

## Deep dive, high risk: The terror in the deep



**Glen Dunkley helps Mark Ellyatt (left) prepare for his dive.**

Going for records in any sport offers both thrills and perils.

In the case of diving to extreme depths, the risks are particularly high.

Some of the dangers can be managed; others cannot.

In the last three dives worldwide to depths below 250 meters, all the divers suffered Vestibular Decompression Illness.

*Mark Ellyatt* thought he had the answer. Apparently he did not. On these pages is his account of a 260m dive – the deepest recorded in Thai waters – that turned bad.

Imagine being so drunk that vertigo spins your mind like a gyroscope and causes vomiting reminiscent of a scene from *The Exorcist*.

My eyes dart back and forth uncontrollably. My mind is spinning out of control, like being on an upside-down merry-go-round.

I signal to Sweinung, the first unlucky support diver who will now have to assist my every move: I am helpless. All I can do is hold the line and breathe.

Each minute seems to last an eternity as I twist and convulse, waiting to reach the surface. Mike Stark and Glen Dunkley take over at 21 meters. They remove my multiple tanks and replace them with a single tank and a weight belt.

The vertigo and vomiting continue unabated. The vomit runs into my mask and makes it hard to clear. On top of everything else, I now have stomach acid in my eyes.

I try to get myself horizontal, face down in the water, to minimize the risk of drowning. Unable to tell up from down, left from right, my only guide is that, in a certain position, the vomit is no longer in my eyes. I concentrate on that.

Much as I wish to, I cannot race to the surface. This ordeal has to be endured. The support divers do a great job of helping me. During the dive briefing 90 minutes earlier, I told the team that I must decompress – regardless of how ill I look: I know that if I abandon my decompression plan I will probably suffer a massive stroke before I even reach the surface...

In December I decided on a deep-dive project, hoping to put Phuket on the destination map for technical diving – diving below the normal recreation depths.

I had lots of deep-diving experience in miserable conditions and thought a series of dives in paradise, culminating in a record attempt, would be pleasant. John Bennett of the UK currently holds the record for the deepest dive: 308m in November 2001 at Puerto Galera in the Philippines.

A date for the first major dive was set and the location found: west of Phuket is an undersea wall that starts around 100m from the surface and goes down to a depth of about 500m. Pinnacles shown on sea charts rise from 320m right up to virtual “shallows” of 180m, supplying a depth record location with something to see.

On the chosen date, February 25, we left with spirits high and nearly perfect sea conditions. I decided on a 260m dive as a warm-up for a deeper descent at a later date. I would use Reduced Gradient Bubble Model (RGBM) software tables for the decompression profile, reducing the decompression schedule to less than three hours – compared with more than seven hours using traditional methods.

With surface water temperatures above 29°C, I chose a 7mm Body Glove wetsuit. I knew this would mean I would be chilled to the bone at depth, where temperatures drop to 4°C, but that I would soon warm up when I returned to the “shallows” above 90m.

I chose double 20-liter tanks for my deep-breathing mix of nitrogen-free trimix with 5% oxygen and 76% helium (underwater gas pressures can exceed 100%, relative to surface equivalents).

I also carried two 15-liter stage tanks of “travel trimix” to use at the 90m and 120m gas switches. Low-pressure steel tanks made by OMS were chosen to avoid buoyancy problems when my wetsuit was compressed.

We arrived on site and deployed the descent line. Next, the 10-strong support team were briefed on the dive plan and possible emergency medical procedures to be followed should something go pear-shaped.

Although I wasn't expecting a problem, I went into detail on how to deal with isobaric counter-diffusion (ICD) decompression problems. These are caused by gases of different molecular sizes interfering with the off-gassing of body tissue. A good analogy would be a crowd of thin people (gas bubbles) leaving through a tunnel (artery) in an emergency. If six fat people attempt to run the other way, then the thin people can't leave as quickly and some will trip and fall causing further obstructions or complications.

I have studied ICD in detail. It seems to strike randomly, in some cases when gas mixtures are changed with decreasing amounts of helium or when helium is eliminated altogether.



**‘It seemed like we could see forever’: Mark Ellyatt begins his descent, accompanied for the first 50 meters by Hilde Montgomery (upper diver).**

ICD has killed and maimed many times. Even with totally controlled ascents, commercial divers still get hit with counter-diffusion problems. While still in the decompression habitat, such problems can usually be dealt with successfully. Any diver undertaking helium or trimix-based deep-diving should understand ICD.

Sadly, most technical dive-training agencies dismiss or downplay the problem – emphasizing it doesn't help sell courses.

All training materials that I have seen either deliberately omit any reference to ICD or

contain a derisory two-sentence explanation from someone who does not understand it.

The result of ICD is vestibular decompression illness, or vestibular DCI, a cluster of very unpleasant and dangerous symptoms that strike while the diver is still coming up, unlike the more common form of decompression illness, which strikes after the diver has surfaced.

John Bennett, coming up from his record dive in the Philippines, was stricken by vestibular DCI and suffered through eight hours of vertigo, vomiting and so on.

Briefing over, I plunged into the water with Hilde Montgomery, who would drop to 50m and supply me with normal compressed air to breathe before I went self-sufficient.

The water was electric blue. It seemed like we could see forever. Because of the current deeper down, the descent line was slanted at a funky angle from vertical.

I started my descent, sliding the line through my hands and using my increasing weight to speed up the descent. I wanted to drop quickly to 150m, slow down for the next 50m and proceed very slowly over the last 60m in order to avoid "helium tremors".

Soon I was plummeting into the darkness like a greased anvil, the cold biting into me. At 200m the speed of descent was causing my dive hood to flare open and flush with near-freezing water. At 220m I returned to a hand descent and started to hit the brakes by using the inflator of my buoyancy wings.

I checked my depth gauges here. My Stinger gauge had stopped working at 150m, the Nitek at 200m and the Alladin computer at 231m. I could not see the bottom. Total blackness engulfed me above and below.

I checked myself for High Pressure Nervous Syndrome symptoms, but didn't feel anything unusual – apart from my shivering body. I was freezing cold, but this was expected so it didn't concern me. I continued my descent.

The visibility deteriorated with passing waves of silt and jellyfish. I continued down, carefully noting the depth on the line. It was increasingly cold but apart from that I felt good.

Finally, I reached the bottom of the line and hung on the end with one hand, like a high-tech monkey swinging in infinite, unbounded darkness.

I checked my kit at the bottom. All dive lights still worked fine. I had some SL4 lights mounted high and also an OMS phantom light on my hand. I was surprised that everything still worked. I felt very happy down there despite the numbing cold and the legions of translucent jellyfish slipping over me.

Dives below 80m place enormous strain on the regulators (air supply valves), often causing them to free flow wildly.

I have had big problems in the past on deep dives. This dive was happily different. My Apeks regulators worked without a grumble despite the below-freezing gas running through them at enormous pressure.

The decompression plan called for a first stop at 175m. I was still freezing there and shaking uncontrollably. Shallower stops came and went in a shivering blur – until the water temperature finally entered double digits at around 120m.

From this depth I looked up and could see sunlight on the surface high above and the shadow of the dive boat. The water was exceptionally clear.

I looked up for the deep support diver Bruce Konefe, who was to meet me at 90m and bring fresh gas for the stops between 90m and 60m. At first I couldn't see him coming down the line and thought there might be a problem, so it was calming to see him approaching shortly thereafter.

I ascended with Bruce, the decompression stops going smoothly. At 60m we met Mike Doyle with the next decompression trimix (20/30). We continued upwards.

The next gas change was a mixture containing only oxygen and nitrogen. Sweinung, the next support diver, delivered this nitrox mix at 40m. I put the regulator in my mouth and started to breathe. So far so good.

A minute later I was in big trouble as the ICD kicked in and affected my inner ears. The long ordeal of vomiting and vertigo began.

One thing working in my favor was the accelerated decompression schedule I was following, which limited this torment to no more than three hours, unlike Bennett's eight. A traditional decompression plan, at seven hours, would have been no guarantee against the dreaded ICD. I was happy with the ascent as it panned out and was confident in the experimental plan I had chosen.

After three hours I finally broke the surface. The support team put me into the rescue boat. Fortunately, medical facilities in Phuket are world-class. I sampled the delights of the recompression chamber for several days.

Chamber treatments are intended to speed recovery, but I was very concerned that the associated constant pressure changes were making the damage worse. With ICD some of the "windows" in the ear – thin membranes – are blown out. In my case, the window between the inner ear and the middle ear had burst, leaving me deaf and with no sense of balance. As windows try to heal, the last thing they need is big pressure changes.

It was a month before I started to feel normal again. With this type of DCI, I believe little could have been done to avoid the problem. There is a variety of methods for returning to the surface from very deep dives, but I have seen all of them fail at one time or another.

The only guidance I can offer deep divers is this: have a large support team ready if you plan to dive below 80-90 meters.

If you have a problem with vestibular DCI, have support divers assist in the decompression stops; you will have no reference points to help you distinguish up from down. You will vomit with every breath. If you ascend without decompression you will get the bends; if you stay you may drown.

I have completed many deep dives without incident. But many divers have drowned while dealing with vestibular DCI on far shallower dives. Very little is known about vestibular DCI; thus there is no certain way to eliminate the risk.

Budding depth-record attempters have contacted me seeking advice. "Wear a lucky rabbit's foot" is the best advice I can give.

My dive would have had a far worse outcome were it not for the help of a dedicated support team. I would like to thank them all. I would also like to express my gratitude to Scuba Cat for the incredible support and logistics help.

And the record? Will I go for it in the waters off Phuket? Maybe. I'm thinking about it.

*RGBM software from <http://www.rgbmdiving.com/>. For further information contact Mark Ellyatt at Scuba Cat Diving (Tel: 076-293120-1; Email: [tech@scubacat.com](mailto:tech@scubacat.com)).*