gainesville, FL 32604.

NEW CAVE FAUNA TEXT AND JOURNAL AVAILABLE
- by Jeffrey Bozanic

Two new publications have recently been released that may be of interest to cave divers. They both deal with the biology of subterranean waters, one a text and the other a new journal devoted to the subject.

Stygofauna Mundi is a compendium of knowledge relating to "stygobionts." These animals are defined as free-living taxa which (a) are exclusively found, or almost so, in all of their developmental stages, in one or more subterranean aquatic habitats, and (b) display adaptations generally to be seen as characteristic of subterranean aquatic animals.

The book was produced as a result of the cooperative effort of 65 specialists in subterranean aquatic fauna. It provides detailed information on the fauna of subterranean waters, the geographic distribution of these animals, and supplemental data on their habitats for fauna throughout the world.

The text was published in 1986, and contains much recent information otherwise only available in a multitude of journals.

Each chapter deals with a group of related animals, either a phylum or a genus. Within each chapter are the following parts: (1) An introduction giving a general overview of the group and its relationship with the realm of subterranean water. (2) A key bibliography. (3) An abundant illustration affording the reader an impression of what most of the morphological types within the group look like. (4) A tabular part, essentially confined to stygobiont animals, and giving all the data systematically arranged, the geographical distribution of species and subspecies, and the inhabited habitats. (5) "Notes" placed at the end of the chapter providing additional information.

The text was produced to document in one location the advances which have been made in the field of subterranean aquatic biology, and to provide a stimulus to further research. It is an over-sized and weighty tome, containing 740 pages. Most of the contributions are in English, although some in French and German are also included.

Stygologia is a quarterly journal devoted to presenting the results of studies in all types of cave waters--continental, marine, and phreatic waters. Results from research in a variety of fields will be focused upon, including biology, microbiology, physiology, ecology, marine biology, limnology, population dynamics, taxonomy, evolution theory, karstology, speleology, hydrogeology, hydrology, and hydrochemistry. Primarily results which have not been previously published and are new will be considered for publication. Contributions will be in English, French, or German, with an English abstract.

Both of these publications can be ordered from E.J. Brill, Box 9000, 2300 PA Leiden, The Netherlands. Checks should be made payable to E.J. Brill, Leiden, or VISA and MasterCards may be used to order. Stygofauna Mundi is $210.00 post-paid, while a 1987 subscription to Stygologia is $87.00. Back issues of the 1986 volume (three issues) of Stygologia are available for $67.00 Exchange rates may cause prices to vary slightly.

CASTLEGUARD CAVE - THE CANADIAN ROCKIES
- by J. Pollack and K. Sawatzky, M.D.

After two previous attempts, the main sump in Castleguard Cave was dived to a depth of 70'. Thanks to the generosity of Derek Ford and Chris Smart, a helicopter was used to ferry diving gear 12 miles from the road to the entrance of Canada's largest cave (11 miles mapped). The other aborted trips failed on the approach, which requires cavers to ski up an active glacier and cross a 7000' (above sea level) pass.

The dive had a number of complicating factors that made life interesting. First, 16 man-loads were hauled through 3600'' of low passage to the flooded shaft known as Boon's Blunder. Secondly, it was a high-altitude dive (6800') which, combined with the depth, made decompression a certainty for any dive over 25 minutes. Thirdly, the water temperature was low (35 degrees F.) and a flooded drysuit would be a real problem. Finally, there were tons of loose rock at the only entry point into the flooded shaft; over 5000 pounds of loose blocks were tipped into the water before it was pronounced "safe." This activity is not a recommended Canadian silt-management technique.

In the end, we made four solo dives

using drysuits with redundant B.C.'s, Blizzard and Poseidon cold-water regulators, backmounts with K's (Sawatzky) and sidemounts with K's (Pollack), generally with 72's, a 40 decompression tank fixed on a heavy shot line in the rift, and the Canadian Armed Forces high-altitude tables. Visibility in the rift never really cleared; it averaged 2" to 4". On the third dive, however, Sawatzky entered a flowing current. He went upstream, laying 400' of line in 30'+ visibility, reached his air margin and returned in bad visibility. Pollack entered the water an hour later, but he was unable to pass Sawatzky's far point due to terrible visibility.

It appears that this trunk passage is part of the lower, active Castleguard Cave system which has now been entered for the first time. Previous explorers concentrated on descending shafts in the inner cave, hoping to drop into the lower, active streamway. The upstream end of this new, flooded trunk has 6 miles to go to the catchment area, but it is anyone's guess how much of that distance will be air-filled. At the present rate of rise, the trunk will stay submerged for at least 2000' in the upstream direction.

A return trip is planned for 1988.

BACKPLATE MODIFICATIONS

– by Jeffrey Bozanic

Dennis Williams and I have, in the course of our travels, needed a more versatile tank-mounting system for our diving. Specifically, we have needed the ability to switch diving systems from single cylinder to dual cylinder to stage bottle or sidemount rigs on a frequent basis. The problems we have encountered have included the need to carry several backpacks (single tank backpack, double-tank backplate), hassles with switching gear and light-mounting brackets from one backpack to the next, trim and buoyancy problems when changing configurations, and poor carrying capabilities while on extended walks.

To solve some of these problems, we have made some modifications to the standard backplate distributed by Dive Rite Manufacturing, Inc. Some of these modifications are widely used, such as D-rings at shoulders and waist for stage bottles, belt pouches for carrying accessories, and additional holes and D-rings attached to the plate itself for attaching additional equipment. Others have not been seen before, and may be of interest.

To enable the rapid switching from one set of doubles to another, holes one inch on either side (above and below) of the center-aligned holes for the tank band bolts have been drilled. This allows one to adjust tank height relative to the diver's body to fine tune trim while diving. In this manner, band placement on a set of doubles with a dual-valve manifold is not so critical.

We have moved our crotch strap fastening point from the lower bolt on the doubles to a hole drilled in the plate below the bolt-attachment holes. This insures that the crotch strap is not forgotten when switching doubles, and saves on time when switching. The strap is attached with a stainless-steel shackle for ease in removal when desired (see photo).

A pair of slots have been drilled in the middle of the plate (see photos) through which a soft tank band is placed. This allows the same cave-diving modified backplate to be used with a single cylinder as well as doubles. The flexibility of this system is not to be underestimated--no longer does one have to continuously change pouches, attached accessories, etc. from backplate to backpack, forgetting in the process one or more pieces of vital equipment. It also standardizes gear placement, which increases safety if the diver is perceptually narrowed for any reason. The time required to alter configuration from doubles to single is also reduced. The system carries well, but if the crotch strap is centered on the backplate, it may have to be removed to position the single tank properly. Slots should be about 2.5" long and 0.5" wide.

Photo by Jeffrey Bozanic

Many divers have been using dual single cylinders, especially for solo diving. The backplate can be modified for this system in the same manner, by drilling two sets of slots for two tanks, and attaching them with four soft bands. These should be placed so as to keep the tanks close together and stable while diving.

Many divers have found that fastening lead to dual cylinders is a convenient method to carry needed weight, and at the same time adjust trim to the desired position. Most divers have done this with a bar made to fit between the cylinders. For traveling divers, where it is not convenient to carry these specially shaped weights, standard diving weights can be used. Hip-shaped weights work well, as do normal square-shaped weights. Use a soft tank band slipped through the weight and around the tank to attach them. They can then be easily removed or altered to adjust buoyancy, or slipped up and down to adjust trim. Sherwood's band works well, as most weights easily slide on the strap.

Dennis has designed a primary-light mounting bracket that is an integral part of his backplate. His battery pack fastens to a hinged bar, which swings in and out from his stomach. When fastening the light, he swings it out to see what he is doing. While diving, it hinges back to lie snug against the tanks. A small cord is rigged through a nylon sailing ratchet to secure the tanks. This ratchet requires no knots be tied, and can easily be done with a single hand. If he has problems during the dive, or needs to work with the battery pack for any reason, he can swing it out for easy access. The system works equally well with either double or single cylinders.

A new suspension system is currently in the works to allow tanks to be more comfortably carried long distances (sometimes several miles for our diving). It shifts the weight from the shoulder straps to the hips, and uses a padded hipbelt to distribute the load. The system is quite similar to suspension rigs on modern camping backpacks.

Dennis has also modified his backplate to include a quick-release shoulder strap. He uses a velcro system commonly seen in open-water backpacks, where a strap slides through a metal loops and fastens to itself. This allows him to easily get in and out of his tanks without fighting. It has also eliminated further battle scars from being added to his drysuit cuffs, which in the past usually caught on the arm strap while he was donning his tanks.

Finally, Dennis is working on a system where it will be possible to put the backplate and all of the accessories on, and then attach the doubles. This would make gearing up relatively easy, and would significantly reduce pre-dive fatigue. It could also have use in other applications, such as where a diver might want to penetrate a significant distance on doubles, then drop the doubles inside the cave and continue on side-mounts.

Photo by Jeffrey Bozanic

We have also eliminated the normal quick-release buckle on the waist strap of the backplate in favor of a 2-inch fastex clip. This has less tendency to hang up on tight squeezes. It also cleans up one dangly, that of the strap end which protrudes through the buckle. The loop in the waist strap left when the fastex is attached can also be used. The strap should be placed through both loops on the accessory pouch, then through the fastex. Run the strap back along itself folding to the inside, but do not pass it through the first of the loops on the pouch. This allows you to slide the pouch forward to get at items inside, or back to get it out of the way. It also prevents the pouch from being able to inadvertantly slide off the end of the belt.

I hope these ideas solve problems which some of you might share, and that they spur other divers to share modifications within the hallowed pages of Underwater Speleology! Happy diving!

O-Ring Failure Precautions
by Roger Werner

Those who go cave diving with their valves wide open would do well to heed the message of the open-water diver cited in the September 1986 issue of UWS. He cited losing 700 psi from a single tank in the 20 to 30 seconds it took to close his valve. Why did it take that long to close the valve? I suspect it was open all the way. I remember a similar incident which occurred while filling a set of double 80's (manifolded), in which an orifice O-ring blew, and 700 psi was lost from the 80's in about 15 seconds required to turn off the valve. It is also worth noting that my experience was on the surface. It is reasonable to expect that at depth the air would be lost faster. (The pressure difference driving the air flow is less, but that is insignificant. What is significant is that the air leaving the orifice is denser.)

For this reason alone, I have since dived with my valves open only about 1/2 turn. I have found this to be adequate. If an O-ring blows, first, the valve opening much smaller, so the air is lost at a slower rate. (This is easy to observe with any tank. Open the valve 1/2 turn and see how fast the air comes out. Then, if you dare, open it all the way, and observe the difference!) Secondly, since I don't have as far to go, I can turn the valve completely off much faster.

Though I am not the only cave diver to dive with my valves 1/2 turn open, it seems that we are in a distinct minority. Diving with valves 1/2 turn open is not completely without hazards. First, particularly as your air gets low or if your breathing rate goes up, it may get harder to breath. In such a case you should reach back and open the valve a little more until breathing is easy again. (You CAN reach your valves can't you?) My only experience with this has been once at 90 ft, when my air was down to about 1000 psi, air flow started to get sluggish. Opening the valve a little further solved the problem. Secondly, it is easier for your air to turn itself off. This is possible when backing out of a restriction and your valve knob rolls against the ceiling. It doesn't have to roll very far, and when the valve turns off, the air STOPS. Again, the cure is the same: reach back and open the valve a little further. Some valves are less prone to turning themselves on or off than others. Thirdly, some rules concerning valve position address persons who may have difficulty knowing which way is off. Those persons probably should not be reading this article (or going cave-diving either).

Lastly please note that 1/2 turn on may not be enough for everybody. You may require a full turn, or more. As a general rule, if it is hard to breath, your valve is too closed (or of course, you might also be running out of air). The minimum valve setting is higher as depth increases and tank pressure decreases. I recommend finding a setting which consistently works for all your dives without trying to fine-tune the critical valve position. After a little experimentation, I think you will find that 1/2 to 2 turns on is fully adequate for most diving.

Fill station operators and users of transfer hoses would probably also be wise to open valves only as much as necessary. If the hose breaks loose at one end, a wide-open valve will give maximum flow, making the hose flail about most violently. I have heard that it is no fun to be whipped by a hose.

MANIFOLD or K-VALVES?
by Roger Werner

For many years, throughout the American cave-diving community, the dual-valve, or "ideal," manifold has almost universally been considered to be the best and only acceptable way to configure double tanks for cave diving. I wonder if perhaps we have jumped too hastily to that conclusion. For years French and Australian cave divers and American sump divers have used pairs of single tanks held in doubles-bands. Throughout this article I will refer to this arrangement as "twin singles." It is my understanding that the French and sump divers use twin singles for ease and safety in carrying the tanks through air-filled passages to the water. (It is difficult and dangerous to carry a set of doubles through a dry cave. Dry cavers must always contend with the risk of falling--a hazard somewhat foreign to many cave divers [once in the water].) Australians use single tanks because it is a more efficient use of high-pressure air (their caves tend to be a long way from the dive shops). Only recently have twin single tanks come into common use in the United States, but the common arrangement is to carry them as stage bottles, generally referred to as "side mounts," rather than in doubles bands worn on the back.

In this article I wish to revive consideration of twin singles, each tank with its own independent K-valve or Y-valve. I propose that twin singles may not only be the best configuration for sump diving, but in fact may be a the best configuration for cave diving in general.

DISADVANTAGES OF MANIFOLDS:

1. Failure of either neck O-ring, any burst disk, or the manifold seal will cause an immediate loss of all air in both tanks.

Bear in mind that since most manifolds have two burst-disk ports, and all have at least two tank-neck O-ring seals, air loss due to O-ring or burst disk failure is twice as probable for a manifold than for a K-, J-, or Y-valve. Also, due to its shape, it is much easier to break a manifold by striking it on the middle section than to break a K- or J-valve. As any experienced cave diver can see, hitting the ceiling has been common in underwater Florida caves.

A number of manifold failures have been reported in recent years. A survivor of one such incident told me that that the outrush of air forced him down into the silt, and he was entirely out of air within 3 or 4 breaths. Even more common have been failures of valve orifice O-rings and tank neck O-rings. Certainly these, though rare, are very serious hazards to consider.

A diver's options for survival in such emergencies are limited. First, he may carry a third tank, separate from the manifolded tanks. Some divers have done this with stage bottles (usually 71.2 cu. ft.). These are quite cumbersome to carry just for the risk of a manifold failure. Stage bottles (1) reduce streamlining, (2) increase the probability of touching the ceiling and the bottom, (3) invite entanglements, (4) induce added stress from the task loading of just having to deal with them, and (5) all of the above very much so. It is therefore questionable whether the addition of a stage bottle, merely for protection against a manifold or major O-ring failure, increases the overall safety of a dive.* Some divers have elected to mount small "pony bottles" (14 to 20 cu. ft) on their doubles for their personal redundant air supplies. This certainly increases air safety, but also invites some bad entanglements if not properly mounted.** If the pony bottle is mounted between the double tanks (above them when the diver is prone), it increases the vertical height of the diver, making restrictions "tighter," if not impassable, and greatly increasing the risk of hitting the ceiling, thereby adding to already-rampant cave destruction (but also protecting the manifold!).

Secondly, and most commonly cited, is the option of getting air from one's buddy. This of course requires that the diver in difficulty communicate to his buddy that he needs air, and that the buddy respond immediately--and not one second too late! Buddy breathing also requires that both divers exit linked together--a somewhat slow and sometimes tedious process. Such communication and response would be severely hampered in a restricted passage. Consider for example the bedding plane restriction in Jug Hole (Ichetucknee Spring, Columbia County, FL), the "Potter's Delight" or "Rocky Horror" passages in Madison Blue (Blue Spring, Madison County, FL), the vertical shaft in Diepolder II (Hernando County, FL), and entrances to the water where there is room for only one diver at a time on the surface (minor restrictions at the entrance to the water--the diver on the surface will neither see nor hear a diver in distress under water).

<u>ADVANTAGES OF MANIFOLDS</u>:

1. If either regulator or orifice O-ring fails in any way, a diver can still get at all his air through the other regulator.

<u>DISADVANTAGES OF TWIN SINGLES</u>:

1. Each regulator is only good for the air in that tank. You cannot get at all the air through either regulator alone. HOWEVER, on a properly planned dive there should always be enough air in either tank alone to get you all the way out. This applies to manifolded systems as well as twin singles.

Let us consider why you would want to stop using a regulator. First, it may be mildly free-flowing. In this case, you can still breathe much of the air out of that tank through that regulator. If you have a violent, uncontrollable free-flow (the high-pressure seat may have failed), you can still regulate the flow

* Manifold failures were reported in two articles in <u>Underwater Speleology</u>, Vol. 10, No. 5/6. In one article, the author raised the question, "What if they were diving solo?" As with any diving, the presence of a second, entirely independent air supply is mandatory (or at least highly recommended). When diving alone, the solo diver must carry this second supply himself. Air must be planned so that at any point during the dive, enough air remains in either system to get entirely out of the cave--and decompress if other air has not been securely deposited for that purpose. There are other, perhaps more serious, hazards to solo diving in addition to the increased stress and entanglement hazard of carrying the stage, or bailout, bottle.

** Werner, "Every Dangle is a Potential Tangle and Cave Destroyer," <u>Underwater Speleology</u>, Vol. 9, No. 4. See discussion of line-trap hazards imposed by hose clamps.

somewhat with the tank valve (you can reach your valves, can't you?), and still get some if not most of the air left in that tank.

2. What if when you switch to the other tank, it doesn't work for any reason (neck O-ring, burst disk, total regulator failure, etc.)?

Exit the cave on the tank you went in on, and, if necessary, get air from your buddy, as you would if you were diving a manifold and it dumped all your air. The air rule for twin single tanks is NOT to use one tank going in and the other tank for coming out (although some who waited until it started getting hard to breathe before they turned the dive might be alive today if they had used this plan!). The twin-singles air rule is also NOT to use half of each tank going in and the other halves coming out. Neither of these rules leaves enough air in either tank to get all the way out from the point of furthest penetration.

For maximum safe penetration one should use 1/3 of the air in one tank and then 1/3 of the air in the other tank. At this point either tank alone should have enough air to get you out (assuming you consume air going out at the same rate you did coming in). Notice that this is the same as the procedure used with manifolded tanks (1/3 of each tank going in, 2/3 to come out) or with stage diving. Obviously, this requires a pressure gauge on each tank.

As has always been true of the 1/3 rule, this leaves no margin for decompression. Decompression air must be planned separately from bottom air. One also has the option of breathing 1/2 in on one tank and then turning the dive (to go further would leave insufficient air in the first tank to get out). Also, if you do this sort of a dive, make sure you know where the other regulator is before it starts getting hard to breathe!! Preferably, don't breathe the first tank down that far.

3. How do you tell which regulator or pressure gauge comes from which tank? One can always follow the hose manually from the tank valve. A much easier method is to use regulators and gauges which look or feel different (e.g. different brands, different shapes, etc.) for the different valves, and memorize before the dive which regulator is on which tank; or you could mark them. If neither of these methods works, monitoring one's pressure gauges for a few minutes during the dive will soon reveal from which tank one is breathing.

4. Won't I get unbalanced if I breathe the air from one side and then the other (instead of draining both tanks together)? Probably not. How negative is your light? Don't you carry it on one side? What is it counter-balanced with? If roll balance is really a problem, then having separate tanks gives you the opportunity to very finely tune this balance (this doesn't help with pitch and yaw, though!). Don't forget the air rules mentioned above, though, while fine-tuning your balance. "Wings" buoyancy compensators also allow one to adjust buoyancy to counteract a roll moment by shifting air from one side (wing) to the other.

5. Buddy Breathing:

The probability of having to buddy breathe is extremely remote when both divers are using twin singles. However, if one diver is diving a manifold, he is much more likely to need air from the one diving the twin singles, than vice versa. Both divers may wish to consider the factors listed below:

a. If you have to supply air to a buddy, hopefully you have planned your air such that there is enough in the tank with the long-hose regulator for him for the rest of the dive and enough in the other tank for yourself. With adequate air planning this should not be a problem. You may wish to have a long hose on each tank, but watch out for the dangle/tangle hazard presented by long hoses. Don't wrap both long hoses around your neck. One or both long hoses may be easily secured under rubber bands on the tanks or through loops of surgical rubber tubing.

b. What if my buddy needs more than the air in one tank? Switch tanks before his is empty. It would probably be good to switch regulators occasionally in order to compensate for unequal breathing rates or air supplies in the two tanks.

For example, if your buddy breathes twice as much air as you do, and you both begin exiting breathing off one set of tanks, with equal amounts of air in each tank, then if you switch regulators when you have used 1/3 out of your tank and he 2/3 out of the other, then (theoretically) there is enough in each tank for you both to go that much further again (on the opposite tanks). If you wait until one of you runs out of air, then you will have to pass a single regulator back and forth (and hope that both parties can retain sufficient sanity to do this while swimming at the same time and without either one getting greedy).

It is in the interests of the greater hog of air and/or he who is the recipient of shared air to insure that switching takes place well before either tank runs out. Since real-life calculations are not likely to be so simple, I would recommend just routinely switching regulators occasionally so as to keep nearly equal quantities of air in both tanks.

c. What if there is another total air failure and the tank the buddy is breathing suddenly goes empty? You might consider giving him your remaining regulator and breathing from your BC inflator. If you do this, be prepared to not get your regulator back. Even with manifolded systems, at least two regulators or one regulator and a power inflator must be functional in order to sustain two divers. It may be a good idea to have a BC hose on each regulator (secure the unused one so as to avoid dangle/tangle or plug it into your drysuit). Bear in mind, though, that every low-pressure hose is a potential source of catastrophic air loss.

6. Probably the most serious disadvantage of the twin-singles arrangement is that if a low-pressure hose or orifice O-ring ruptures, you will not be able to use any air through that regulator (with the possible exception of what you can get as it bubbles out the hose or after it piles up on the ceiling--a use for snorkels!!)

This problem and the free-flow hazards described above may be mitigated or avoided by replacing one or both K-valves with Y-valves and more regulators. If you do this, bear in mind that the "wing-nut" knob found on most Y-valves turns itself on very easily. Every orifice on a Y-valve must be covered by a regulator--otherwise you would probably be safer to use a K-valve. Also, your task-loading stress increases with the increased number of hoses. Two tanks, each with its own Y-valve and two regulators, give maximum redundancy for air supply, but also present a jungle of hoses to deal with and tell apart.

I recently tried a combination of one K-valve and one Y-valve. Only one pressure gauge is necessary for each tank. As I suspected, keeping track of three 2nd stages is slightly less easy than keeping track of two. It also adds the following hazard: What if one 2nd stage has already gone bad, and you are breathing on your second 2nd stage when it goes bad? You now have two second stages to choose from, one which you know is bad, and one which you hope is good. It may take two tries to find the good one. Note that this is not a problem with a two-2nd stage arrangement. With a 2-regulator configuration, when the second one goes bad, you know before you try it that the other regulator is also bad.

Octopuses are not recommended whenever there are separate valves. Although an octopus facilitates buddy breathing if you have only one valve, it also introduces additional free-flow risk. You cannot turn off a free-flowing second stage without turning off its first stage and every thing attached to it. For this reason, an octopus is not recommended for the solo diver who would be daring enough to dive with only one K- or J-valve. Octopuses are only recommended for buddy teams who are daring (or foolish) enough to dive each with a single K- or J-valve and refuse to get the proper valves.

It should also be noted that if you blow a low-pressure hose on a manifolded system, it may be difficult or impossible to breathe off the other regulator until the gushing one is turned off (reference: Bill Gavin). It will take some amount of time to determine which regulator system must be turned off and then some more time to turn off that valve. During that time BOTH tanks are draining if they are manifolded together (and rather fast if the valve was open wide!).

Another remedy for the ruptured LP hose would be to have your buddy change your regulators for you if the time came that you actually needed the air in that tank. You should get air from him while he does this. Regulators should be fully cleaned inside after changing under water. Though the water shouldn't hurt any of the materials, we don't want to have sand in the wrong places.

<u>ADVANTAGES OF TWO SEPARATE TANKS:</u>

1. The chances of having to buddy breathe are extremely remote.

   In order to lose all your air, or even to have to buddy breathe, you have to have two total air failures. If both partners of a two-man buddy team were diving manifolds, two total air failures would kill both of them. If both divers are diving twin singles, they can each survive one total air failure at the point of furthest penetration. If there is only one total air failure at furthest penetration, they might be able to survive a second and even a third total failure on the way back.

2. If you fall while wearing twin singles, you do not risk breaking or damaging a

manifold.

BEST OF BOTH WORLDS?

A third configuration, used by many cave divers today is that of two single tanks, each with a Y-valve. Each Y-valve has one first stage on it. A transfer hose runs between the remaining two valves. One may sustain a low-pressure hose or orifice O-ring failure on one tank, and still get at all the air in that tank through the transfer hose. I have never dived such a configuration, but propose the following about it. The transfer hose should be pressurized during the dive to keep water out, but the valves to which it is connected should probably be kept off until a transfer is needed. (What if one of their O-rings failed, or the transfer hose failed?--or worse yet, what if the hose broke loose and beat you to death while you were trying to turn off both valves?) The hose might best be kept pressurized by having one valve just cracked open, leaving enough restriction to minimize flow in the event of a hose or other failure. This way, if a hose fails, there won't be enough flow to make it flail about; there will be only one valve to turn off, and then not very far.

CONCLUSIONS

The major points discussed above might be summarized as follows. Manifold failures, tank neck O-ring failures, and burst-disk failures, though rare, are very bad. The problems with twin singles are much more common, but much less serious.

The vast majority of the American cave-diving community continues to dive manifolds. It is this fact alone that makes me wonder if I have overlooked something in this Manifold vs. Twin Singles argument. If so, I would very much like to know what it is. These arguments also raise the question: What is the justification for a single-valve manifold (for any kind of diving)?

ACTION

When I last visited Ichetucknee Spring (Columbia County, FL), I was presented with a list of equipment which was required, in addition to a cave- or cavern-diving certification card, in order to dive there. This list included double tanks of at least 71.2 cu. ft. each, connected with a dual-valve manifold. In the bedding plane restriction in Jug Hole, a diver probably has at least a 100% chance of hitting the ceiling (unless he is diving side mounts and is very good). Also, if he needs air from a buddy in this restriction, the chances of getting help in time, are somewhat doubtful. Probably the most appropriate tank configuration for this place is two side-mounted tanks, but even that would not be appropriate for a diver not familiar with them.

I propose that we, as an organization, recommend to the State of Florida that it only require cavern- or cave-diving certification cards, as appropriate, and let the certified cavern or cave diver dive however he feels is most appropriate. I would like to think that the possession of a valid Card implies that the owner has demonstrated enough sense to plan and execute a safe dive himself. Let us not wait until there is an accident, especially since the State's list probably originally came from the cave-diving community. If there is a fatality while using our list of equipment--one due to an inherent shortcoming of the equipment we have recommended--then we may lose considerable credibility.

LETTER TO THE EDITOR - [The Editor apologizes for what may seem like an inordinant delay in printing this letter. It is hoped, however, that its author will be well satisfied that its ideas were taken to heart and that they have made a big impact on subsequent issues.]

Nov. 1986

Having just received my latest issue of Underwater Speleology, I stopped everything I was doing until I had completely read the news from front cover to back. Afterwards, I must admit, I felt somewhat disappointed--even downright disgusted--at the contents. If Jim Coke's article on Quintana Roo's spectacular cenote diving hadn't been included, this particular issue could have been called the "CDS DEATH NEWS." Please don't misunderstand me, I love the News and feel that U/W Speleology is the leading news in its field, but...there must be a better place for drowning reports. I guess I just hate to see precious space which could be filled with juicy stories about cave exploration, new equipment ideas, and educational forums, all subjects we truly enjoy, wasted to tell us something that we all already know all too well. Rule violators, and those not trained properly in overhead environments, can and do drown in caves. I'm sure my level of involvement with drowning scenarios has something to do with my attitude, but let's review the facts:

Were any of the divers who perished in the various underwater caves trained in cave diving?

Were any of the divers who perished truly familiar with the concept of accident analysis, and therefore adhering to the rules associated with it?

Was there anything said or told in the cloned stories on each drowning that would be considered new and important facts about rule violations?

If the answer is no to all of the above, then you have learned nothing that you don't already know. A hard fact to learn, but one I know all too well is divers who drown in caves seldom do anything creative. Case after case, the rules of accident analysis are broken, and divers pay with their lives. Sooner or later someone will drown, violating some rule, outside the traditional rules governed by accident analysis. When that does happen, we should hear about it in the News. Until then I feel like all "typical" reports should be reviewed and then forwarded to John Crea, the CDS Accident File Coordinator. If the readership feels that it wants to read about all of the accidents, that's fine, and would then recommend that an annual "Cave Diving Accident Report" be published similar to that done by the NSS.

Underwater Speleology is the newsletter of the Cave Diving Section of the National Speleological Society, and should be reserved for news that reflects the goals of our organization: to explore, to study, and to conserve. All individuals reading this newsletter should appreciate that being editor of U/W Speleology is a thankless task. It should also be noted that not enough news is contributed from our readers to offer the diversity necessary for a well-balanced newsletter issue after issue. Anyone with a story of interest should submit it. Please don't assume that your story isn't worthy; let the editor decide that! To help set the stage, I have enclosed an article entitled "The Scientific Future of Cave Diving." I hope you'll enjoy it.

Safe cave diving,

Wes Skiles
Training Chairman NSSCDS

THE SCIENTIFIC FUTURE OF CAVE DIVING
- by Wes Skiles

Cave diving developed initially as a sport; however, as the level of participation and interest grew, cave divers began to study, interpret, and map the fragile, unusual environment they were privileged to visit. In the past five years, cave divers have participated in substantial biological studies. Although these studies are important, emphasis in the future will almost certainly be placed on the caves' role as windows into the aquifer--research laboratories to test aquifer health and aquifer potential as a water source.

Scientists interested in direct study of these resources are increasingly turning to cave divers for data to support their studies. Likewise, geologists and hydrologists are concerned with the specifics of how water moves through the ground so that it may be better managed. In both cases, cave divers able to collect and study information from the underground underwater environment are needed.

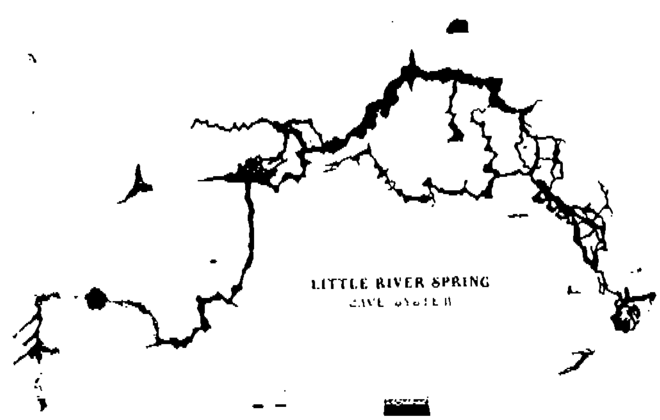
Cave divers are hurried visitors to a beautiful but hostile and potentially dangerous environment. The present state-of-the-art of cave diving allows safe, quick visits to the underwater systems, but does not allow time to be spent for the collection of data or close, careful study of a system without great physical sacrifice on the part of the diver--in increased decompression times, in nitrogen narcosis effects, in bearing the physical burden of stage diving or long swims with heavy loads.

Cave divers can help in many ways with studies of the underground underwater world. The first part of this paper identifies the ways in which cave divers can further scientific research. The second part discusses the improved cave-diving tools, equipment, and procedures needed for safer and more thorough study of underwater systems.

FIELD DATA COLLECTION POSSIBILITIES

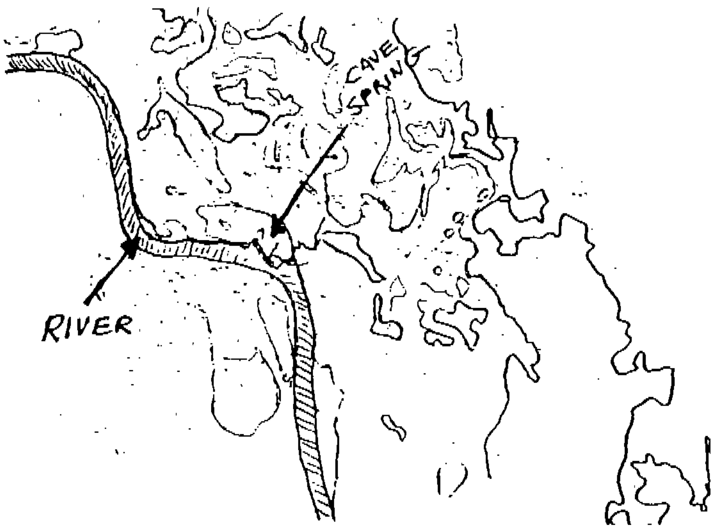
Cave divers, with their direct experience of cave systems and their sometimes encyclopedic inventories of surface karst features such as springs, sinks, and "little holes in the ground," can assist scientists in the following ways:

Survey and cartography. Line surveys of caves can be completed, providing depths, distances, directions, sketched passage features, and vertical profiles. The limited time that cave divers can spend underwater is the single largest factor in preventing more complete, detailed, and accurate mapping of underwater caves.



Little River Springs Cave System. Cartography by Wes Skiles. Newly revised edition now available through CDS Publications, see p. 17.

Dye Tracing. Based on topographic information and the trend of the cave system under study, dye-tracing experiments can be carried out to trace the contributions of (potentially polluted) surface drainage into the aquifer system.



Little River Springs Cave System overlaid on area topographical map.

Water Chemistries. Water samples can be taken through out a system for analysis, allowing scientists to study water quality, dissolved salts, the influence of infiltration from local communities and surface drainage, and changes in water chemistry with depth.

Photography. Photographs can be taken that allow non-divers to view the spectacular, beautiful underground environment, and allow scientists to study such things as passage cross-section relative to flow dynamics.

Biological Collecting. Biological specimens can be collected when this is appropriate, with all due care taken not to disturb the ecologically sensitive cave environment.

Geological Collecting. Rock specimens can be collected at different depths in a cave system and in areas where solutional activity is intense or unusual; thus, scientists will be able to correlate rock units and passage characteristics.

Photo by Wesley C. Skiles. (Subject prefers to remain anonymous.)

BETTER TOOLS AND TECHNIQUES FOR RESEARCH DIVING

The following ideas are the pieces of a puzzle. If we can fit them together, we can realize many research goals. All of them have the goal of staying longer or gathering more information in the underwater environment.

Staying Longer. Presently, our ability to stay in the underwater cave environment for long enough periods of time to do significant work is limited by the amount of air we can, practically, carry and/or stage into the cave before the working dive is carried out.

Multiple Staging. Multiple staging has grown popular in recent years; it is largely being refined by explorers attempting to achieve new penetration records in Florida's larger cave systems. The technique requires detailed planning and multiple set-up dives to be done properly. Five-, six-, and seven-tank stage dives (plus the cylinders being worn on the back) have been completed successfully, but only at the cost of great time and effort on the part of the participating divers. If cave divers wish to advance beyond what has already been achieved, we must develop better and simpler ways to increase bottom time.

Carrying More Air. French, German, and Swiss cave divers have increased their "on-the-diver" quantity of cylinders (as opposed to placing cylinders in the cave in advance of the planned push dive). This method has the obvious advantages that the diver can, on one dive, enter a cave, swim to the desired zone of penetration, and exit without the complex series of set-up and clean-up dives required with the staging system.

Special problems such as excessive negative buoyancy have been handled by mixing high-volume steel cylinders (104 cu. ft. or 140 cu. ft.) with equally high-volume (100 cu. ft.) fiber-composite cylinders that tend to be positive even when full. The excessive negative buoyancy of the steel cylinders tends to be cancelled out by the positive fiber-composite cylinders, thus giving the cave diver a large but neutral load. This allows a diver carrying an awesome mass to make decent forward progress because the mass is neutral.

As with all great ideas, there are drawbacks. The most obvious one is that all caves would need to be the size of Wakulla Spring to use such a system. Since the vast majority of underwater caves do not meet this specification, other alternatives must be sought.

The Australian Sled System. The Australians, in the world-record penetration of Cocklebiddy Cave, used "tank sleds" made up of 16 aluminum 80-cubic-foot cylinders. These sleds worked quite well; they ansported a large volume of air deep into the cave efficiently and without too much diver effort. But the sleds did tend to become extremely buoyant as the tanks were breathed down. Considerable lead had to be carried, and there were occasional underwater problem-solving sessions as sled buoyancy caused hang-ups on the ceiling.

The Tank "Peel Off" System. By mixing the good aspects of American stage-diving techniques and the European bulk-air system, we should be able to come up with an ideal mix. The tank "peel off" concept would allow a diver to begin with an enormous volume of air (690 cu. ft.) and, as the dive progressed, to "peel off" the tanks as individual groups of tanks had been breathed down to two-thirds of the initial volume. This puts the explorer in an increasingly streamlined configuration as penetration increases. The beauty of such a system is that the explorer is shedding the redundant mass of air along the way, allowing better negotiation of smaller passages that may be encountered as the penetration increases. The explorer could end up with a tank configuration as streamlined as a sidemount system as far back as a mile and a half. (See Diagram 1.)

To Stay Longer More Safely. With the pacity to increase bottom times through the use of new tank-configuration systems, thought must be given to the additional time required for proper decompression. Modern cave divers have already pushed bottom times without the use of a chamber to the absolute extreme. Fortunately, the cave-diving community has experienced good success in decompressing. Some of this success can be attributed to the learned fine are of "comfort decompressing." The most common of these important techniques are:

1) fluid and energy replacement,

2) pure oxygen use on a rotating schedule with air for the twenty- and ten-foot stops, and

3) increased warmth through decompression, achieved either by layering wetsuits or by using drysuits with warmth-retaining underwear.

Even though these steps have been beneficial in avoiding decompression sickness, they fall far short as satisfactory methods for sustaining the cave diver through substantially longer bottom times. Possible solutions to the problem of "high-risk" decompression dives might include:

1) Nitrox diving gas mixtures to decrease the saturation level of nitrogen in body tissues,

2) portable decompression bells, and

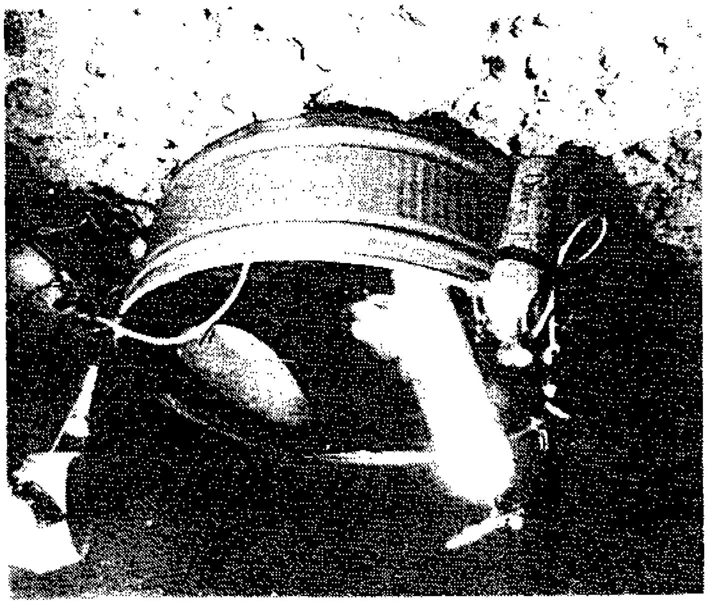
3) use of habitats for saturation cave diving.

These techniques could greatly extend the capabilities of the underwater researcher/explorer.

Nitrox Gas Mixtures. Compressed air, used for all forms of recreational diving, has distinct disadvantages for the cave diver planning a long bottom time. Because of the high partial pressure of nitrogen in air, the body's tissues reach saturation or even supersaturation (once the diver begins to ascend) very quickly. Increased depth causes increased nitrogen intake, thus making deeper and longer dives more "high risk" as far as decompression sickness is concerned. Nitrogen absorption is a problem because the gas is inert, not used directly by the body for any specific purpose. Oxygen, on the other hand, is very much in use by the body and causes no problems, such as bubble formation in the tissues. The drawback to oxygen is that our bodies accept only a maximum partial pressure of the gas. Partial pressures of oxygen that exceed 29.4 psi become toxic to the diver.

Nitrox, a special gas mixture of nitrogen and oxygen, could hold one of the keys to extending bottom time by lowering nitrogen partial pressure and increasing oxygen partial pressure. an ideal mix could be arrived at where the diver has greatly decreased nitrogen absorption while staying below the toxic partial pressure of oxygen. Presently several individuals are studying the feasibility of developing a system to mix the proper percentages of oxygen and air to create a workable and safe nitrox mixture. Specific mixtures will have to be blended for each depth range the diver anticipates exploring; it should be noted that Nitrox can only be used safely in shallow dives. The maximum safe Nitrox depth should not exceed 130 feet, based on a 1.2 pp O2 mixture. Given this limit, a reasonable depth limit for obtaining benefit from Nitrox would be 90 feet. No diver should experiment with exotic gas mixtures unless he or she is fully educated and equipped to work in such an area.

Tom Morris returns to the decompression bell after a penetration dive. Photo by Wesley C. Skiles.



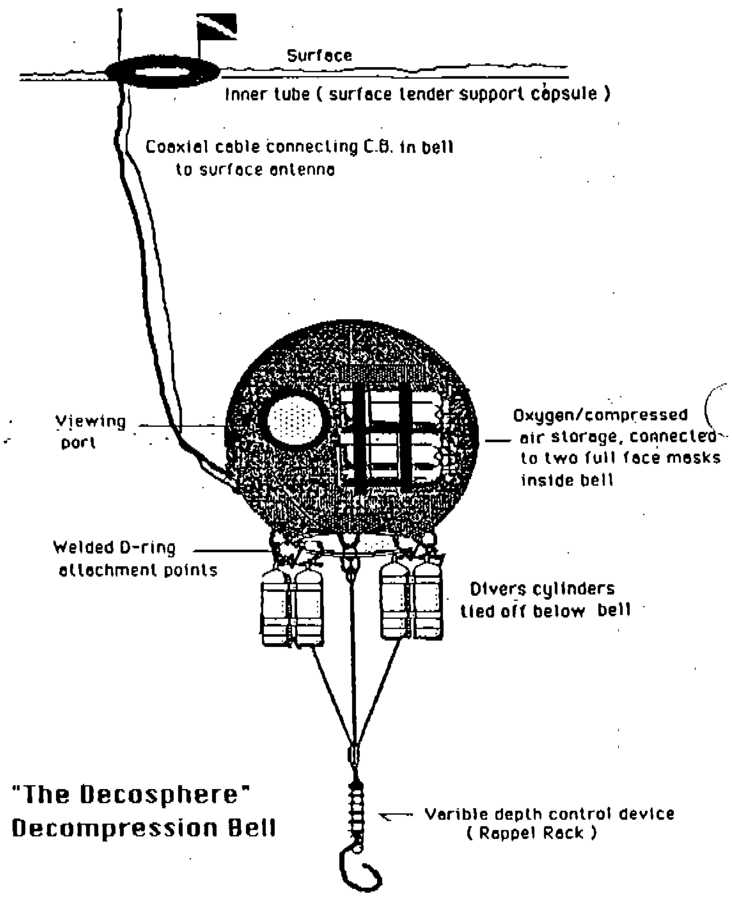
Peacock Springs: inside the decompression bell, a cow trough converted to habitat. Photo by Wesley C. Skiles

Portable Decompression Bells. The major drawback to long decompression schedules in the water is discomfort. Cold, extreme boredom, thirst, needing to urinate, and/or feeling that the decompression is no necessary are primary motivators for a diver to "push" the tables. The word "push" is being used in a broad sense; it could cover anything from leaving decompression early to skimming the tables to fit your needs. Whether any of this is the case or not, there is a problem with divers on long and/or deep dives having the ability to stay comfortable during their prescribed schedule.

Ron Allum from Australia tries out the decompression bell. Photo by Wesley C. Skiles

A portable decompression bell would eliminate all of the drawbacks of racking up long decompression schedules. Since the first stirrings of this idea arose, there have been a number of bell-type environments proposed. The theory behind all of the designs is to make for a more comfortable, safe stay at decompression. Being able to remove cylinders and rise into an ambient-pressure air environment allows the diver to become far more comfortable. A portable decompression bell could be stocked with a variety of options. There are two categories within the bell system concept (no pun intended). They are:

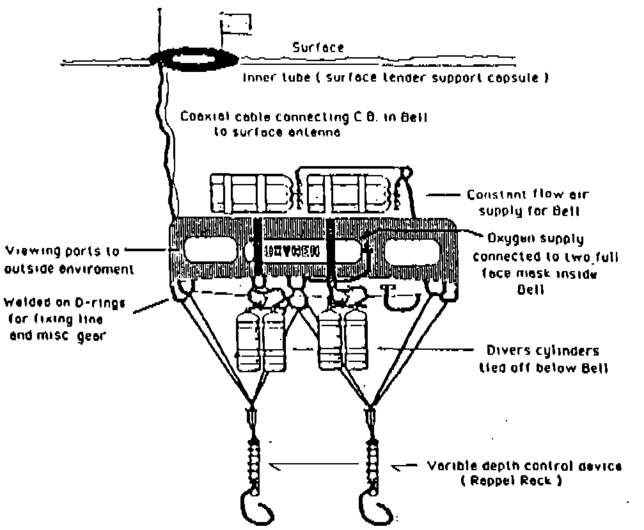
1) stationary (fixed depth) bell, and
2) variable bell depth.



"The Decosphere" Decompression Bell

The Decompression Sphere. Using a surplus World War II-era decompression bell, the cave diver can now feasibly install decompression spheres at sites that warrant them. The spheres presently available measure 5 feet in diameter and weigh 617 lbs. Once it is submerged and filled with air, the sphere creates a total of 3000 lbs. of lift force, which could be countered using either a variable or fixed depth system. (See Diagram 2.) In most cases the ceiling of the cave could be used to achieve the fixed depth.

Once the concept of decompression bells in absorbed, the options for increas-

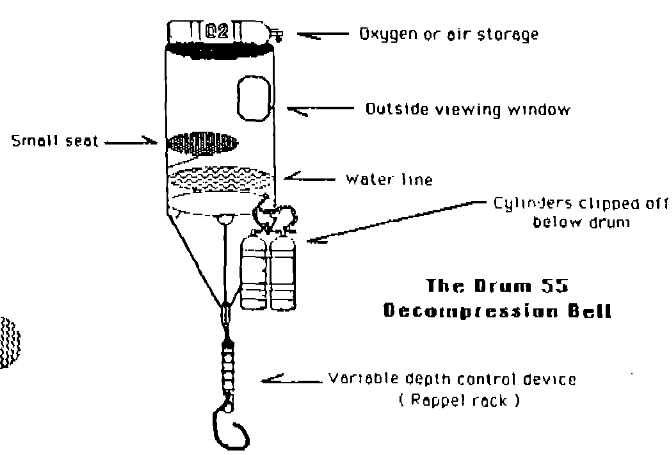


The "Trough" Decompression Bell

ing the efficiency and comfort of decompression become quite exciting. The list below describes some of the feasible options that could be added to any of the bell designs.

Storage Air Mounted Externally on the Decompression Bell. This method would allow a free flow of fresh air to be constantly bled into the chamber, eliminating the need to keep a regulator second stage in your mouth inside of the bell environment.

Storage Oxygen Mounted Externally on the Decompression Bell. By having an oxygen system with one or several demand face masks, the diver(s) could comfortably decompress using oxygen. [WARNING: Many potentially dangerous scenarious could be created by attempting this; it should only be attempted by individuals thoroughly educated in this area.]



The Drum 55 Decompression Bell

Surface Air Supply (S.A.S.) Feed to the Decompression Bell. This would eliminate the high cost and effort of the storage air option. A small, low-pressure compressor with filtration would be adequate for the application, although there are not too many locations were the use of S.A.S. would be practical.

Decompression Bell Instrumentation and Gauge Console. A variety of important gauges and instrumentation could be integrated into the system to allow users to monitor life-support information at a glance.

Surface-to-Bell Communication System. A citizens' band radio could be installed inside a waterproof compartment in the bell with insulated coaxial cable running up to a float supporting the antenna. This should give anyone within range the capability to speak with decompressing divers.

Wet Bar and Snack Center. The in-bell compartment would contain all of the divers' favorite fluids and energy-replacement foods.

Diver Entertainment Center. The possibilities are limitless. Most common printable suggestions have been games, reading materials, and music.

In closing, anything that helps the decompressing diver become more comfortable will aid the diver's attitude in completing all, if not considerably more, decompression than required.

HABITATS FOR SATURATION CAVE DIVING

By taking a science which is already well understood and applying it to the realm of cave diving, explorers and scientists could take a quantum leap in studying the underwater world. One commonly shared vision is to have a permanent habitat installed in a cave with near-limitless resources to be explored. After successful testing of the habitat concept was completed, explorers and scientists could "lock out" for extended stays, making study and exploration of a specific cave much more complete and thorough than is possible using our present methods.

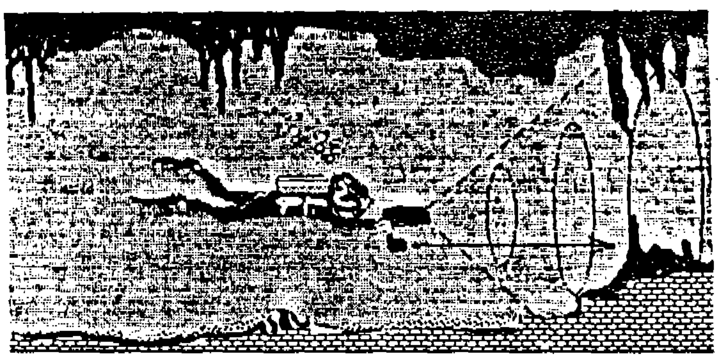
TO PENETRATE ANY ENVIRONMENT

As we continue to explore new realms of the underwater world, we are faced with ever increasing hurdles to overcome. To the adventurer, these types of hurdles are the main motivators for their involvement in the sport. To the researcher, they bar access to the least-known and thus most interesting areas. Cave divers have chosen to work, play, and explore in "ideal" environments, failing to recognize that the greatest potential for future cave-diving exploration lies in the vast category known presently as the "untouchables."

Whether these areas are not explored because they are unreachable or because they are undesirable, the fact is that they do exist. In this section I focus on some future techniques that would allow the explorer to enter environments that may have been considered, in the the past, too hostile or even alien to interest the cave diver. [It was decided to leave "excessive depth" out of this category, since it is still, to date, the most extensive and costly hurdle to overcome.] The following text lists some of the classic "untouchable" zones and discusses potential methods to explore them.

Black-Water Cave Diving--The Use of Sonar and Other Special Gear. Few people will disagree that attempting to swim into, explore, and study a cave without any reasonable visibility is undesirable. Unfortunately, the largest underwater caves in the world remain completely unexplored because they lie in the inky world of tanic-acid water. Several individuals have begun attempting the tedious process of exploring these vast, dark worlds. In making this effort, the need for special instrumentation for navigational assistance and information gathering has been realized.

Initial work is already well underway. Sonar designed specifically for use in underwater caves has already been tested.



"Speleosonics"

LCD reading sonar and compass for use in the exploration and survey of low visibility underwater caves.

The sonar's primary function is to measure the distance from the source to whatever structure it is aimed at. The present maximum accurate read is 200 feet. This sonar is a real marvel. Its accuracy consistently fell within two inches of fiberglass-tape measurement and the sonar measurement was much faster. Passage dimensions can now be accurately obtained and documented in seconds.

Cave sonar is a fine addition to the tools of the cave diver, yet the main application of underwater cave sonar has yet to be discussed. Because of the nature of aggressive black water, most systems that have been entered to date contain enormous phreatic passages. Widths of over 150 feet have been recorded in Gilchrist County, an area with more than its fair share of black-water caves. The sonar's main application therefore could be to identify passage trends. By combining an L.E.D. reading compass with sonar, cave divers will be able to successfully draw pictures of tunnel configuration and direction by panning the instruments and deciphering the collected data. (See Diagram 3.)

Because of the problems associated with communication in black water, advances in the area of communication must be made. The drawbacks of present systems are the mouthpiece requirement and signal reflection because of the cave environment. Hopefully, modifications in design will be made in the near future to permit more effective use.

Extreme High-Flow Environments: Underwater Single-Rope Techniques. There are underwater caves with flow rates so high that there is little to no chance at all that a fully equipped cave diver can penetrate past the entrance. Another extreme-flow condition is that of the Bahama Blue holes. For the most part, major Blue Holes have remained unexplored because of inability to cope with the high flows caused by tidal effects as water is pushed in and then drained out of these dynamic caves.

Our ability to cope with flow is limited now by a lack of the proper equipment to get the job done. Using Single-Rope Techniques underwater could hold the answer to the obstacle of extreme high flow. The use of Underwater Single-Rope Technique might follow this concept:

TO CLIMB IN--Reversing typical SRT, the diver could incorporate either a Jumar or rope-walker system to overcome the pressures of extreme flow. In testing it was found that a diver could overcome 200 pounds of direct pressure exerted on the body. This could be more than adequate force to overcome the flow of any entrance that I am presently aware of.

TO STABILIZE--Among the major concerns voiced about a fast-flowing system is the ability to stay for extended periods of time (decompression) in one place while being exposed to high flows. This concern (which is very real) could be taken care of by using the simple SRT method known as "locking off." This can be accomplished by attaching a Jumar or Gibbs ascender (descender in USRT) to the rope, which in turn is attached to the diver.

TO EXIT--Certainly the most exciting thrill of USRT will be exiting the high-flow environment. This can be accomplished by using the technique known as rappelling. Again, the process is in reverse of the above-water technique but it should still prove effective. The equipment likely to be used will be either a figure 8 or rappel rack with brake bars.

Special concerns in using this technique might be:

1) excessive stresses on the body,

2) gear being ripped off the body

because of the force of the water.

3) the fact that the cave must be entered first without USRT to secure the low-stretch kernmantle rope,

4) the possibility of extreme regulator free-flows during decompression situations, and

5) the requirement for keeping the rope under close control and avoiding potentially dangerous entanglements.

A final note about the future of USRT: it seems likely that some form of flow deflector cone will have to be designed to be threaded onto the rope before entering the high-flow area. By doing this the diver can partially enter the cone, thus avoiding the brunt of the effect generated by the flow.

THE FUTURISTIC CAVE DIVER TODAY

In closing, it is appropriate to spend a moment considering the personality type that makes forward advances in a sport such as cave diving and why that might be relevant to a scientist or researcher. Most cave divers/explorers tend never to be satisfied with the way anything works. With such an attitude, cave divers are endlessly seeking ways to improve. With this comes improved equipment systems, safety margins, and techniques. The areas that I focused on came from my interest in exploration and research. It's up to you to promote any and all new ideas that will make cave diving a better, safer, and more productive activity. If we all work together, promoting excellence from within, we, as a scientific community, will be able to experience and enjoy more of the greatest realm of unexplored territory on Earth.

INTERNATIONAL CAVE DIVING CAMP TO BE HELD IN ITALY

The 7th International Cave Diving Camp, sponsored by the Italian Spelaeological Society Cave Diving Commission and organized by the Corpo Nazionale Soccorso Alpino Sezione Speleologica, is to be held Aug. 29 - Sep. 5 in Cividale del Friuli and Trieste, Italy.

The Camp is intended to be a meeting at which cave divers from various parts of the world can exchange experiences and ideas. During the period of the Camp, technical reports and documentation consisting of photographs and films (prepared by the participants) will be on show. In addition there will explorations of some of the dry caves and underwater caves to be found in Friuli Venezia Giulia, including Karst spring of Grogazzo, which reaches a depth of 90 m., and the waters of Timavo (an underground river).

For copies of the full literature on the Camp, interested parties should contact the Editor, H.V. Grey at POB 575, Venice, FL 34284-0575.

COW SPRINGS MAP AND LITTLE RIVER UPDATE NOW AVAILABLE

Wes Skiles and company have provided the CDS with yet another new, beautifully drafted underwater cave map: Cow Spring. He and his team have also made an updated revision of the Little River Springs cave map showing additional new passageway. Both maps are now available from Map Publications Coordinator Tim Holden through NSS-CDS Publications.

Current available maps:

A.	Green Sink System,	1987 (Exley)
B.	Peacock Springs,	1987 (Exley)
C.	Madison Blue Springs,	1979 (Exley)
D.	Little River, rev.,	1986 (Skiles)
E.	Rock Bluff,	1985 (Skiles)
F.	Blue Hole/Jug,	1985 (Skiles)
G.	Bonnet Spring,	1985 (Skiles)
H.	Cow Spring,	1986 (Skiles)

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All maps orders must be accompanied by payment (check or money order made out to "NSS-CDS") and a photo copy of both sides of a Basic Cave or (full) Cave certification card from either the NSS-CDS, NACD, NAUI, or YMCA. Maps are rolled for tube shipment; allow 4-6 week for delivery. Mail orders to:

NSS-CDS Publications
P.O. Box 950
Branford, FL 32008-0950

SCOOTER FATALITY IN MEXICO

Just at press time, there was a late-breaking news report of the first scooter-related cave fatality. None of the participants was cave trained or cave equipped.

The report is that three divers on two scooters ventured into an unspecified cave somewhere in Mexico. The first scooter was operated by a diver towing a 13-year-old boy with "five minutes of scuba instruction." The only lights were the scooter headlights. Apparently the first scooter/divers got too close to a sand bank and silted out that portion of the cave; the second scooter/diver then retreated. Evidently, the riders of the first scooter continued, became lost, and presumably drowned when they ran out of air. There is some concern that there may be serious "repercussions" because the elder of the two lead divers was the son of a Mexican politician (former presidential candidate?). [Is that short enough, Wes?]

THE RETURN OF LAMAR ENGLISH

– by Milledge Murphey

Lamar English, cave diver, explorer, and famed cave-diving equipment manufacturer, recently returned to Florida, following a sojourn in Augusta, Georgia. Lamar is well known in the international cave-diving community as a designer and manufacturer of quality high-tech cave-diving lights, reels, and diver-propulsion vehicles. A written record concerning Lamar's diving background is in order as he is once again diving and developing equipment for the cave-diving enthusiast.

Lamar began scuba diving during 1973, at age 12, when two of his friends brought newly purchased scuba equipment to his parents' home in Greenville, Florida. The friends took Lamar underwater buddy breathing for his first scuba experience in a zero-visibility, 6-to-8-foot-deep pond near his parents' home.

Shortly thereafter, at age 13, Lamar took his first scuba course, PADI Basic Scuba Diver, with one of the open-water dives being conducted in Madison Blue Springs, which has remained a favorite site for Lamar over the subsequent years. Lamar's father, Charlie, joined him for this basic class and was in his mid-forties at the time (the course was taught by Kent Buescher of Valdosta, Georgia.)

Lamar and his father purchased equipment including U.S. Divers Calypso regulators, horsecollar B.C.'s, and single 80-cubic-foot tanks, and spent the next two years diving for artifacts in the Aucilla river with G.W. Pridgeon of Tallahassee, Florida. They found many arrowheads, shark teeth, spearpoints, and bone needles during these dives.

At 16, while black-water diving in sinkholes near his home with G.W. Pridgeon, Lamar made a singular discovery--four corpses! The 6-month-old bodies, in a state of advanced decomposition, were the result of a drug/criminal-related multiple murder. Lamar's discovery of the bodies resulted in the ultimate arrest of the murderers and drug ring. It was at this point that Lamar terminated his black-water sinkhole diving and built his first cave-diving light--of the liquid-nicad battery-pack type.

He then began regular clear-water diving in North Florida Springs, including Blue Springs (Madison County), Peacock Slough, and others. He also began his first cavern and short-penetration cave dives at these sites, and purchased a set of 104-cubic-foot steel tanks (which chagrined his parents). He continued cave diving without parental permission, and when he became 18, took the NACD cave-diving course from Barry Kerley and Dale Malloy.

Returning to the first light Lamar built, the liquid battery pack exploded

Lamar English and Milledge Murphey, with English Engineering products.

spectacularly in his parents' bathroom when Lamar was burning it down for recharge. This prompt explosion of his first effort at building a cave-diving light added immeasurably to his parents' delight with his chosen hobby.

Upon graduating from high school in Aucilla, Florida, Lamar took a PADI Instructor Training Course at the University of Florida, which was directed by NACD Cave Diving Instructor Paul Meng. Lamar's cave-diving buddies at this time were Mike Fosky and Janice Upton, with whom he began extending his range of dive sites and penetration distances in subaquatic caves.

At this point Lamar began teaching open-water diving at Sub Aqua Specialties in Valdosta, Georgia, and moved to that city from his home in Greenville, Florida. He and several other cave divers, known as "the Valdosta Boys," and including Court Smith, Guy Bryant, Lee Sams, and David Nolan, dove extensively in Madison Blue, Little Dysmel [sic], Peacock, and other sites. Most of Lamar's subsequent cave dives have been in the company of Smith and Bryant.

Lamar committed marriage during January, 1981, with Debra Crawley, and they became parents in the subsequent months. He reduced his rate of cave diving with the birth of his daughter, Jennifer, and also ceased his job as a professional diving instructor, taking a job as dispatcher for the Florida Highway Patrol. His dive buddies had moved (Court Smith to Warner Robbins, Georgia, and Lee Sams to Augusta, Georgia) so his cave-diving activity was further limited.

He did, however, continue diving occa-

...onally with Guy Bryant. Lee Sams and Bryant had begun exploration of "Line Eater Springs," and when Sams broke his leg in an auto accident, Lamar joined Bryant in the exploration effort. It was there that Lamar made his longest penetration: 3,200 feet at a depth of 60 feet during 1981 (his deepest dive to date is 220 feet at Sullivan's Sink during 1980), and he states that he has logged more than 300 cave dives.

Having moved to Lake Park, Georgia with his family, he initiated "English Manufacturing Company, Inc." He produced distinctive, high-quality cave-diving lights in a variety of configurations (see Underwater Speleology, Vol. 11, No. 6A, pp. 1-3) and also made reels and D.P.V.'s, many of which are still motoring in subaquatic caves. Lamar is proud to state that he designed and built one of the first D.P.V.'s which actually worked well and is safe.

During this period (1983) his major source of income was from his work as a paper maker for Owens-Illinois Paper Company.

Lamar has built the lights chosen by many cave-diving luminaries including Mary Ellen Eckhoff, Dr. John Rutledge, Court Smith, Paul DeLoach, Guy Bryant, Henry Nicholson, Steve Gerrard, Joe Taylor, and others.

The next phase of Lamar's diving career included a heavy spearfishing emphasis with Dr. John Rutledge in the West Palm Beach, Florida area. His cave diving virtually ceased as he became immersed in spearfishing at the quantum level. He built the 250-watt mega light (described in the previously cited Underwater Speleology article) and, selling it to this author, used the money to purchase a hooka rig to continue his spearfishing for longer-duration dives.

Lamar continued with intense Gulf of Mexico hooka spearfishing during 1984, then sold all of his cave-diving equipment to the author, and, his wife having been admitted to the Medical School of Georgia, moved to Augusta. During this period Lamar began Karate training in Isshinryu Karate with Mr. Harold Mitchum (9th Dan) of Albany, Georgia. He has had a successful tournament record to date and trains regularly.

While in residence in Augusta, Lamar was employed at the Savanah River Nuclear Facility. His diving activities came to a virtual standstill while he was in Augusta, as evidenced by the fact that he went spearfishing only once during his 7-month sojourn there. Lamar and his wife decided to go their separate ways, and Lamar returned to Florida where, during 1985 (and thus far in 1986), he had resumed cave-diving light production and cave diving. He now resides and has his business at:

English Engineering, Inc.
Rt. 3, Box 54
Greenville, FL 32331
(904) 948-3311

At present Lamar is manufacturing two primary lights. Both are unique, high-performance instruments and incorporate state-of-the-art battery/light-head cannister systems with recharging units of the most advanced and easy-to-use type(s). Presently the lights are being marketed by English Engineering directly to dive stores, which may be contacted for purchase information. English Engineering is the wholesale distributor for English Engineering Equipment and the lights may be purchased by contacting dive shops. Lamar will be happy to advise interested persons of the names, addresses and phone numbers of the shops which carry his lights.

The English primary cave-diving light has a 12-volt, 10-amp-hour cannister-type battery pack which contains sealed lead-acid rechargeable batteries. Lamar manufactures a variety of head types depending upon customer preference. He prefers to use a 42-watt projector bulb head and builds sealed-beam "Goodman-type" heads of 30 watts (3 hours plus burn time), 37.5 quartz (2:45 burn time), and a 50-watt quartz head, which gives a 2-plus hours burn time. All times are before the load begins to deep cycle the batteries.

Lamar also builds a completely unique 6-volt, 5-amp-hour light with a 6-volt quartz bulb head. The burn time is more than four hours for this cannister light, which is extremely light and compact (2-3/4" outer diameter, 10-1/4" tall). The head is 4" long with a 2" outer diameter, probably the most compact head ever placed on a cannister-type light. Both lights come complete with charging equipment, which can be left on charge indefinitely, without damage to the batteries.

I recently visited Lamar's manufacturing location in Greenville, Florida, and after viewing the manufacturing processes we took a hooka dive in his parents' swimming pool. Lamar began introducing his daughter, Jennifer (4 years old), to scuba diving that day, and I understand he is now building a D.P.V. and set of double 15-cubic-foot tanks for her. Her first experience on scuba was on double 72's in the pool (4 foot depth) for 3-1/2 hours. It appears that there will be a second English in diving soon.

I'm sure I speak for all cave divers when I welcome Lamar back to Florida and to cave diving, and I, like many others, enjoy each of my cave dives using English Engineering equipment.

NEW AUSTRALIAN CAVE-DIVING ORGANIZATION

The South Australian Underwater Speleological Society (SAUSS) announces its formation and incorporation as a separate new entity as of Sept. 1986. According to its first information flier, the SAUSS was created because of perceived conflicts of interest between sports-oriented, recreational cave divers and scientifically oriented cave divers, and because of "major internal problems which fragmented the CDAA (Cave Divers Association of Australia) in the mid-1980's, highlighting the need for a totally independent research body which could work closely with tertiary institutions and scientists whilst providing the maximum possible protection for caves of scientific importance."

Full membership is by invitation only; however, "Associate" status (non-voting) is available to anyone who supports the ideals of the Society. For more information contact:

The Secretary, SAUSS
18 Glenda Avenue
Morphett Vale, 5162
South Australia
AUSTRALIA

SUMP DIVING NEWS FROM INDIANA

Stephen Maegerlein reports that he and Noel Sloan and Clarence Dillon are currently exploring and mapping in southern Indiana sumps. Their present project is mapping Fishing Hole Spring Cave. Steve writes that beyond the 300-foot-long sump entrance, there is at least a mile of cave, and that they have not explored the many side passages off the main stream passage.

PANHANDLE UPDATE - by Kelly Brady

The last two weekends, I've travele[d] to the Panhandle of Florida with open-water students. Although planning to avoid Vortex Blue Spring, I was forced to go there due to water conditions. I was really shocked to see a sign near the door with the instructions "TUNNEL LIGHTS MAY FAIL. ALL DIVERS MUST CARRY A HAND LIGHT." Upon asking one of the staff what that was all about, I was told that they had placed lights inside the cave system, all the way back for 300 feet. As usual, Vortex management has attempted to make the cave dive more attractive to open-water divers. It's now much more inviting to enter the cave system.

What really worried me was when an older man, who evidently lives nearby, asked me to "count how many lights are burned out if you go into the cave." Evidently, they have no idea what to expect as far as bulb reliability goes. When I asked what the lighting system consisted of, I was told that there were car headlights powered by a battery charger hooked up to a battery, so that if the power failed, the battery would power the lights.

After placing CDS Safety Brochures on the counter (and getting a dirty look for the clerk), I browsed the isles of the di[ve] shop, looking at the Navy rebreathi[ng] units, semi-open-circuit rebreathers, canisters of CO2 absorbant, and Dupont Blaster's Handbooks, which were all for sale. As I was leaving, all I could think of was, "Do these people seem at all safety conscious?" Of course, the readers of Underwater Speleology know the answer to that question.

CAVE DIVING SECTION
of the
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P.O. Box 950
Branford, FL 32008-0950

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