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1-4-88

FEB. 4, 1988

SCUBA (THE JOY OF DIVING)

INTRODUCTION

Dear Athenaeum Members: Scuba, for the purpose of this paper, is not part of a phrase old blue eyes might say such as scuba, scuba doo. That might be the topic for another paper. This one is about Self Contained Underwater Breathing Apparatus. Along with my children, I have recently taken up sports diving or scuba. I have enjoyed it so much that I thought I would share this with you. While I realize that some of the audience has had this experience, and in fact I have been diving with one of our members, I hope that my presentation will enlighten and pique the interest of the rest of you. With this in mind, I am going to give you a little background of the history of the sport then, I shall discuss some of the basics of the equipment used. Following that, I shall discuss very briefly some of the underwater physiology involved and in the end, I will tell you how to get started and what to look for in this sport.

HISTORY

Although Sports Diving is new on the historical scene, man underwater is not. In the Iliad, Homer writes, "Ye God's! with what facility he dives!" Later, in the same work, he states, "So then, in Troy it seems are divers too!" These passages would indicate that men were diving at least as early as 1,000 B.C. Other ancient historians, such as Herodotus, mention divers being used by rulers in their local battles. Xerxes of Persia, around 475 B.C., used divers to recover treasure. One such diver, A Greek named Scyllis, used diving to escape from Xerxes' kingdom by cutting the anchor lines of the ships in the harbor during a storm and making his watery getaway while the crews were trying to keep their ships off the rocks. Alexander the Great was lowered in a barrel into the sea to steal a look at the divers worls. One of his victories at Tyree, around 300 B.C., was supposedly aided by underwater swimmers. Throughout history, underwater swimmers and divers have been used by the military for battle under the water. Today we have what is known as the Seal Team and the UDT Team which are very active in underwater warfare.

The oldest diving method know was staying underwater with a tube in the mouth. The tube would be connected to a float on the surface. Aristotle, approximately 355 B.C.,

mentions such an apparatus. Knowing what we do today about dead air space and carbon dioxide build-up it is unlikely that anyone actually used these devices to any extent. The pressure on the body increases at the rate of 0.445 lbs per square inch for every foot of water the diver has above him. This means, in practical terms, that man's muscles are not strong enough to inflate his chest below 3 feet of water. Even if a diver could inflate his chest, the CO2 build-up from the long tube would cause blackout in a matter of minutes. Pliny the Elder, as late as 77 A.D., wrote of a similar device. The device probably used was so the swimmer could stay under the surface of the water and so be unobserved as he drifted. This must have been our first snorkel. To remain underwater, the diver needs air which is under pressure. The deeper the diver goes, the more pressure is needed to force the air down to him. There were many attempts at this sort of diving between 1,000 A.D., and 1,800 A.D., but none were very successful. There were two problems. The first was sinking the bell. A bell large enough for man to stick his head and shoulders into was so buoyant it became cumbersome to handle when all the weight was added to sink it. The second problem is if he breathed into the bell even for a short period of time all the oxygen was used up and the diver blacked out. In the early 1800's the air compressor came onto the scene. Now air could be pumped down to the diver and circulated so that it didn't become stale. The first type of successful diving rig was the displacement helmet.

With the ability to stay under water longer, new problems began to crop up. The divers inherited a mysterious affliction of the construction workers who were engaged in tunnel building. The construction companies built caissons under water to work and would remain in these all day. To keep the water out of the caissons, they were pressurized with air. When the man left the caisson at the end of a 12-hour day, they suffered pains of the joints and became ill. Some were crippled and others died of "caisson disease." A Frenchman named Bert had insight into what was happening and suggested slow ascent to reduce the rapid pressure change. In 1907 Haldane found a mathematical equation to explain the problems in terms of nitrogen gas absorption and was able to compile enough data so that the "first stage" decompression system was developed.

Caisson disease is now called "the bends". ~~by almost everyone.~~ The story of how this name came about is interesting. The workers would try to ease the pain in their joints by slouching or "bending" at all their joints. Also, it is rumored that about the same period in time there was a popular dance called "the bends." Because the workers appeared to be doing this dance in their slouched position they were said to have "the bends."

The first scuba operation was carried out in 1925 when a man named James devised and constructed a belt that would carry air. The diver breathed the air from the belt. The concept was good because the water pressure compressed the air in the belt and the diver thus had compressed air to breathe. The problem with the belt was that it would not carry enough air to last longer than a few minutes.

By 1880 Henry Fleuss and Englishman had developed a different type of scube device. This used pure oxygen which the diver breathed over and over. The diver had to be very careful because oxygen under pressure can become a deadly gas. The deepest the diver could go was 30 feet. This device was approved and used by the United States Navy in World War-II. It was a closed system and would not let off bubbles to give away the presence of the diver. The real breakthrough in diving apparatus occurred when the steel tank was developed that could hold air under high pressure. This allowed the diver to take a significant amount of air under water with him. The first use of this tank was with a full face mask where the air just flowed through the mask and the diver breathed again as it went through the mask. Since much of the air was wasted, the divers' underwater time was again short. In the early 1940's Jackques-Yves Cousteau made a very important find; he developed an underwater demand type regulator that conserved air by releasing only the amount of air the diver needed to breathe. This increased the time the diver could stay down on one tank and compressed air to approximately one hour if he were in shallow depths. The Cousteau rig was simple and inexpensive and marks the beginning of the sport of scuba diving.

In the early 1950's rubber suits were designed and markeded in quanity. These used a thin sheet of rubber that fit next to the skin and provided insulation. The main problem with this was that the material would crack and tear and eventually these wet suits were not protective. Following this a neoprene material was used which allowed for a layer of water between the diver and the suit which would soon become warm and provide further insulation and these have been known as Wet Suits and completed the equipment that was devised necessary for man to enter water both of body temperature and below body temperature.

EQUIPMENT

At this point we will talk about the equipment that one needs to dive and discuss a little bit about it. The first thing that is needed is the equipment necessary for snorkeling

This equipment is used both in snorkeling and in scuba diving. This equipment consists of a snorkel tube for breathing, face mask for underwater viewing, and fins to propel one through the water.

The snorkel, is usually made of plastic of large bore with a gentle curve at the mouth with a fitting that allows it to fit between the teeth so that the swimmer or diver can float face down and breathe normally. Many of these are arranged so that the bending portion can be twisted out of the way of the diver's mouth so that he may get his regulator in his mouth to breathe. The face mask was of single oval construction and often had a valve which would allow one to dispel air out of the mask. Today's masks are much smaller in volume and often have 2 lenses (one for each eye.) These provide less volume of air in front of each eye ~~that is compressed.~~ Nevertheless, the nose is always fitted into the mask so that when equalizing pressure one can use the nose to add air into the system. To obtain a proper fit one simply puts the mask against the face and inhales through the nose and if it forms a nice seal then usually the mask will be suitable. If the diver wishes he can have his prescription lens put in the face plate or the glasses.

The last item necessary for both snorkeling and scuba are the fins. These come in various varieties and include those that have a heel built in and those that have a strap across the heel which is either adjustable or not adjustable. Most of the fins that are worn are usually best worn with a pair of small neoprene "booties" so that the diver can walk with or without them on the beach and then slip his fins on. The fins are an extension of the foot wideblade that will help propel the diver in the water and these can be tested to suit the individual.

Lets now go to the items that are used only by the scuba diver in addition to the above mentioned devices. The next item would be the tank. A tank that holds compressed air is generally of steel or aluminum and holds somewhere between 72 and 92 cubic feet of air. It has marked on it the date of last examination. The federal government demands that the tank be inspected every 5 years for its ability to withstand the pressure necessary. It is also wise for the diver to have his tank inspected annually as far as someone looking on the inside with a light source to make sure that it is clean and has no rust, etc.

Next is the regulator which is basically the demand valve system devised by Jackques Cousteau. This enables high pressure gas to be stepped down in pressure and made available on a demand type breathing apparatus. Also attached to the regulator

~~usually~~ is a hose to inflate the vest and another hose which monitors the internal pressure of the tank so that the diver may tell about his pressure at any time. Today, besides the regulator often one finds a spare regulator called an octopus. This is a safety device that enables the diver to share his oxygen with a second diver who may have run out. The B.C. or buoyancy compensator is really a vest that the diver wears that holds the tank of oxygen and is inflatable. By being inflatable, it allows the diver to either stay on the surface like a life jacket, or by putting in small amounts of air, to be buoyant. In other words, to maintain a desired depth below the water, without having to constantly swim or exert effort, the diver can add or eliminate air from his B.C. Also equipment involved in the buoyancy is his weight belt. The weight belt is very important. Without enough weight the diver must work constantly (and therefore use extra oxygen) to stay down at the depth he wishes to go, or if he adds too much weight he must work constantly to get from the bottom to the surface.

On a recent diving trip I changed equipment and used a different oxygen tank which was more buoyant. My ordinary weight requirement to be neutrally buoyant is between 8 and 9 pounds. With the larger tank and different buoyancy compensatór, I found that I was much too light. I tried to overcome this by stuffing rocks in my swimming trunks but this method was not very satisfactory. One has to remember that any change in what you are wearing will change your buoyancy factor (especially when wearing a wet suit). With a full wet suit in order to be neutrally buoyant you must add about 12 pounds to your initial weights in oreder to be able to sink below the surface of the water.

Most divers would also consider necessary a knife. Not for the reason you think. Actually the underwater life is not to be fought off. The knife is used to pry loose items you wish to examine. The knife is an excellent communication device underwater in that it can be used to tap on your tank and alert your partner of your whereabouts or some message you wish to pass to him. The knife should be worn on the inside of your leg on the calf. The reason for that location is that if worn on the outside of the leg and an emergency arises in which you must ditch you weight belt you don't wish your weight belt catching on your knife. If someone wishes a great deal of exercise, then you will find it in using the next item of equipment that I am going to talk about. That is the wet suit. This is really basically a skin tight suit (jacket and pants) that fits extremely closely. The mere donning of this piece of equipment will use

enough calories to take care of a decent breakfast for most folks. The name wet suit gets its name because actually lets in water. There is a thin layer of water inside the suit. The body immediately heats this layer up and then, along with the rubberized material, maintains insulation between the cold water and the diver. The shock is entering the water because initially the cold water surrounds your body and is quite cool. In November, I went diving in 54° water and while it was quite cold initially it was surprisingly warm within a few seconds. I personally am not gerribly fond of wearing this equipment. The entire wet suit outfit with hat, gloves, and booties seem to restrict my motion. It is much nicer diving in Caribbean waters that are 80° with only your trunks on. The other equipment that can be used later has to do with those things that you might wish to do in addition to simply scuba diving and that the equipment might be used if you get interested in underwater photography, underwater fishing, spearfishing, etc.

UNDERWATER PHYSIOLOGY

When one goes beneath the surface of the water and breathes oxygen under pressure there are several changes in the diver's physiology that he needs to become aware of. First of all, vision underwater is such that the water magnifies the objects. It makes them appear 25% closer and larger than normal. Therefore, when one of your fellow divers mentions seeing a huge fish go by one must remember that the fish is really 25% less than it appeared. Colors are also not what they seem. Color is absorbed as one goes deeper. At approximately 16-20 feet reds are absorbed so that below this level, one does not see red. Orange is absorbed at approximately 25 feet. Yellow is absorbed at approximately 35 feet. Greens at about 60 feet and blues at about 70 feet. Below 80 feet all one sees is grays and shades of gray. Thus diving to these depths eliminates all of the brilliant colors.

Sound waves move 4 times faster underwater than in the air but this doesn't really help your hearing. The problem is detecting the source of the sound, as sound now comes from all around you. Localizing sound heard underwater is very difficult. You can hear equipment clanging, boats buzzing on the surface, bubbles from your regulator, etc. At times the underwater environment can become quite noisy. Until recently speech between divers had been impossible. Communication devices between diver and surface unit have been possible for sometime. There are several devices now with microphones built into regulator devices and divers can actually talk between themselves. At present, most divers communicate with each other by means of hand signals; thumbs up means going up and gown means going down. The usual halt sign means stop. When you are on the surface of the water and you are letting the dive boat know that you are on the surface and okay you give the okay sign or the half okay sign. Danger is always a closed fist. Out of air is drawing the hand across the throat much in the same way as the newscaster signals you are out of time.

The diver must always remember to let others know where he is diving. If you are with an organized group the boat will have a flag with the usual diver's down flag which is a red field with a diagonal white slash. If you are going out with a friend diving or even snorkeling it is best to have a buoyant diver's flag to carry with you to inform the boats that you are there (they may or may not stay away from you).

They can talk longer.

Pulmonary physiology is very complicated. Women have smaller lung volumes than men and use less air than we do so they can stay down longer than we can. I tried to overcome this on a recent dive with my daughter and purchased a larger tank. However, she still outlasted me.

Lets mention briefly some of the physical changes in gases brought about by changes in pressure. At sea level we consider this one atmosphere of air. ~~and that~~ An atmosphere is based on a column of air 1 inch square and extending 60 miles to the top of the atmosphere. That amount of air exerts a force of 14.7 pounds per square inch on the surface of the body. When one goes 33 feet below the surface of the water the pressure now is 2 atmospheres or 29.4 pounds per square inch absolute and at 66 feet the pressure is now 44.1 pound per square inch at 3 atmospheres absolute. This becomes important in several aspects. First of all if you take a container full of air at sea level and carry it to 33 feet below the surface of the water of 1 atmosphere difference you will compress that air to 1/2 of its original size. The same is true you will compress it 1/2 again going from 33 to 66 feet so that now the volume at 66 feet is 1/3 of the original container 9.9 feet or 4 atmospheres 58.8 pounds per square inch, and 132 feet (5 atmospheres) equals 73.5 pounds per square inch. Imagine if you took a can which is closed without any opening whatsoever ~~that~~ the can will collapse as it is taken deeper and deeper below the surface. Now the same is true when one goes above the surface of the water. In other words if you were to come out on the dry land at sea level and take off in a private plane to an altitude of 18,000 feet you would change from one atmosphere to 1/2 atmosphere and reduce your pressure to 7.35 pounds per square inch. Where is this important? Well it is not quite as important going down as it is coming up. As you go down you are equalizing your pressure in your body so that the pressure remains constant. However, when you rise to the surface from underwater the opposite occurs. In other words if you have a volume of air in your body at 66 feet (3 atmospheres) and you now ascend to 33 feet that volume of air will expand to twice its size and so on as it goes to sea level and then as it goes from sea level to your airplane pressure. The body can equalize these pressures but it takes time to do so. For this reason when someone flies into a dive spot, most diving operators will not let you dive for the first 24 hours. The same is true when leaving the area. You don't wish to immediately do your last dive and get on an airplane and reduce your pressure even further. Generally speaking, on a dive trip, one does not dive on the first or last day of your visit. Remember that in addition to your lungs being filled with gas your body cavities are filled with gases. Your bowels, sinuses, and all of these areas also go through these same changes in pressure.

When one goes down from the surface to 33 feet one winds up having to clear their ears by pinching the nose and blowing in order to equalize the pressure in the sinuses and middle ear to that with the outside pressure. One of the things that has prevented a lot of people from diving is the sensation of pressure in the ears when going below the surface. We have all noticed this in swimming pools at 10 feet and it is quite painful if one stays there for any length of time. However, let me assure you that in most people who have this sort of problem scuba diving is no problem whatsoever. One simply continues clearing all the way down every 2-3 feet and when you arrive at 100 feet you are quite comfortable.

Some interesting things can happen in this regard. A condition that you face going down is called "body squeeze." This is when the volume of air is being reduced as you descend. For example, the air inside your mask is reduced in volume creating more and more suction of the mask on your face and this can cause your eyeballs to bug. In fact one individual that I met who had a long history of diving, came up and when he both eyes were bloody. On his first night dive, he was afraid and forgot about mask squeeze and wound having bled into both of his eyes. This would have been easily overcome by snorting "air" into the mask. This will equalize the pressure and reduce the amount of suction on your face. However, at times it can be quite uncomfortable in other situations if you have sinus problems or inner ear clearing problems. In that case the only solution is to ascend to a lesser depth.

The basic rule in medicine and diving is that if it hurts, you are doing something wrong, and don't stay down. The body can take a great deal. In fact, breath holding divers have gone below 300 feet with no damage to their lungs. I am always curious about how they do this in that there are some other problems that I'll mention later that make this difficult. The main rule in diving is never hold your breath when coming up. That is so you can equalize your pressure, as the lung volumes are expanding. If you do not do this then you may have rupture of the lung or other body cavities. The body can equalibrate this pressure nicely if one rises less than 60 feet a minute. This is not a slow rate ascent. When I think about this, this is one of the reasons I like to dive at about 30 feet of water it means that my ascent time if I run out of air at 30 feet, is 1/2 minute (30 seconds). However, if you are at 100 feet and you have more than a minute and half time to get to the surface when you run out of air it makes you watch your pressure gauge more closely. How does one tell the proper speed when one is ascending? You could watch your depth gauge and your watch but that is much too cumbersome. What the diver does, is look at his smaller bubbles (that are less than 1/2 inch in size) and as long as you don't ascend faster than they do, you are at a proper ascent rate.

Two other unique problems in diving that are of interest are nitrogen narcosis and the bends. Nitrogen narcosis is the "rapture of the deep." One remembers Jeff Bridges in some of his episodes of nitrogen narcosis. One hundred feet is the suggested limit for sports divers. Ordinarily gases like nitrogen or helium are more or less inactive. They are not consumed or used by the body and they have no effect on your mind. However, at increasing depths, the partial pressure of nitrogen increases and can become narcotic. Your ability to think and perceive is altered at depths greater than 100 feet. People who are in poor health or have had repetitive dives can accumulate enough nitrogen time so that they have nitrogen narcosis at lesser depths than 100 feet but generally speaking 100 feet is more or less the cut-off. Beyond 100 feet, nitrogen narcosis can affect your ability to think and make judgments. At 150 feet you may become dizzy. Between 200 and 250 feet you may become unable to communicate or perform simple motor or mental tasks. At below 250 feet the average diver is useless and becomes a menace to everyone. The simple treatment for nitrogen narcosis is simply reduce your depth and the nitrogen will go back into solution and the narcosis effect will be relieved. The divers I have talked to who have seen others in this situation, note that they behaved bizarrely. They may be staring at nothing and doing nothing and really may resist your attempts to help them up to a lesser depth. However, they quickly recover when their depth is reduced.

The most serious physiologic aspect in diving to depths at pressures generally exceeding 2 atmospheres is the possibility of decompression sickness or the bends. As the diver descends the inert gases (helium or nitrogen) of the compressed breathable mixture begins to be absorbed in the blood stream and from there into the fatty tissues. If a significant amount of gas is absorbed by the fatty tissues the danger rises that as the diver ascends the gas will be released into the blood stream in the form of bubbles resulting in the bends. Decompression procedures are used to prevent the bends. The time that the diver may remain in a given depth without having to undergo decompression varies with the depth of his dive. For this reason, those of us in sports diving pay great attention to the divers tables. One can quickly look at these tables and plan your dive. We know that a general rule of thumb is that if you are going to dive to a depth of 100 feet you can stay there for 25 minutes without having to dcompress. Decompression means stopping at various stages on your ascent for a period of time to let the nitrogen again return into solution. Most of our attempts now are to avoid decompression. One of the nice things about shallow diving at depths of 30 feet or so is that there really is no decompression time that has to be figured in that you will run out of air long before you will have to decompress.

If you are going to do several dives a day, you have to keep up with this time and at the depths that you dive, the amount of time you spend on the bottom and the amount of time you spend on the surface between dives. All of these one uses to calculate your retained nitrogen time and the amount of time that you again may dive to a particular depth that you wish to explore.

When you finish diving each dive, you enter into your dive book the depth that you dove, the location and the temperature of the water, etc., and any interesting features that you may use as a dive diary. Basically your log book is to show what depths you have been and to plan your next dive. Divers may dive up to 4 times a day and it becomes increasingly important (in order to prevent the bends) to keep up with the depths that you have been and the amount of time you have been down. Modern technology has also kept up with diving in that now there are several dive computers which the individual may purchase which will keep all this for you and give your remaining time down. The dive computer hooks up to your regulator system and will give you constant read-out on pressure. For example, in the past when you wished to dive to 100 feet and say you were going to that depth one doesn't always stay at that depth so you might be at 100 feet, 90 feet or 85 feet but in calculating the amount of time spent you have to calculate it as the deepest that you have been because you are not able to keep up with the other depths that closely. So if you dive to 100 feet for 20 minutes you count all of your bottom time at 100 feet from time to time that you reach the bottom until the time that you surface. Dive computer notices from second to second the depth and your time and calculates all this for you so it will tell you how many minutes you have left for tha- dive and then will keep up with the surface intervals on repetitive dives and tell you how much time and what depth you can achieve the next dive.

Now we have been through the history, equipment, the physiology involved and now will discuss what you do.

When traveling to areas of diving, one can take as much or as little equipment as they wish. Since all of the equipment with tank and all weigh about 90 pounds that is a little tough to carry through airports. Most diving areas will rent you any of the equipment. Most divers prefer to carry at least their snorkeling equipment. Many wish to carry their B.C. regulator. On our last diving experience my children insisted that they wanted to carry their weights which meant I carried their weights and this got to be somewhat of a chore. I found out that most dive operators do not charge for tank or weights. So there is a great reason to leave those home and if you are going to carry equipment carry your B.C. and regulator only. My advice is to carry just your snorkeling equipment and if you have a B.C. and regulator carry it but otherwise leave your weight belt and tank at home. Naturally there are some flight regulations by taking pressurized oxygen on airplanes and I think that would be a bit cumbersome.

One also should check with the dive areas involved long before planning the trip in that many of the operators are full at various times of the year and you might have difficulty in getting a trip. Nevertheless, in areas like the Cayman Islands there are a great number of shore dives you do not have to book. Simply put on your equipment take off from the shore and go out to the reef. If one is going to do any serious diving, picking your dive partner should be a serious matter also. I remember being on a dive boat and there was a woman who was incredibly nervous. We were going to take a dive of about 100 feet and when they asked for a partner for this woman no one jumped up and I think the dive instructor finally took her. In an emergency situation, you would like to have somebody you can count on if that occurs. To me the main fun of scuba diving is achieving some sort of natural buoyant state and quietly watching the reef life. Watching predator and nonpredator fish is fascinating and seeing them deal with their environment. There is a great deal of plant life and sea life to be seen and in many fascinating colors. One general rule is, if it looks ugly don't touch it. Actually the very beautiful fish with the marked coloration is perfectly safe. Those ugly ones scorpion fish, lion fish, stone fish are poisonous and one leaves them very much alone. The latest sport is to feed these fish with spray cans of cheese. Other divers choose to feed other varieties of fish and we have all seen pictures of divers hand feeding sharks and moray eels. I may some day do this but to this point, have not become this Nacho. Saying that, the last dive I took was feeding stingrays by hand. This sounds very dangerous but in actuality is not. The rays range from very small (1 foot) in size

or maybe a 5 foot span and are really giant vacuum cleaners. I was a little bit chagrined when I first put on my dive gloves to go down and the dive master informed all of us that we were not to wear gloves that the stingrays have a protective coating on their backs that the gloves can rub off so we did not want to injure them. His only comment was not to aggravate them. He was quick to add that he had never had anyone injured with this sea life. They feed and get all over you. It is interesting to have stingrays on your head and -nder your feet and all around you. We were given small bits of fish which you hold in the flat of your hand and they come over you and simply suck them up. If you wish to engage in a little fun with them you can hold it in your fingers and push it to the front and back of their mouth openings and watch them do all sorts of girations to get to the food. When that first one comes at you, you may dodge but after a few minutes of playing with these you are delightful and like little puppies. The worst they can do to you is leave a "hickey" on you and for the larger varieties a "large hickey."

One has to be very cautious in diving each new area as the laws vary. In the Cayman Islands non-Caymanians are not allowed to spear any sort of fish or to take anything other than some conch. Also all of the coral life and reef life is protected and one cannot bring any of this back up either alive or dead.

Other activities that divers can enjoy are underwater photography which is becoming an increasingly large sport. The equipment is fairly expensive. However, if you do engage in this hobby you will find that each dive shop and dive boat have equipment to wash your camera and take care of your expensive equipment. Also, if you are interested in underwater photography one can generally rent equipment anywhere at any of the standard dive areas to take pictures on your own. The operator will be glad to give you a brief course in how to operate either his video camera or his disc camera. They have anything from a small disc to expensive Nikonos. I understand that underwater fishing and spearing is an interesting hobby. I have not had a chance to do this ~~at this point.~~ There are some precautions that must be taken. One is that after you spear a fish you get it on board your boat as soon as possible as the predators i.e., sharks are attuned to the flopping of fish and the distress signals fish put out and one would not wish to be caught with a flopping fish on the end of your spear and a giant Mayco which is hungry in the area. Wreck diving is fun. One that we took is in the bay of Georgetown Grand Cayman and is a freighter that came in to port during a giant storm with 50 foot tidal waves. The depth in the harbor is 30 feet so that means when this tide wave rose 50 feet and came down 50 feet it slammed this boat against the bottom of the sea and caused it to sink. Since it was a large freighter and was occupying the harbor the Caymanians

decided to dynamite it and blew it into a bunch of pieces that scattered over about a 30-40 foot depth in the harbor. All sorts of sea life is available in and around it and later on one evening while watching a video we saw an area that we had been on this ship and saw there was a giant moray under that particular area that we missed.

Scuba diving can be a delightful family sport. Actually we had booked this as a vacation many months in advance. I had taken a certification course in Nashville and my children took their textbook work and their swimming for orientation in Tuscaloosa, Alabama where they go to school and we met in the Cayman Island after they finished their semester and then we went on their first 4 open water dives. After that we did 4 other dives with the group that did their certification dives and then did one dive on our own from the shore. As mentioned Samantha is the smaller of this group and uses less oxygen. Brad was the largest of this group and uses the most air because he is very active under water with exploring every crevice, every cave and usually winding up his swim with a few somersaults, etc. My wife enjoyed the trip tremendously sunning on the shore and giving us an enthusiastic good-bye and hello when we came back. She was enjoying the sun and sand. She is beginning with snorkeling at this point, ~~and may in the future join us on some of our dives.~~

Now one last word: At this point if you are interested in pursuing diving further, there are any number of agencies that can cerfify you for diving. There are 9 certifying agencies. Of the 9, there are approximately 4 that do most of the certifying among these are the Professional Association of Diving Instructors (PADI), Scuba Schools International (SSI), National Association of Underwater Instructors (NAUI), and YMCA. These offer certification courses.

After certifying, there are any number of other certifications that you can obtain. What one obtains initially is the basic open water certification. Then there is advanced open water, night diving, wreck diving, etc. Finally leading up to dive master. Since this is a sport in which a lot of people are interested, colleges are now being established with 2-3 month courses for people who wish to go into this as a field. There are several large diving companies that we have been acquainted with that are making an excellent living. Many of these are chains that have shops in the various dive centers of the world. Some of the outstanding dive areas are: Cayman Islands, Cozumel, Great Barrier Reef of Australia, Bora Bora and Bonaire. For those who are cost conscious, there are some great trips aboard boats where you fly to the Caribbean and board a boat that you live on for your entire dive experience. These boats are geared for fulltime diving and

you have up to 4 plus dives a day and every day in different locales. All the compressed air is supplied as well as room and board. These can be quite inexpensive and for divers could be a great adventure.

GETTING STARTED

Getting started in scuba is relatively east. In order to find out whether you would like this or not, most hotels or resort areas have what is called a Resort Course which is a very brief course in how to use the equipment, then they take you on a shallow dive to acquaint you with the wearing of the equipment and the fun involved. That is probably the easiest and cheapest way to begin. One ordinarily doesn't have to purchase any equipment to take the resort course. This was the first introduction that I had to scuba diving. John Newsom, Bill Dew and I had a very short resort course (about 15 minutes) then did a dive in the delightful waters at St. Thomas. After this, if you decide that you really wish to scuba dive you must be certified. I'll mention more about certification at the end of this paper. Certification means one has to take a formal course, with a written examination, and receive an identification card that one is certified as to knowing how to use the equipment safely. None of the dive groups will rent you equipment unless you show the certification care. Many, in addition to your "C" card will ask to see your log book to make sure that you not only have been certified but that you have recently been diving and your skills are fairly current. Certification process involves classroom lessons and several orientation courses usually in swimming pools followed by at least 4 open water dives. The cost of this usually runs in the neighborhood of approximately $300-$400. You can arrange to do this on weekends through several groups in Nashville.

Who should learn to scuba? Age is not an important consideration in scuba diving. One should be healthy. Certainly people with any sort of significant heart or lung disease should not use this as their sport. However, one must quickly add that the physical expenditure of scuba diving for most dives is not great. In fact many of the people who have taken this up as a serious sport have been individuals who are quite athletic and for one reason or other have injured various joints to the point that they can no longer participate in other active sports such as tennis, running or requetball. The swimming is leisurely under the water and the energy expenditure to breathe in and out of the oxygen tank is minimal. Most of the enjoyable diving is done in 40 feet of water or less. The deeper depths are not necessary to enjoy the sport. The best scenery is seen basically in 30 feet of water or less.

SCUBA DIVING - by Henry Ketels, Book #797.23, 1979

SCUBA DIVING - by William Koelzer, 1976, #79723

SCUBA DIVING - by Owen Lee, #797.23

SCUBA DIVING - by Carl Roessler, #57.45

SCUBA, SAFE AND SIMPLE - by John Reseck, #797.23