2014 WORLD PREMIERE NUNO GOMES BEYOND BLUE AUTOBIOGRAPHY



NUNO GOMES is a South African SCUBA diver (of Portuguese descent) who holds the official current world record deep dive (independently verified and approved by Guinness World Records. He used self-contained underwater breathing apparatus (SCUBA) to dive to a depth of 1,044 feet (318.25 m). This depth excludes the rope stretch of 11.68 feet (3.56 m). The dive was done in the Red Sea (Dahab), off the coast of Egypt, in June 2005. Nuno's total dive time was 12 hours and 20 minutes, the descent took only 14 minutes. He is one of only two men verified by Guinness World Records to have dived on SCUBA equipmentbelow 1,000 feet (the other diver being the late John Bennett), Pascal Bernabé claims to have dived to 1,083 feet (330 m), including a rope stretch of 32.81

feet (10 m), in July 2005. His dive was never approved by Guinness World Records, due to lack of verifiable evidence. Gomes is also a renowned cave diver and olds the official current Guinness World Record for the deepest cave dive, done in Boesmansgat cave (South Africa), to a depth of 927 feet (282.6 m), in 1996. The cave is located at an altitude of 5000 feet (1550 m) above sea level, which resulted in Nuno having to decompress for an equivalent sea level dive of 1112 feet (339 m) to prevent decompression sickness ("the bends"). The total dive time was 12 hours and 15 minutes, while the descent took 15 minutes.

BIO



CHAPTER 1

BLIND SEARCH

etting lost in a cave is probably one of my worst fears; followed closely by loosing my total air or gas supply. These two fears share a common reality; one cannot cheat them. Cave divers are trained to maintain their sense of orientation in a cave. When they don't, their chances of survival are greatly reduced. It may not be possible to survive, except by pure luck. The only way of overcoming fear, in cave diving, is by learning how to live with it. Training and practicing cave diving skills will go a long way towards not being paralyzed with fear at the mere thought of getting lost or having empty cylinders. It is impossible to completely tame the fear, which grows second by second at a relentless pace and could easily turn into irrational panic. Everyone has a limit when things start going wrong; there is no doubt about that. Sheck Exley, a legend in cave diving circles and the holder of many world records, always said: "it is just a matter of time before the monster hiding in the big black of the cave catches you".

Residual oxygen in the human body tissues is not limitless but is greater than people usually think it is. Divers have been revived after being submerged for nearly half an hour, in freezing cold water, without breathing and without any permanent side effects. My personal record in static apnea is eleven minutes and forty five seconds. Breath hold dives with durations of about seven minutes are not uncommon for some free divers. Most Scuba divers will have difficulty in holding their breath for more than a minute or two. The main factor that limits one's submergence time is in fact the human mind. It is not one's body that still has considerable amounts of reserve oxygen in the tissues but the human mind, which reacts to the inability to breathe in a controlled manner.

When I started diving in the early 1970's, my greatest fear was that of sharks. The movie Jaws did not help much in overcoming this fear, ignorance usually leads to unfounded fears. Paper-back magazines with photographs of enormous beasts, on their covers, triggered my imagination and fueled my fear. I saw myself being chased by a school of vicious great white sharks as soon as I put my foot in seawater. South Africa is definitely not a place where sharks are seldom seen. Believe it or not I had made over two hundred dives without seeing one. It might be that I just erased any images of sharks from my mind or that I was not really looking for them for fear of seeing one. Today, I realize that my fear was mostly driven by a total lack of knowledge. Sharks, even the big ones, are not fearless animals. They are rather cautious in preparing their attacks and most of the time these are carried out in sea life near or at the water surface. Divers on Self Contained Breathing Apparatus swimming near a coral reef at considerable depth are usually left alone. Surfers, on the other hand, are far less fortunate. They are often mistaken for swimming turtles and attacked, sometimes with fatal consequences.

There is a skill required of divers under-going training for deep diving with air or trimix (oxygen, nitrogen and helium) that many are uncomfortable with and some even fear. It is called "blacked out" mask skills training. The idea is to teach the fully equipped diver to reach the air supply with his blacked out mask fully flooded with water. The diver has to swim along a guide line drawn from his or her backup reel. The required swim is 20 meters with some changes in direction. The end of the line is attached to the stage cylinder with a regulator secured to a bungee (elastic) rope. The cylinder valve is closed so the diver must first release the regulator from the bungee rope and then open the cylinder valve before being able to take a breath. After swimming 20 meters holding one's breath there is not much time and breath left to complete all the tasks. Most divers will not make it on their first attempt. The diver's instinct compels him or her to swim faster, which causes oxygen to be depleted sooner. Holding one's breath will cause positive buoyancy and a tendency to float up. In the end most divers will find themselves halfway along the line gasping for air and holding a guide line stretched out a few meters above the bottom towards the surface. Unable to reach the cylinder to perform the required tasks most will bail out for the surface. The real trick is to swim at a steady pace, forward, not thinking much about air, blackness and the time needed to reach the stage cylinder. Some will count the number of windows in their homes, some think about vacations, beautiful women, cars or anything that will distract their oxygen starved minds from thinking about the hunger for air. Once the skill is perfected the only thing that will remind you about the need to perform

the required task of releasing the regulator from the bungee and opening the cylinder valve - before taking a breath of air - is the clang of the diving helmet hitting the cylinder. Most of the time the divers, that make it, will find themselves nervously untangling the regulator from the bungee followed by a frantic search for the cylinder valve before opening it, and finally a coughing spurt after the first gasps of air mixed with salt water.

Getting lost in a dry cave is a totally different matter. Hypothetically if you follow the wall nearest one's right hand and keep on following it, by keeping contact with it with, "the right hand against the wall rule", eventually you would reach the entrance of the cave. Even if it took a few days. One problem is that caves are multidimensional environments. Caves can go up or down and left or right. A cave can meander, get wide or surprisingly narrow, form chimneys a few hundred meters high and be half or totally flooded. All of this in total darkness, except for your head-lamp. Guide lines are not used in dry caves. One has more time because there is no limit to the air supply, and the other plus is that visibility is also unlimited. It is easy to imagine myself getting lost in a dry cave, wandering around for days in total darkness trying to figure out which of two passages will lead to the exit until eventually finding my way out. Humans depend mostly on their eyes and image memory, without sight there will be no visual memory. In extensive cave systems covering hundreds of kilometers there would be much to remember. Some people develop a certain "feel" for a cave, a sixth sense which prevents them from getting lost, even though they leave some markers as they penetrate the cave. I do not have that certain "feel" for a cave, the guide line is my sixth sense; it's far more reliable.

Divers do not only get lost in caves but at sea as well. Every year the coast guard picks up divers in the open sea, if they are lucky enough to be found. Divers could drift with strong sea currents for weeks, before help arrives. I remember diving on a wreck of the Lusitania, a Portuguese liner, lying in -42 meters of water. The liner had sunk after it struck the Bellows Rock, four kilometers off shore from Cape Point in South Africa, on the 19th April 1911. Due to very rough seas, over the wreck-site, near the "Bellows Rock", it was not possible to anchor the dive boat. When

we surfaced, after decompression, a very dense fog had set in. We could hardly see each other, on the surface, much less the dive boat or the shore. All that we could do was to stay together and use our whistles, attached to the Buoyancy Compensators, to try and attract attention. In the open sea with the sound of the breaking waves, over the rock, the sound of our whistles did not help much at all. Eventually after a few hours, the fog lifted. Soon after that the diving boat found us. It had been a very unpleasant experience being lost at sea, in 19 degree centigrade water, for a few hours.

The most experienced dry caver in our group was Pieter Verhulsel. Back in 1984 it meant that he had spent more time in dry caves than Malcolm Keeping and myself. There were no formal courses for dry caving. Pieter was a member of the South African Speleological Society and had done quite a bit of dry caving, on a number of outings with the Society. Just like with dry caving, there were also no formal cave diving courses available at that time. The basic cave diving rules were known, such as: use a guide line, the 1/3's rule (use 1/3 of the air on the way into the cave, 1/3 of the air on the way out and keep 1/3 as a reserve), have a backup light, stay together in case there is a need to share air and do not stir up the silt on the bottom of the cave. There was also the basic dry caving principle to prevent one from getting lost "the right hand against the wall rule". It is certainly true for dry caving but even then one can still get lost, patience is required. The submerged world allows for easy three dimensional movement, it is thus somewhat more complex.

At that time we were novice cave divers. Our Ariadne's thread (guide line) was a big surface supplied reel of 5mm rope. The practice has not changed much from the days of hardhat diving ("Brass Helmet" diving) much like during the construction of the Svern railway tunnel from London to South Wales, under the Severn River, in the 1880's. Pieter and Malcolm were surface tenders and fed me the line. My role was to lay the line from the Milner Hall to the furthest point in, which was an air pocket past the Elephant Chamber, the rock resembling an elephant with its trunk, tusks, ears and front legs. My dive buddies were briefed and I was confident. The dive we were going to do on that Saturday, the 29th September 1984, was an exact repeat of the dive that I had made with Craig Stevenson three weeks before and also the same dive I had made two weeks prior to that, with Martin Clark.

Craig Stevenson was as reliable as a Swiss clock, something that I appreciated in a diving buddy, besides that he was always on time for any appointment. While I was the chairman of the University of the Witwatersrand Underwater Club, he acted as vice chairman and we were used to working together. Being an engineer like me we worked well as pair. We were young and adventurous and cave diving expeditions, besides diving, also offered the opportunity and pretext to go camping and spend the evenings around the camp fire talking about our diving experiences, under the African star spangled sky. Craig was a man with strong moral views; he shared the tent with his girlfriend but there was a partition. His girlfriend slept on one side and he on the other, we all found this very amusing. Martin Clark, my other diving buddy, was also an engineer. He worked in the military aviation sector. Martin and I pioneered the exploration of caves such as Bobbejaansgat, near Ottoshoop.

Pieter, an entomologist, was quite different from both Craig and Martin, far more casual in his approach to life. One quality that Pieter definitely had was courage. He was accustomed to dark narrow places and was not prone to panicking, in the underground and underwater environment. Along with that courage went his independent nature and recklessness at times. Pieter and I were the first divers to reach a depth of -90 meters at Boesmansgat. The previous deepest depth had been -60 meters, by Charles Maxwell. Our dive, on air, was only 12 meters short of the African trimix dive record depth of -102 meters, done at Sinoia caves, back in 1969, by Roly Nyman, Ian Robertson and the van der Walt brothers.

It was a warm weekend at Sterkfontein caves. The temperature was close to reaching twenty five degrees centigrade during the day and falling to ten at night. In those days there was no museum or professional tour guides; neither were there fancy restaurants, curio shops and spa-

cious paved parking areas. There were guides on request but we did not need one, we knew were the water was. The Sterkfontein Karst area, is perforated by sinkholes in the dolomitic rock, hidden from view by dense bushes, one of those cavities leads the way into the cave system. If not careful one could easily fall down into one of the many shafts, varying in depth from ten to sixty meters deep. Such a fall would probably be fatal. This is exactly what happened to one of the early humans, called "Little Foot", four million years ago.

Under the warm midday sun, we hauled the gear to the entrance of the cave using the stairs constructed by Guglielmo Martinaglia, an Italian miner, during the nineteenth century. The miners desperately needed lime and used explosives to retrive it from the cave. Lime was necessary for the chemical extraction of gold. The precious mineral had been found in South Africa in 1884 and it had triggered a rush comparable only to the Alaskan gold rush. We followed the footsteps of David Draper, a respected geologist, who persuaded the miners to abandon the main cave and preserve its underwater lake and rock formations for future generations.

Instead of carbide lights, like in the early days, we used "modern" Ikelite torches with distinctive black and red casings as well as other torches and scuba cylinders. Malcolm and Pieter had only single cylinders. I also had a single cylinder but also had a spare stage cylinder, in case one of my buddies or I needed it, in an emergency. By modern standards, we were probably poorly equipped, but Sterkfontein is not a Boesmansgat. The water was a maximum of four meters deep and our dive would be just over twenty minutes, maybe twenty-five minutes. If forced to use all the gas in our twelve liter single cylinders, we could probably spend more than seventy minutes at that depth. This would be slightly more than the lights from our torches would last, without replacing the batteries. In the early 80's, sharing a light, stage cylinder or a gauge was common practice. The Niewenhuizen twins dived sharing a dive light in 1983. They were on a night dive in the Wondergat cave, linked by a buddy line they used a single torch. At some point during the dive they were separated from the main diving group and somehow lost their only torch. The bodies were recovered from the bottom of the sinkhole the following morning.

There was no map of the Sterkfontein cave system; we were in fact busy mapping it. At least I had not seen one before. No one, not even the Transvaal Speleological Association, who caved there, had officially mapped Sterkfontein. The guide line, which I had laid, was our only means of getting in and out safely. It is easy to get lost in the Sterkfontein caves. There are at least nine sumps connecting the main show cave and the lake with the dry sections with a few restrictions along the way. When seen from above the lake looks vast with occasional stalagmites creating a maze of passages and dead end corridors. Knowing that we moved in a single file, we followed the line with Malcolm behind me, and Pieter at the rear.

Sterkfontein is part of the "Cradle of Humankind " a Karst system where more than one thousand fossils of early humans have been found. Most of the discoveries took place in the twentieth century, in a 170 thousand hectare area, which consisted of three dozen caves. The Sterkfontein cave system was the largest and probably the most important one. In 1947 Robert Broom and John T. Robinson found a 2.3 million yearold fossil of the Australopithecus Africanus, nicknamed "Mrs. Ples". They were also able to put to rest any previous doubts that the fossil was not from an early human but from an ape. Although Mrs. Ples was not a woman but a juvenile male, the age of the fossil along with the discovery of the Taung Child laid the grounds for the "Out of Africa" theory. According to the theory, all humans came from the African continent. The cultural and political impact of these discoveries was enormous. Five years after apartheid collapsed the whole area of the excavations became a UNESCO world heritage site.

This history was however happening above us, in the vast dry passages of the Sterkfontein cave. We were exploring the considerably smaller, underwater part of it. So shallow in fact that in comparison to Wondergat or Boesmansgat, it could be called a single tank recreational dive site, in terms of depth.

Pieter did not believe much in the buddy system. In November 1982 we became separated while diving at the Rand Leases dam. I did a brief search and surfaced according to protocol with no sign of Pieter. For over an hour I tried to locate him both on the surface and underwater and only when I started calling fellow divers to help me search for his body did he miraculously reappear. "Where the hell have you been?" I asked, truly pissed off. "Just diving," was his answer. He was somewhat of a loner. Maybe because of that, he did not have many friends. I was one of the few friends that he could count on.

Malcolm, who was even closer to Pieter than I, also knew about his attitude and promised me that he would watch over him. Especially since he had missed the diving outing to Sterkfontein three weeks before our expedition. Craig and I had waited for Pieter for an hour and then left for Sterkfontein. This time he was warned that we would not wait for more than five minutes.

All went, almost well, on the 120 meter penetration dive to the air pocket, in the third unnamed chamber that I had found five weeks ago. Pieter was lagging behind Malcolm and we became separated once but after about twenty minutes we all surfaced in the small air pocket of the pool of the third chamber, that was the end of the line. The chamber was oval in shape, not very large, maybe three meters wide and one meter high. When making a cave penetration like that, in deteriorating visibility, I always felt relieved when reaching the end of the cave. Underwater caves are not a friendly environment and getting to a location, where one can take the regulator off and talk to your dive buddies is always rewarding. There was also the excitement of exploration. We were in a place where maybe only Mrs. Ples had been before, two and half millions years ago.

A cave is however deceiving. At the entrance, it charms with crystal clear water, silence and tranquility, only four meters deep. Down, at the bottom, the silt is thick, accumulated over millions of years; it waits for a careless fin. We did not use the frog kick in the 1980's. We used the regular flutter kick and were as careful as possible not to disturb the silt. The shallow water does not help much with one's trim. There were also the

side passages and restrictions, all these doubled one's chances of disturbing the silt.

We swam back, slowly, in single file and in the same order. When we reached the Elephant chamber, Malcolm signaled me by pulling gently on my fin, that Pieter was missing again. I indicated to Malcolm to wait at the guide line and went back to find Pieter. He was off the line observing something with his torch. In fact there was a big chance that he might have found something. We were all working at the University of the Witwatersrand; Malcolm was doing his PhD degree and Pieter his MSc degree. There was a chance that the skull of Little Foot's sibling would sensationally emerge from behind a rock. This time there was nothing of interest on the bottom and I guided Pieter back to the line. He seemed to be in a good shape. No wide eyes, no nervous checking of his instruments. A regular and confident Pieter.

After we had passed the restriction into the Milner Hall, Malcolm signaled me that Pieter was missing yet again. The cave chamber, named after the English miner Lord Milner, was quite big, it was and perforated with cavities and side passages. There were two possible routes linking the Elephant Room with the Milner Hall. We didn't know if he had stayed behind us or passed us unnoticed, using the possible parallel passage. We carried on all the way out making sure that he was not outside, in the show cave. We were anxious but we knew Pieter. He would soon join us, after all he had dived with me to -90 meters, at Boesmansgat cave, only a few months back. This cave was only -4 meters deep. Sterkfontein was not like Wondergat that had claimed the lives of more than thirty divers, who got lost due to the effects of Nitrogen narcosis at depth. Sterkfontein was also not as technically difficult as cave such as Wetsgat, Bobejangat, Boomgat or Cramer's cave.

Back in 1979, at Wondergat, I was also close to becoming at statistic. During a pretty easy dive I realized that I was unable to find my way out and back to the ascent line. With no guide line in sight and without the reassuring presence of my dive buddy, Isabel de Freitas. I had lost all my sense of direction. The scary thing about being lost in a cave is that it takes some time to comprehend that you are in fact lost. First you think that it should be that way. After swimming for a while you realize that you are not where you thought you should be. You take another turn with a similar result. Finally you look at your air contents gauge and your eyes become a little wider than before. At Wondergat I had not reached that stage yet. When I realized I was lost, I stopped and sat on a large rock at the bottom. I relaxed and controlled my breathing and heart rate, I then made what seemed to be a logically calculated guess. I guessed the right way out to the ascent line, based on the slope of the bottom of the cave. It had been a 50/50 chance; my guardian angels had been with me.

It's so easy to panic, so tempting to let your emotions go and let them overwhelm you. Zbigniew Stychno a deep diver from Poland and one of my team members accompanied Daniel Sieradzki to the Ras Mamlakh's cave in Egypt. During the dive, Daniel panicked and tried to ascend from -60 meters to the surface. In a cave such as Ras Mamlakh there is no surface, only hard solid rock. The team looked on in amazement while he tried to push himself through the ceiling. His partner, Robert Klein, attempted to get hold of him and drag him to the exit. A man in panic uses all his strength to try and do the impossible, in this case, pass through solid rock. Unfortunately he succeeded in repelling all assistance, finally his regulator fell from his mouth and he drowned.

Panic is always knocking on the door. It is always present in the background, especially with less experienced divers. It whispers let it go, don't fight, it will soon be over. The more experience one has, the less audible the murmur is. Every diver has a breaking point, even the very experienced ones.

In Milner Hall there was no sign of Pieter Verhulsel. There were no bubbles, no lights or noise emanating from the Elephant Chamber. We assumed that he must be somewhere further inside the cave. We quickly got back in the water to repeat the original penetration, along the now permanent guide line. Malcolm and myself swam the route slowly, several times, looking left and right for Pieter in the now deteriorating visibility. There was no trace of Pieter. It was a real concern.

Sterkfontein is not a lake that can just be exited by surfacing. It is a dark cave. It is an overhead environment. All problems encountered dur-

ing a dive must be dealt with underwater. If you get lost and the lost diver drill is not fruitful, you must stay where you are. Sterkfontein, with its many air pockets can lengthen one's chances of survival tremendously.

A diver in Mexico got lost and spent two days in an air pocket waiting for a rescue team to arrive. The rescue dive team, flown from the United States found the highly hypothermic diver still alive. This rule is only valid if you stay close to the place where you originally got lost. The wanderer will not be saved in totally uncharted territory.

After the fruitless search along the original route, we took an additional line and checked out all passages that we knew about. No luck, we searched for a further four hours until we had run out of air in all of our cylinders. It was time to call the police; they however, did not come. The fire brigade divers appeared. They had a look at the lake and refused to dive, they were not cave divers. The water was now murky due to the suspended silt. The visibility was down to about one meter, with an underwater torch. At least they had fresh cylinders. So when Craig Stevenson showed up, we carried on with the search. Malcolm was freezing; it was left to Craig and I to dive.

We had started diving in the morning, at around 11 am. It was now late afternoon, I had been diving for a total of 275 minutes; the cylinders from the fire brigade divers were now also empty (less than the required 1/3 of the full pressure). Once again we called the emergency services. After waiting for approximately another hour and the sun having set, the policy divers arrived.

With the police divers came, Roly Nyman. He was probably one of the most, if not the most, experienced cave diver in Africa. Most certainly he was the deepest diver in Africa, besides being the chairman of the South African Underwater Union (affiliated to the Confederation Mondiale des Activites Subaquatiques (CMAS)). He was a police diver himself.

Craig offered to take Roly for an acclimatization dive, to give him an idea of the areas that we had searched so far. Once that was done the other police divers then also started diving, by two o'clock in the morning the visibility had been reduced to zero - diving in those conditions was hazardous, to say the least.

At some point, I also gave up the search. I was hypothermic, still in a wetsuit, exhausted and hungry. Sitting in a corner of the cave sipping hot tea I was watching the drama unfold before my eyes. There were a lot of people coming in and out of the cave. Powerful fireman's lights illuminated the entrance. There was an ambulance ready to take the body, someone was talking on the radio, people were hauling more gear inside. A fireman fell and broke his leg. They carried him outside. It was organized chaos. After having dived for close to six hours in a five-millimeter wetsuit I was dizzy. No longer able to help or contribute much, I was just an observer.

My memories drifted back to my childhood days. Sometimes I would get lost on my way home back from school, specifically when taking short cuts. During the winter the Lisbon streets became dark earlier. I saved my bus fare money, for the 45-minute bus ride home, by walking home. I would always get home, eventually, sometimes a lot later than expected by my worrying parents. There was no need for them to worry about me, I enjoyed exploring the suburbs, I always made it back home.

Before the police arrived I was in charge. Now, it was early morning and Pieter's body had not been found. There would not be any further searching for the day, in fact the whole of the next week, until the weekend. Roly proclaimed that from then on the cave was off limits for nonpolice divers and that included me. He did not want any further fatalities. No one, for the following six weeks, was allowed to dive there, other than police divers. Two weeks later, on the 14th of October, I turned up uninvited at Sterkfontein caves. I was not welcome but was allowed to do a search with a police diver and indicated to him a possible route that Pieter might have taken. Most of the police divers, at that time, did not have our type of cave diving experience. Strangely Craig, Malcolm, Martin and myself had been left out of the process. Could we have made a difference? No one would ever know.

Police forces around the world; mostly have the attitude that bystanders and witnesses are only needed if they can provide information. The strategy and execution must be left to them, even if the police, besides

Roly, had limited competence in a particular type of diving. Allowing others to participate was not part of their plan of action.

At two o'clock in the morning, on the 30th of September 1984, the police claimed that Pieter was dead. They would not risk anyone's life searching for a dead body. They also informed us that because there were no connections between the underwater cave and the dry systems. The chances of Pieter surviving in the cold water for eleven hours were virtually impossible. Our discovery of air pockets was somehow not taken into consideration.

Someone had called Pieter's wife, Shirley, that evening to inform her that Pieter was missing in the cave. The next day Malcolm, Craig, Liz (my wife at the time) and I arranged to meet Shirley in Bellevue, a suburb of Johannesburg, to inform her in person that Pieter had not came out of the cave. We also informed her that even after an extensive search we had not been able to locate him. It was the first time that I had to face someone who would probably blame me for all that had happened. I, after all, was ultimately responsible for the expedition, had invited the divers, briefed them, laid the line, and led the way. Why was Malcolm and I still alive while Pieter, Shirley's husband, was missing and presumed dead?

We had not actually knocked at Shirley's door. She met us outside her flat and the conversation had been brief. We all still had hope at that time. It was really hard to believe that someone could die at Sterkfontein, which was a shallow and relatively small underwater cave system. We hugged her and she left with her car, she wanted to see Sterkfontein for herself. I couldn't read anger but it was probably there.

Over the following six weeks I had been allowed to dive Sterkfontein only once, with a police diver, for fifteen minutes. After that dive I was forbidden to get even close to the site, not to mention diving it. The police were still searching for Pieter 's body but they did it only on weekends. When asked why only weekends the explanation was that they wanted to allow the water clear out and let the silt settle. There was no water current in the cave so it took a day or two for the silt settle down. The police did not want any other divers or dry cavers in the system to prevent further fatalities. In the murky waters of Sterkfontein the search was indeed futile but the dry passages were not affected at all. Nevertheless, they were also closed for exploration. The police's decision was based on two assumptions. First that Pieter was dead and the second was that there was no connection between underwater system and the dry sections of the total system.

The last notion was based on the fact that the Cave Research Organization of South Africa (CROUSA) - Transvaal Section, headed by Roly Nyman, at the time, had not found a connection. It was hard to dispute the opinion of the organization operating in that area. For anyone taking a guided tour of the heritage site today, this assumption might not be that logical. Roger Ellis, headed the South African Speleological Association (SASA) - Transvaal Section and he certainly was not convinced that there was no connection, even though Sterkfontein was not in his area. The belief by CROUSA that there was no connection between the wet cave and the dry cave system was unopposed. Moreover the police rejected the idea of pumping off the entire pool with its four-meter depth and 120 meters length. It was a task that could have been accomplished. The water level could be dropped to allow boats to access deeper in the cave and light up a greater area. Flocculation with chemicals such as aluminum sulphate could also have been used to speed up the settling of sediment in the water and clearing it quicker. Such chemicals form a fluffy snow-like precipitate that aids in the settling of suspended particles such as mud and silt.

I had no problem diving in zero visibility conditions, I even found it relaxing and comforting. My first dive ever was a salvage dive from a depth of -20 meters; I used a twin hose regulator with no submersible pressure gauge, in pitch-black water. The task was to find a lost outboard motor from a yacht in the Vaal Dam reservoir. The venue was very popular for boating and hosted an annual "Round The Island" yacht race. It was also famous for the Guinness record for the "Longest Inland Yacht Race in the World". Doing salvage had become a regular weekend job for me. Located 77 km south of Johannesburg's airport the reservoir and its marinas created the perfect environment for yachting. Inevitably something precious would be lost overboard to the underwater world. Craig Stevenson would assist me from time to time, on other occasions, I would dive solo assisted by a surface tender, most times it would be and my brother-in-law, Piet du Preez. Usually there would be outboard motors or mooring chains. On occasions we would salvage an entire yacht. I remember salvaging a significantly large yacht. It had sunk the week before, during a storm, along with a few other expensive yachts. The tricky part of the job was to swim inside the boat and raise its keel. All the diving, swimming and crawling in the interior of the boat was done in complete darkness. The next step was to attach empty drums to the boat and fill them with compressed air. This was again a tricky maneuver, done in total darkness. The idea was to raise the boat in a horizontal position to avoid unevenly distributed stresses. Failure to do that could result in the boat breaking up. If done correctly, the boat would then slowly ascend from the darkness. The reward was not only diving but also ten percent of the value of the boat. For me this was great fun. I am sure that most people would not consider spending the weekend in muddy water as fun.

On a few occasions we went underwater on a completely different mission. We searched the bottom to confirm that there was indeed a sunken boat. Insurance companies liked to be sure that the owner of some expensive motorboat hadn't hidden it in a garage when claiming the loss. If the boat was located it would be double bonus - first for claiming the validity of the loss - then for salvaging the yacht from the bottom of the dam.

What scared me down there the most was not some lost in time Loch Ness monster but the occasional encounter with a two-meter long catfish. Barbels are sometimes used to locate victims of accidents or crimes underwater. I was not so sure that they can discriminate between a diver and a cadaver. I definitely had a few surprises underwater when I touched these slimy creatures, while probing the bottom in the pitch-black water. They usually reply by means of a nasty caudal smack to the face, which could result in temporarily losing a regulator or face mask.

After Pieter went missing, the media went into a frenzy. The story appeared on the front page of every newspaper in the country. I was giving countless interviews and the phone didn't stop ringing. I even remem-

ber speaking to some psychics who assured me they knew where Pieter was. During this turmoil I was oblivious to police actions at the dive site. My studies were abandoned for the year. I could not concentrate for long enough to absorb enough information for my exams. When the media onslaught subsided somewhat and the police declared the search had ended it became clear to me that they had dived only six days out of the forty-two days available to them. They had not found the connection between the lake and the dry passage. This revelation bore no significance to them.

In the meantime SASA volunteers, led by Roger Ellis, were exploring the neighboring system. When the ban on Sterkfontein was lifted Roger and I were on the site immediately. On the first day, I found a connection to the dry section myself. Soon after that Roger found Pieter using a dry entrance.

His body was in a small chamber near a sump, located approximately 100 meters from the nearest dry exit. The marks on the walls of the chamber indicated that he had been trying to draw the attention of the rescuers to his position. He must have heard them, at least the police diver who swam just ten meters from the entrance of the sump in water four meter deep where he left a mark. Pieter had died of starvation and had lost twenty kilograms. The opened battery container of his Ikelite torch had served as a cup for drinking water. The length of his beard indicated that he had spent three weeks waiting for us to find him, in vain. His brand new cylinder and regulator were scratched from his attempts at trying to squeeze himself through the very narrow spaces of the sump. The submersible pressure gauge still showed 160 bar out of 200 bar. It was nearly full. He had spent at least three weeks there close to the sump with enough air to return but he didn't. In the fading light he watched the water surface calculating if it would be better to dive and never find his way back again or sit in darkness and wait. He chose the latter.

Nobody was held responsible. The judge, at the inquest, said that Pieter had died of misadventure. All rescuers were released from any wrong doing. As a result of the accident the South African Underwater Union (SAUU) made cave diving courses obligatory in South Africa. No one could enter a cave without completing a cave diving course.

Paradoxically Roly was my examiner on my cave diving course. He also signed my certificate. I met him many times after the Sterkfontein incident and every time felt sorry for him. So many things went wrong during that time. He will live with it untill the end of his days and so will I.

Shirley, Pieter's wife gave me his hunting knife and some photos. She got married again. Not to another explorer, but rather an artistic type of guy. We became much closer than before. Maybe I reminded her of someone she had lost. Pieter's body was cremated. Shirley threw the ashes into the ocean near Cape Town. I cannot remember the funeral. If there was one, it was attended only by the immediate family.

The cave monster caught Pieter. It lured him off the Ariadne thread to the overhead maze of dry passages. It had repelled his attempts to get back into the water, to submerge and try and get out. But maybe there was no monster? Sheck's notion of a cave as a predator lurking in the darkness does not appeal to me. It's not the womb either. The cave really does not care. It was there for millions of years before us and it will remain there after all mankind has gone. Darkness definitely beckons but I am always reminded of the sun we leave behind. Pieter left a written message on the cave wall, adjacent to the place where he was found. It said: "I love you Shirley and Mom".

CHAPTER 2

S H E C K

pair of blue fins caught my attention, at Boesmansgat cave, on the evening of 6th August 1993. There was something strange about the fins. Usually, when a diver surfaces, his head and body come out first. This time the fins appeared through the darkness, followed by a pair of legs and a body, being pushed out of the cave entrance by another diver. When I didn't see a regulator in the diver's mouth, I knew I was facing tragedy.

It was my first dive with an international diving team. In South Africa we had little or no ties to the country where cave diving has reached its perfection - United States. The reason for our isolation was not only the great distance to Johannesburg from Miami (a 19 hour journey) but more importantly the sanctions South Africa endured during the apartheid years. When Harry Schwarz was our ambassador to the United States, the sanctions against my country were lifted, Bill Clinton secured a \$600 million aid package for us and we signed the Nuclear Non-Proliferation Treaty in 1991. For us the warming of bilateral relations brought cave diving legend Sheck Exley, who had crossed Atlantic to attempt to beat two of his own world records. Probably in exchange Nelson Mandela flew to the United States a year later. The first of Sheck's planned attempts was deepest cave dive. The second, deepest dive on air. Both bids would take place at Boesmansgat, a fathomless water-filled cave, in South Africa. To complicate matters the dives would be done at high altitude, 1550 meters above sea level where decompression obligations, orhovering at different depths of the water column, add at least 30% to the total dive time.

There is not much to be done during decompression stops. At least not in Boesmansgat's narrow dark cave entrance. In the Red Sea, off the coast of Egypt, another of my favorite destinations, I could follow schools of colorful tropical fish swimming to and from their dwellings amongst the beautiful coral formations. In Boesmansgat, all that can be seen is the dark surface of the naked dolomitic rock, in a vertical tunnel. The shaft descends from a small, almost cozy, little lake to a vast labyrinthine chasm nearly 300 meters deep, at its deepest point. Like Theseus in the minoraur's labyrinth, all cave divers use a guide line or shot line to decompress safely with, such as the one I was holding on to.

A shot line is not something used to climb during the decompression pauses, it is more like Ariadne's thread, a guide line to find one's way out of a cave. In conjunction with a clock, a shot line is the difference between being lost and ultimately dead and exiting the cave safely and alive. However during the mandatory shallow decompression stops the thrill of exploration and the flight of descent to your designated depth disappear. With decompression we enter the world of boredom, human endurance and anxiety - because proper decompression is crucial to the dive's success. There I often snooze, waking up from time to time to check the time and the depth gauge, to correct the trim and to find a body position where the twin cylinder harness is more comfortable. Sometimes I reflect on something so deeply that I forget to control my respiration rate, only to be woken by the need to breathe. Then I deeply inhale, ascend to the correct depth and after finding the previous location on the line, resume the decompression pause, having forgotten what I'd been daydreaming about. During decompression the residual amounts of nitrogen and helium outgas through the lungs. Eventually the bubbles formed by these gases in tissue are reduced to the point where it is safe to surface.

Before deep dives there is always anticipation and some degree of anxiety, both for novices and experts alike. The anticipation of being "bent" or suffering from decompression sickness is not imminent, although some say it is. If one does enough deep dives it is not a question of if, but only a question of when, one will get "bent". Most criminals know that they will be caught, it is just a question of when. This notion is always in the back of their minds. With deep diving it is the same, one day, you may get out of the water shouting: "I need a re-compression chamber". Most times it will happen unexpectedly, even when you have played by the rules, you may exit the water on a stretcher. Even when additional precautions are taken, by increasing the decompression times or by slowing the ascent rate, you can still get "bent". One never really relaxes during decompression, your body gets a continuous inspection during these pauses, every itch is carefully examined, the elbows are straightened and the knees bent, looking for signs. Usually, nothing happens, fortunately. Sheck | 29

Nobody knew Eben Leyden, besides Boetie Sheun, his diving buddy from Namibia. They came along for the expedition invited by Charles Maxwell, a cave diving expert and the expedition leader, from Cape Town. Frankly speaking, only Boetie Sheun was invited, Eben Leyden just came along. Boetie Sheun, the deepest male diver in Africa, with whom I shared a silent competition of who would go deeper, or be the most adventurous explorer on the continent. Expeditions of this nature are strictly by invitation only and when you come with a friend, an uninvited friend, you are making some sort of a statement, or maybe you are just not following protocol, or both. Nobody said a word though. If Eben Leyden was bold enough just to come along - everybody thought - he had better prove his worth to the expedition. Boetie himself had a reputation. In 1988 Diaan Hanekon and I had made a dive to -123 meters, a new Africa record. Boetie Sheun along with another deep diver, Eben Benade, a year later, descended to -132 meters in Guinas Lake. I then pushed the stakes higher with a -155 meters dive in Boesmansgat. Both were contenders. Eben Leyden hoped to mix with the technical diving community. Boetie Sheun were there to challenge my record.

The accident happened at -60 meters, with Boetie. He dived with Eben passing the narrow entrance of the cave and then swam into the void, of Boesmansgat. Much of what actually occurred is unknown. Maybe they did a bubble check and exchanged OK's at the beginning of the dive, after tying the line of their reel to the primary guide line. The primary shot line was already there. It's possible that they even stopped for a moment where the roof of the cave starts at -52 meters. Boetie probably went first without looking back for the assurance that he was being followed. When he arrived at -60 meters Eben was not there. Boetie could see his lights beaming through the darkness, frantically moving from side to side like someone in panic. Contrary to one of the most basic rules of cave diving, the rule of third's, as described in Sheck's book, "Blue Print for Survival", Eben had finished his first cylinder completely. He now needed desperately, to start using his second cylinder but he could not find the second

regulator, it was stuck behind him, stuck under his twin cylinder harness. He should have started using the second cylinder much sooner, when he had used only one third of it. In the panic that ensued, he lost control and tried to ascend to the surface. In a cave the surface is not directly above. In Boesmansgat, in particular, a diver can wander for days looking for an exit on the roof of the cave that could lead nowhere. All the lights in the world will not help. The only way of finding the entrance would be to use the guide line, the lifeline. Boesmansgat's cave chamber is 253 meters long, 79 meters wide and almost 300 meters deep, it makes it the largest flooded sinkhole cavity in the world.

Boetie recovered the body from -60 meters, he didn't go straight up. He completed half of his decompression stops while holding onto Eben, until I saw him. Maybe he could have surfaced, passed the body to the team, on the surface, and then gone back down to complete the rest of his decompression. Commercial divers do it, every day. They hop out of the water, after some initial decompression stops, re-pressurize themselves in a hyperbaric chamber, at the surface, and then complete the rest of their decompression obligation in the chamber. It has been well documented on diving documentaries by the National Geographic and the Discovery Channel. One usually has a five-minute time gap to do it in, before the onset of decompression sickness. There is a certain amount of risk involved but it can be done.

Maybe if Boetie had done a better buddy check he would have found the second regulator stuck behind the harness. A cave diver is supposed to be self-sufficient and check it himself. We usually dive with someone but if we lose sight of that someone then we are diving solo, it is a situation that all cave divers should be prepared for. Everyone will lose his or her dive buddy during a dive, some time. It's imminent; the only question is, when will it happen?

I couldn't be much of help myself. With a sight of the blue fins appearing from nowhere the snoozing was over; I cut my deco stop at -6 meters to almost zero and the -3 meters stop to nil. Even Sheck was worried that cutting 40 minutes from the decompression time would result in two casualties that evening. Not just the body with the blue fins but possibly myself as well. I felt OK. We tried hard to revive Eben for more than an hour and a half, some doing heart massage, others pushing air through his rigid lips. When the doctor arrived it was officially all over, he was pronounced dead. Eben Leyden had become a victim of what some may call, pushing the limits. He was another diving casualty. A victim of the extreme sport of cave diving.

Eben Leyden's family never contacted the team members. The police never blamed Boetie or any other diver, in the team, for Eben's death. Deep down inside I felt the guilt that maybe more could have been done. It may have been that guilt that silenced Sheck when he reported his dive and the expedition, in the journal of the National Speleological Society, as well as other diving publications. Eben's name was mentioned, only once, on Sheck's nine page report. It was referred to under the mistaken name of Eben Benade, Boetie usual buddy from Namibia, not Eben Leyden. His death itself was not mentioned, he probably felt that Eben was not really part of the expedition.

There was a meaningful silence at the van Zyl's farm house, that night. We all reflected on what may happen during cave diving. The thought of being mortal against all this invincibility we were surrounded with, made for somber conversation. Surely Eben had it coming, he had helped his own ghosts catch him, but death is death and its finality silences all doubts. Maybe we could have done more. I wondered whether there was more that we could have done to prevent his death and that of many others. Even if nothing else could have been done, given the circumstances, and the stress of the situation, the doubt remains.

Sometimes, I think, that in those days we were equipped with an immortality switch. When it was turned on we pushed further and deeper, if we had "the right stuff" and were lucky, we would make it. If somehow you begin to analyze the risks, in depth, and think more about the risks rather than how to achieve the goal, things can go very wrong. Dave Shaw had literally started writing his last will and testament before his second dive at Boesmansgat. "If I don't come back, please leave my body in the cave, tell my wife...". No, this attitude will not get you anywhere. You have already lost the battle before you have even begun. I did not have the habit of calling home before or after every successful dive, unlike Dave Shaw. I seldom called home, when cave diving in Namibia or Southern Africa. In some cases there was no mobile telephone coverage, I had a good excuse. I knew that I would be coming back and my wife, at the time, Elizabeth, knew it too.

Boetie Sheun with Eben Benade, his buddy for deep records never got deeper than -132 meters in Guinas Lake, a sinkhole cave system in Namibia. I spoke with Boetie several times after death Eben Leyden but he never mentioned the incident, some things are hard to deal with. Sometimes I caught myself thinking that if Eben Leyden had not died the competition between Boetie and myself would not have stopped then. There might have been a different body being dragged out of a cave, somewhere.

That day I was sure that the whole expedition would be canceled. I was wrong. Boetie Sheun departed with the police and his friend's body. We stayed. Both Charles and Sheck had decided that there had been too much expense and planning involved in this endeavor to give it up. Calling the whole thing off would not revive Eben. Besides he was there to help Sheck, not to turn him around. The puzzle some of us were about to solve was repeated countless times both above and under the water. After Dren Mandic's death in 2008 on K2 his partners continued to climb. I was not sure what we should do but frankly speaking, it was not my decision to make. If the expedition leader and Sheck had decided to go on with the project, I wouldn't be dropping out. Especially since we were now short of divers.

When it came to deep diving with trimix, Sheck was the authority. Contrary to Charles, who didn't dive trimix, only deep air. A gas mixture made up of oxygen, nitrogen and helium as opposed to air made up of oxygen and nitrogen, trimix had at that time evolved from being a mystic mixture used only by deep hard-hat navy divers to a tool propagated by sport divers in very deep explorations. Both Sheck and I dived mix as it was called then, as did Boetie Sheun. With his departure I was the only one left to fill the shoes of a deep support diver and a trimix diver. Of course besides Sheck himself.

The first time I saw him was on a photograph, in Martyn Farr's classic 1980 book, "The Darkness Beckons". The book a must-have for all cave divers, has had three editions, so far but the photograph of Sheck is the same in all three publications. It depicts him in profile, wearing full cave diving gear, including cylinders, a wetsuit with his mask is on his forehead. He held a powerful hand-held light and since his hair was still dry he was probably about to submerge. Interestingly enough he had no Buoyancy Compensators, in the photograph. It could be that in some of the tight passages of the Florida caves he didn't need one. Many of my first cave dives were also done without a Buoyancy Compensator. Seen on the photo Sheck's twin 18 liter cylinders, in particular, were massive and hard to obtain. I had no access to anything that size, at the time. In South Africa in those days twin 10 liter cylinders were considered big, back mounted twin 18 liter cylinders were a real eye opener. Back in the 80s and early 90s European setups were typically side-mounted for diving in cave siphons. In South Africa we inherited French and English schools of cave diving. Mobility and ease of cylinder detachment in tight shallow caves was the first priority. Apparently Sheck had different masters.

The photo, in the book, did not reveal his true stature. He was not a tall man. Certainly, he was well built especially in chest area, but not tall, much like me. A submariner. But cave divers are not measured by height or weight but rather by their accomplishments and he had plenty of them. So when Charles Maxwell first called me and said there was an expedition going to Boesmansgat with Sheck Exley, I accepted immediately. All that I needed to know was when?

Before the expedition I did not know much about Sheck except for what I had read. I knew he was first in the world to log 1,000 dives. He did it when he was only 23. I was familiar with the fact he made deep dives in famous Florida caves like Cathedral, Holton Springs and Diepolder around the time I became an open water instructor. He was the Jochen Hasenmayer of the Western hemisphere, well ahead of me in terms of deep cave exploration. Diving to the bottom of Boesmansgat was some-

thing that I had not even contemplated. That type of deep diving was definitely in a different league, in terms of cave or any other type of diving.

The portfolio of dives I came with in August, 1993 was much less impressive. A year before, Rehan Bouwer and I had been proud to set a new Namibian depth record at the Harasib cave. The record was -105 meters, it was however not my deepest. I had dived to -123 meters in Boesmansgat back in 1988, for me it was deep, really deep. My deepest depth, for Sheck, would probably have only represented his second or third decompression stop, during one of his Mante cave dives, in Mexico. In 1987 he had dived that cave to a depth of -201 meters, it had not been the bottom. His dive depth had been close to the world cave dive record depth of Hasenmeyer, from Germany, who had dived to -205 meters, five years earlier, at the Vaucluse cave in France. After his epic dive in 1987 Sheck had started to chase his own records, he first dived to -238 meters in 1988 followed by a dive to -264 meters, a year later. With this dive he had finally reached the bottom of the Mante cave.

There was a three year pause in his depth pursuit, it made me think there were no caves deep enough for Sheck to explore. We were pretty sure that, in Boesmansgat, Sheck had found his nemesis. The mother of all caves. The real deep one. We were all wrong. His secret cave was located 25 000 kilometers from the Kalahari Desert of South Africa, on the Yucatan Peninsula of Mexico, where Jim Bowden had found the Zacaton sinkhole/cave system.

There is another photo in Martyn's book taken in 1993. This one is of Jim and Sheck on the surface of Zacaton smiling. Sheck is showing 4 fingers (400 feet), meaning -121 meter. That is the depth they had reached. The dive was not on trimix but on air, while they probed the abyss of the Mexican sinkhole. What they didn't know, on that day, was that the cave was much, much deeper than that. The next day armed with a long plumb line they found the truth and Zacaton became the deepest known underwater cave in the world. It extended down to -319 meters. Over the next couple of days Bowden reached -152 meters and Exley -215 meters. By the end of August Jim was back at Zacaton, with his team. In September that year Ann Kristovich became the deepest woman diver by going down to a depth of -162 meters. Jim descended to -221 meters without any side effects, after the dive. Exley was not there he was diving at Boesmansgat with me and the team. He didn't shared this revelations with us.

Even if I had known about Zacaton, even if I knew how deep it was, it would have made no difference. Boesmansgat with its confirmed depth of at least -263 meters was a lot closer and there was no need to look for endeavors for which I was not prepared. My deepest cave dive was still three years into the future, when Sheck was diving Boesmansgat there was no envy from me; he was just in a league of his own. Looking at the films from the expedition, it is obvious. The way he moved underwater, the way he handled the guide line, it was all done with so much ease and confidence that all the other divers stuck out like the weeds in a botanical garden. He was probably the only one who used the frog kick propulsion technique. He was not using his hands to desperately try and change direction, he was calm. His gear was neatly packed and the hoses were not sticking out all over, this prevented the equipment from getting entangled in the guide line. He also maintained the horizontal position even on descent. How many cave dives had he made before arriving in South Africa? Three thousand? Four thousand? Quite a few. Many more than we had done, all together.

We had all arrived at van Zyl's farm on the same day but at different times. Besides Sheck from the United States there was also Alan Riggs, a hydrologist from the US Geological Survey. Alan had dived in Florida with Sheck and Paul DeLoach, over the years. The expedition also included a geophysicist, Barry Pardey from Overseas Technology, in the UK. Charles Maxwell led the expedition and had a biologist with him, Andrew Penney, who was also his diving buddy. Boetie Sheun came from Namibia along with Eben Leyden. I came alone, many of my diving buddies wanted to come along but I was not going to bring anyone with me, uninvited. We did not know each other personally. However, even before the internet days, the world of deep diving was a small one. We all knew about each other's dives, and we certainly all knew Sheck. Even if we had some reservations about the outcome of the expedition, they all disappeared at the Van Zyl's farmhouse.

Mapping the cave was one of the reasons for being there but finding the bottom was even more important. After the tragic accident, on our first day, we started using the rotating side-scan sonar. "Murphy" was lurking, once again, as he always seems to be in any cave diving expedition, waiting for his chance to strike. It was not long and as luck would have it, the sonar somehow got entangled in the shot line. I was the only one available who could retrieve the sonar. Sheck had other deeper plans and this mishap was not going to distract him from his intentions. The other trimix diver, Boetie Sheun was long gone. It was expected that I would find the sonar at -90 meters, I had done many underwater searches but nothing is ever where it is expected to be. Even though I had done many -90 meter dives on air to find it, I presumed the sonar could have been stuck at -100 meters, or even more. I decided not to give "Murphy" any more chances and I chose to dive with trimix. Diving to -90 or -100 meters, on air, is something I would not recommend now; in the absence of helium, in the 90s, some divers were less reluctant to use air below -70 meters.

The mechanical operation of the sonar is pretty simple. It is placed carefully in the water, suspended from a rope, at a certain depth. The rotating head being very sensitive is definitely not designed to be squeezed through narrow cave systems, it is thus important to avoid bumping it on any rocks. The head rotates very slowly and takes measurements by pinging the rock face around it. The data is almost immediately accessible on the computer. Barry Pardey being very preoccupied with not damaging his equipment made us dive and place the sonar head, at predetermined depths, to take the necessary measurements. The depth increments were done in multiples of 10 meters, until we reached -60 meters. From that depth onwards the sonar was dropped down at the end of a rope, in the proximity of the permanent shot line. Once again the depth increments were of 10 meters, until the sonar reached the depth of approximately - 100 meters. That is how the two ropes got entangled. Barry was a very worried man. The problem was that besides not having a machine that could produce nice digital drawings, of the cave, on the computer screen and capture accurate measurements, the gadget also cost more

than 50,000 US dollars. Although mining companies like the ones Pardey worked for use sonars in deep-sea exploration looking for minerals, Barry used his company gear mapping a cave with no financial value. I did not think that he was prepared to sacrifice his precious piece of equipment, even in the name of science. My job was "simple": do a solo dive to -100 meters and salvage the sonar. Reluctantly I had used trimix this time, aware that untangling anything stuck on -100 m was asking for trouble. Happy to have an important contribution in an expedition focused on Sheck, I handled the trophy to Barry. He was extremely happy, so happy in fact that to my surprise he never again let that "thing" go back into Boesmansgat. So, in terms of mapping, we stopped at one third of the actual depth. There were still at least 180 meters more to be explored; from

Another goal for the expedition was to set a new world record for deep air diving, in a cave. Four years earlier Bret Gilliam had dived to -138 meters and in 1993 again to -145 meters, in the sea, reporting no ill effects from narcosis or oxygen toxicity. Sheck in Boesmansgat had reached -120 meters, whilst doing a horizontal penetration on air. Much more difficult than a simple touchdown dive.

then onwards, it would be done visually.

The danger of deep air diving is related to the high partial pressure of oxygen, nitrogen and the residual carbon dioxide. The partial pressures of these gases increase with depth, ultimately resulting in what is called a deep water blackout. John Bantin, a close friend of the late Robert Palmer documented the dangers of diving air to extreme depths. Robert, a British cave diver and Geologist, from the University of Bristol, was fascinated by deep air dives and practiced them while on a weeklong Red Sea safari. "As Rob repeated his deep dives throughout the latter part of the week, our exchanges in his cabin became more and more heated. When he expressed the mind-boggling opinion that an oxygen partial pressure of 3 bar was "safe", even though it is universally accepted that an oxygen partial pressure of 2 bar is the upper limit of a safe exposure, he did so in private. Later Robert was heard discussing 'the cozy effect of nitrogen narcosis, as it closes around you' with other passengers". The story ended at a typical deep-water reef, near the Giftun Islands. There were five in

the group. All on air. A female diver wisely, during the descent, decided to stop at -70 meters. The other pair said that they had stopped at -107 meters, the fourth diver, Rehan Bower, had gone off to do dive on his own. Rob himself was last seen below the others, apparently waving to them to continue on down. His body was never recovered.

What Sheck and Jim Bowden practiced regularly from the early 1980's, is controversial today. The concept of deep air dive training still divides the community of technical divers. Some say it's an unnecessary risk; some advocate that it is necessary it in order to build up a resistance to nitrogen narcosis, this has so far not been scientifically proven. The debate remains but it is agreed by two major institutions that use gas mixtures, even though they do not share all their secrets, namely the US Navy and Comex from France that diving below -60 metres on air is not safe. If diving deep on air is controversial, beating depth records on air might be treated as playing Russian roulette, with more than one bullet in the chamber. In 1990, four years after Bret Gilliam dive, in 1997, Dan Manion set the current world record for deep air diving, at -55 meters. He was almost completely incapacitated by narcosis and had no recollection of the time spent at that depth. For safety reasons, Guinness World Records have ceased to publish records for deep air dives, after Manion's dive.

To further illustrate the deep air record diving issue, during the frenzy of the 70s, Sheck Exley recollected his own first hand experiences: "For this new world record attempt, Archie Forfar had designed an ingenious but simple system of drop-way weights to ensure survival. When losing consciousness from narcosis most divers would retain their regulator and continue breathing, all the dive team members had to do was to make sure their Buoyancy Compensators were fully inflated during the descent and hook some weights behind their knees. These would automatically drop away when the legs were straightened, if a blackout happened. The diver would then float up to where I could recover the diver". On that fateful day, however, one member of Florida divers decided to use the system whilst the others did not. They descended along the cable weighted down by an engine block at what Jim Lockwood remembers as a crazy speed of 60 meters per minute. He soon blacked out at -122 meters to be revived on the surface thanks to the system that Archie had invented. Ann Gunderson and her partner, Archie himself, had no such luck and Exley, then 22, watched them dying as a result of deep water blackout. "From 400 feet down (-122 meters), I could see Archie and Ann still breathing on the steeply sloping wall, down below me. Archie had his head down against the engine block and was still slowly kicking as if he was going down the cable, Ann was lying on her back about 10 feet off to one side. I started to get severe tunnel vision and did all that I could do, just to be able to survive at that depth. The distance from me to Archie and Ann might as well have been a mile".

Archie had been quite a living legend in the Bahamas. He had built Forfar Field Station, on the Andros Island, a complex of rooms and lecture halls for the academic community, studying the Bahamas marine environment. When the pair decided to beat Hal Watts's record and try and reach -146 m on air, Archie was 38 and Ann was 23 years old. "Ann would never have left Archie, so that would account for their double accident" – recollects Jim Lockwood. The drama was heightened by the fact Archie was a married man but not to Ann. Following the tragedy, the station was sold by the Forfar family. The new owners, Walter Bohl and International Field Studies, a nonprofit organization, are still running the station nowadays.

Deep water blackout in scuba diving and shallow water blackout in free diving, which is also known as breath hold diving, can result in death, unless immediate rescue is at hand. They are as much a part of diving as frostbite is a part of high altitude mountaineering.

What is commonly referred to as shallow water blackout is triggered by a lack of oxygen, in conjunction with a buildup of carbon dioxide. In breath hold diving, it is common, especially when diving deep with bottom times exceeding 4-5 minutes. Many excellent free divers have perished because of it, many were revived at very last second. These blackouts were common occurrence during the record dives of Pippin Ferreras and his late wife Audrey Mestre. According to Carlos Serra, his business partner, Pippin had even formed his own organization to prevent exclusion of records ending with a blackout. His last dive in January 2000 in Cozumel, Mexico, left him unconscious for nearly a minute on the surface. His hyperventilation seen on a video from his and his wife's fateful dives were demonstrated in the cult movie "The Big Blue". Deep inhalation can ultimately lead to divers losing consciousness, in relatively shallow water. What happens is that by taking several deep breaths prior to the dive, the free diver decreases the percentage of carbon dioxide in the bloodstream and thus cheats the reflexive respiratory drive. The urge to breath is therefore postponed and the diver blacks out, due to lack of oxygen, during the ascent.

Not only have I lost friends to deep diving but also to free diving, due to shallow water blackout. One of my best friends, Anthony Koch, died while spearfishing in the ocean a few weeks after a scuba diving trip with me to Komati Springs, also known as "Badgat". Anthony loved the water and took part and excelled in a number of water sports. He was a scuba diver, a spear-fisherman and a member of national team for underwater hockey. At the time when we scuba dived in Komati Springs did a lot spearfishing and played underwater hockey.

It was my first trip to Komati Springs, for Anthony it would be his first and last. At the time its location was relatively unknown to most divers. We had not dived there before and even had a hard time finding it. This flooded quarry has water with a temperature which normally exceeds 20 degrees Celsius. At first sight it looks like a thousand other locations, which provide a training venue for scuba divers set in the vast African savannah. Its imposing steep rocky edges, carved out of a mountain are the remains of mining excavations. The Komati Springs dive center, managed by Don and Andre Shirley, has more to offer than most quarries. There are underwater platforms and some sunken artifacts. The visibility is excellent, especially in winter. The main secret of Komati Springs lies way beneath its bottom. It is a multilevel artificial cave system which has been explored down to -186 meters. The system of mined out tunnels with depths exceeding most natural caves found in Florida and France is a training ground for those who are preparing to explore deep caves. The place run by the Shirleys is not unique as there are other flooded mines

with shafts deeper than one kilometer in South Africa. The only problem with the other flooded mines is that the water is so acidic that a diver could end up finishing the decompression obligation, skinless.

Anthony and I were not chasing depth records, at the time, but only comparably harmless bass and barbell, hoping that they would lead us to the submerged entrance to the mine. We never found it, we were diving way too deep, that time. After several deep dives, frustrated we left. Some weeks later, in 1985, I received a call, Anthony had died in the ocean from shallow water blackout, while spearfishing. His buddy tried to recover his body from around - 35 meters. No luck, it was too deep. His body was later retrieved using scuba diving equipment. After all the deep diving that we had done; it was to be shallow water blackout and not deep water blackout.

What the photo, in the South African Speleological Association Bulletin, of the smiling Sheck Exley on the surface of Boesmansgat, was hiding from us, was the fact that he had made a slightly deeper dive on air, a year before at Zacaton. Although he had not been able to beat Hal Watts' record, for the deepest air dive in a cave, set in 1970, he had kept on trying. Zacaton was however such a deeply guarded secret that Exley had decided that it was better to repeat the dive, in South Africa, rather than reveal the location of the deepest known cave in 1994. He knew however that he would have to reach at least -127 meters to surpass Hal. Sheck had reached -121 meters in Zacaton followed by -120 meters in Boesmansgat; he was still short of Hall Watts' record of -126 meters, at the Forty Fathom Grotto, in the USA.

For me the idea of going so deep on air was a bit like science fiction, I knew it, I had been there quite a few times. At a depth of -100 meters you can hear your heart pounding and the blood pumping in your head, you are totally narcosed and feel as though you are about to lose consciousness at any time. It is theorized by the deep diving community that diving deep, on air, will assist one in building up a tolerance to nitrogen narcosis, much like the adaptation to drinking alcohol. It is also postulated that increased amounts of nitrogen in the body will counteract the effects of High Pressure Nervous Syndrome (HPNS) caused by helium. Diving

on air which consists 79% of nitrogen and diving it deep is definitely the way to maximize toleration for mixes with high amounts of this highly narcotic gas. Exley told us that he had experienced the effects of HPNS, in Zacaton. And his way to overcome it was making nitrogen his friend. I was blind. I knew almost nothing about HPNS. The South African record, my record, in 1993 was only -123 meters, oo shallow to experience HPNS in any form. The only thing I felt after listening to Sheck was that it was brave to go so deep using air, with all its side effects. Maybe I thought nothing because this was Sheck and he was the world record holder as well as the best diver in the world, as far as I was concerned. Who were we to question what he could and could not do? I was all eyes and ears, absorbing all knowledge like a sponge.

Sheck took his reel and made the first tie-off at the entrance of the cave. This was followed by the second tie-off at -75 meters, after swimming 100 meters to the northern side of the chasm. The third tie-off was supposed to be placed at -120 meters connecting the shaft with the opposite side of Boesmansgat. He never made it. He found the right place for the third tie-off, a piece of protruding rock. He even managed to wrap the rope around the rock outcrop but the line cut with his knife was made on the wrong side of the reel. Sheck was pretty much immune to nitrogen narcosis but you cannot cheat physics and physiology. His mistake, nearly cost him his life, as he found himself looking at the end of a disappearing line, his lifeline. Sheck dropped his reel, which immediately found its way to the bottom of the cave and he started chasing up after the line. He finally caught the line and proceeded to -75 meters, where he tied-off all the surplus line. He had made his -120 meters deep air dive but it had been a close call.

What was his deepest air dive that August? He reported having done two working dives to -122 meters and -126 meters while placing decompression cylinders. We knew about the close one at -120 meters. Sheck admitted however that he was still chasing Hal Watts' tail. Jim Bowden, in the International Association of Nitrox and Trimix Divers (IANTD) Journal, revealed that Sheck had finally surpassed Hal's record, two days before his death, by reaching -128 meters in Zacaton.

Another mystery for us was his decompression plan. He acted like a magician retrieving a rabbit from a hat. Out of the whole group I was probably the only one capable of understanding the physics behind the trick, the physics while diving trimix but only down to the depth 120 m. What was it? His last deep stop? Even today, in the age of trimix diving computers and freely available specialty deep diving courses, from most technical dive training agencies, decompression is not an exact science. For deep diving, this is especially true. Most of the training manuals focus on dive skills and procedures. The problem with this is that it can give divers a false sense of security. One may think that if you play by the rules, you will be safe. This is not necessarily true. The critical issue with deep diving is surfacing safely after decompression. Decompression algorithms and mathematical models are based on results from experimental data collected over the years. This data includes John Haldane's recompression chamber studies, on goats, at the beginning of the century. Modern decompression models vary widely but in fact they are all derived from Haldane's work. Or Professor's Albert Bühlmann, the next major player, who replaced goats with humans. His experimental dives in a dry recompression chamber, went much deeper than Haldane's. One of his subjects and lead divers was Hannes Keller, a mathematician. Hannes Keller survived the first ever diving bell assisted dive to -300 meter dive, off the California coast, in the USA. Unfortunately two other divers, in the team, were less lucky and perished during the attempt. Keller was the last human subject of Buhlmann's experiments. His followers based their decompression models on almost pure mathematics. Like the concept of micro bubbles first presented by Bruce Wienke in 1998. Yount and Hoffman's Variable Permeability Model (VPM). Baker's VPM-A and later VPM-B. The Reduced Gradient Bubble Model (RGBM) by Wienke. Some dive computers keep this variability alive allowing a diver to switch from one model to another. It sustains freedom of choice but in the end it is a matter of faith rather than factual science.

Exley never shared with us his run-times for the Boesmansgat dive, neither did Johan Hasenmayer or John Bennett. Sheck's run-time for the Mante dive, in March 1989, was published posthumously. Around the time of our dive in Boesmansgat I understood that one of the real advantages that one deep diver had over the other, in the deep diving race of the 90s, and even today, is the ability to calculate a "safe" decompression run-time schedule. It is not an ultimate advantage. The same decompression table that will keep you safe on Tuesday can kill on Sunday. For the very same dive.

The only exception to this rule was Jim Bowden who published his decompression schedule for Sheck's and his proposed -300 meter dive at Zacaton, in the AquaCORPS Journal, in 1995. The one he was about to perform along with his mentor Sheck Exley in Zacaton. Their proposed runtime consolidated all previous knowledge like fast descent and reduced number of deep stops. Also refined the idea of switching from trimix to air. The switch was planned much deeper than in Mante, at -80 meters. This was done to try and prevent isobaric counter diffusion, which occurs when two gases with different densities move in opposing directions in the human body. Jim published the run-time with a note -"Don't try this at home kids"- he knew that there were only a few divers in the world who could survive such a dive. In having done the dive he placed himself in the elite group of divers with the "right stuff". He became immortal in the world of divers. Sheck, probably would not have made such a bald statement. Unfortunately he wasn't given the opportunity. Along with Jim he failed to achieve what has been planned. Bowden reached a maximum depth of -281.9 meters out of run-times' -300 m, his mentor, Sheck Exley, would not return alive from -278 meters. The dive was regarded by Guinness World Record and soon after Jim wisely, quit deep diving altogether. Like Boetie a year before, he was probably fed up with people dying all around him, validating the real truth behind Florida's cave warning message at the entrance to its caves - "There is nothing in this cave worth dying for". Or was there?

When I look back at Sheck's run-time, for Mante, I see a few things. First, the descent was slow. It took 13 minutes to get to -152 meters from the surface. From -152 meters to -264 meters, the next 112 meters, it took another 10 minutes. That was real slow. I would probably make the whole descent in less than 10 minutes not 23 minutes. I knew he had attempted

to beat High Pressure Nervous Syndrome (HPNS), which was supposed to start at around 150 meters. By saturating his body with helium at a much slower rate he was trying to lessen the impact. The effect of helium under pressure, HPNS was his Achilles heel. He could handle nitrogen narcosis to the extent of actually working below -100 meters on air but he was susceptible to the effects of helium. That's why all his mixes were rich in nitrogen. His adviser on decompression schedules, Dr. George Hamilton, who worked with commercial saturation divers was a proponent of slow descents. High Pressure Nervous Syndrome gave Sheck hell in Mante, in Boesmansgat it got worse and in Zacaton, probably took his life.

You would not see Triox (Oxygen rich Trimix) on Sheck's gas list. Some divers advise it to counteract Decompression Sickness (DCS) during the early stages of the off-gassing process. I have seen at least three divers getting bent after using Triox. Sheck probably knew them as well. When he switched to air from Heliair 10 (10% oxygen, 40% Nitrogen and 50% Helium) he doubled the Oxygen and Nitrogen in his breathing mixture. The other interesting thing is that every 3 meters on the ascent, he stopped for one minute. The benefit of doing stops so often is that it keeps you busy. On the other hand with so many stops one can easily make a mistake. Sheck was always fond of carrying elaborate run-times printed on a few laminated pages. He was a mathematics teacher and detailed plans gave him a feeling of control and accuracy. His run-times resembled the plans he drew for us on a whiteboard at the dive site. He kept two whiteboards, one was at Mount Carmel's farm, and the other stayed at Boesmansgat: visible examples of Bill Hogarth Main's maxima "plan your dive, dive your plan". And we definitely dived his whiteboards during that expedition. The last find in his run-time pushed me back to deep air dives. It's his bottom mixture made of Heliair 7 (7% Oxygen, 26% Nitrogen and 67% Helium) which gave him an equivalent air depth of -80 meters, not for the faint hearted. This was exactly the same bottom mixture that he had used at Mante during his -264 meter world record, cave dive.

The base for the final run-time used at Boesmansgat came from Dr. X software. The program built on Professor Albert Buhlmann's model.

Sheck Exley had written it himself to facilitate the calculation of the decompression schedules. I was so eager to get a copy that I exchanged my new Casio G-Shock for a copy of Dr. X. It was in fact available for sale at that stage. I remember Sheck pointing at me after his deep air dive and suggesting I would be the person to retrieve his reel from the bottom of the cave. The software would probably have helped me to do it but it's not software that dives. It's the man.

At -90 meters, I saw tiny lights below me, they looked like fireflies. This image is usually reserved for only one man in the support team. The deep support diver. In 1993 I was the only member of the team capable of helping Sheck at that depth. It didn't mean that I could do much for him should a problem arise, but my presence was reassuring. Having another diver, a lighthouse to navigate to, gives a promise of hope. A beacon to come back to. Everyone needs it. It doesn't matter how tough you are or how much experience you have, going deep is scary. So many things can go wrong and so much depends on some degree of luck as well. Having someone waiting for you is reassuring. Even if all the person can do is to have his lights on. He might be able to do nothing.

I was on air, even so I soon realized that the fireflies were growing bigger, I started ascending to fulfill my own decompression obligations. I had been at -90 meters, for nearly 10 minutes. If Sheck lost the shot line he would still have my headlights for guidance. But he had not. He did it. Everybody was extremely happy. I passed the news on to Charles Maxwell, Alan Riggs and Andrew Penny waiting at - 60 meters. There was still a long time to go to the end of Sheck's dive but the most dangerous phase of the dive, the part where we could not help, was over. Now, if anything happened we could still get Sheck out of the water and decompress him in a chamber, in Pretoria or Cape Town. There was a helicopter with medics and vehicles on standby. He told us after the dive that HPNS got him bad at about - 210 meters. His vision was blurred. He was looking through small circles with black dots and then he had started convuls-

ing, his body was itching and then stinging. The only way to stop these symptoms was to ascend but he didn't have the luxury to do so. He still had tens of meters to go. The bottom of the cave looked like a lunar land-scape, everything was submerged in silt with an occasional protruding rock. The real challenge was to stop in time, before hitting the bottom. The pressure was so great (27.3 bar) that it took ages to inflate his Buoyancy Compensators, to obtain neutral buoyancy. He didn't recover a tag to claim the record depth. Sheck's "Aladin" wrist computers were enough to prove that he had gone to that depth. He looked so exhausted after the dive that I doubted he could think of retrieving a tag from the shot line, at the bottom of the cave.

His own recollections from the dive consisted of several objects on the bottom of the cave: a lost camera, lead weighs at the bottom of the shot line, small surprisingly light colored rocks covered by black sediment. The temptation to explore further and gain some depth on the gentle descending slope was soon replaced by the fear of getting lost in this enormously vast cave, while suffering from High Pressure Nervous Syndrome (HPNS). Sanity prevailed.

Symptoms of HPNS are not the only punishment that one endures when diving to these extremes; the other is the unbearable cold. Even though Sheck had an electric heating system, inside his dry suit, for the seven hour exposure in that environment, he was still very cold. Helium conducts heat ten times faster from the body than air, it is exhaustive. Breathing helium, which is thinner than air, cools the body at a fast pace from the inside. The image of his greyish face and the uncontrollable shaking is still vivid and clear.

Sheck had done it. He had been only one meter short of his own world record at Mante cave, four years earlier. He was the first of three divers to have ever reached the bottom of Boesmansgat. Boesmansgat is still today the deepest high altitude cave/sinkhole system in the world. His dive, in terms of the decompression obligation, had been equivalent to a dive to -315 meters, at sea level.

After the feat Sheck asked me if I wanted to use his gear to reach the bottom. I was not mentally prepared and declined. Two days later how-

ever, I set my own record, -177 meters using Dr. X. The software worked. I was fine. Exley was surprised that I had done my dive without a dry suit. He was not aware I did not own one. Did he knew that two years later I would find a deeper spot in Boesmansgat? Behind his black eyebrows. Deep in his eyes. I found something then. A smile.