Interview with Dr. Bill Hamilton

Photo by J. Silverstein

by Jerry Shine

It's safe to say that if it weren't for Bill Hamilton, technical diving as we now know it would not exist. An underwater physiologist with deep roots in the commercial and scientific diving industries, in the late 1980's he suddenly found himself without a challenge. "They had pretty much learned how to do what they needed to and so weren't doing much in the way of physiological studies," says Hamilton. "A lot of the excitement had gone out of it."

Enter Stuart Clough and his dream of building a commercially viable rebreather. Clough brought Hamilton in on the project. In one feel swoop, Hamilton was hooked up with guys like Rob Palmer, Rob Parker, and Bill Stone. Remember that at the time, the world of decompression was a very different one. Mixed gas schedules were the expensive, closely guarded secrets of oil companies. If you weren't in their loop, you were in the dark, and the few non- commercial divers who had tried to use mix wound up with serious decompression hits.

All that began to change with Clough's rebreather projects. "We got some talk going about the use of helium, and even neon, and then the word got out," says Hamilton. "It wasn't long before Parker Turner (one of the founders of the Woodville Karst Plains Project in Florida) asked me if I could help them put some helium into their mix."

Since then, the list of divers Hamilton has helped divers such as Sheck Exley, George Irvine, Rob Palmer, Bill Stone, Rob Parker, Jim Bowden, to name just a few. With tech diving now coming out of its infancy, and the number of training fatalities start to add up, it seems a good time to re-visit Hamilton and get his views on where we've been and where we're going.

Q: Coming from a commercial background, did you think guys like Stone and Palmer were crazy when they first approached you and told you what they wanted to do?

A: Well, I had met plenty of crazies in the commercial world, so, no, I didn't. I thought they were explorers. Now, there were some that I thought didn't know what they were doing and a few that I didn't think were careful. But that sort of thing is usually self-correcting.

Q: You mean they kill themselves.

A: Sometimes.

Q: Now, back when you first began providing these guys -- who I guess we would now recognize as the first tech divers -- with decompression information on mixed-gases, there wasn't much basis for it in the way of actual dives. Did you have any problems with that?

A: No, because they were going to make the dives anyway and they would have used air, which would have been a lot more dangerous. They needed the techniques and the tables and I was hungry for the information.

Q: In the US, the number of decompression accidents among tech divers seems to be on the rise--

A: I don't like calling decompression sickness an accident because I don't think it is one. You should expect it and be prepared to deal with it. And in most cases it can be dealt with without injury.

Q: Okay, taking the tack that the bends aren't an accident, what do we think we know about decompression that we really don't.

A: Well, a little knowledge is always a dangerous thing. Too many people put too much faith in these equations. They're useful tools and they do work, but they're just a way of representing an empirical event. They don't represent what's actually going on in your body.

Q: Where do you stand on the deep-air controversy?

A: Okay, here's where I get in trouble with Brett (Gilliam). Deep air is dangerous. I've studied narcosis in the laboratory and I know how bad it is when you have to deal with a problem when you are narcotized. If something goes wrong, narcosis can kill you.

Q: So why is deep-air diving still being taught as a formal discipline?

A: I don't know why. Actually it is the way some people earn part of their living. The whole reason technical diving was invented was to avoid deep-air diving. Now some people argue that you need to experience deep-air if you're going to do deep technical diving, and I don't have a problem with that concept, under the right circumstances. But don't go sticking your neck out, because it's a risk you just don't need to take. You can't calculate narcosis in the same manner that you do your decompression because oxygen is at least as narcotic, if not more so, than nitrogen. And when you're in trouble with narcosis while air diving, you are, by definition, a long way from the surface. All your problems are magnified tremendously.

Q: Would you put a depth limit on air?

A: I wouldn't because there are too many variables -- individual differences, what the diver is doing, the environment, temperature, stress levels, visibility, current, et cetera. If I had to, **I'd say 50 meters is a good stopping point**. Then you'd have to factor in all the variables and the limit may need to be somewhat shallower.

Q: There's been some talk that deep-air may cause physiological problems, such as impairing the ability of blood cells to fold as they move through small capillaries.

A: I'm not familiar with data that says that so I'll have to reserve judgement. But I don't think it's much of a problem. We've had people in our laboratory down to the equivalent of 400 feet on air and, while they were pretty well narked, we didn't see anything else. And if you don't see it, then the phenomenon you're trying to observe may not be very important operationally.

Q: The use of deeper stops is starting to become more prevalent. Any opinions?

A: Well, a colleague of mine, Eric Baker, who's also translating Buhlmann's book into English, has come up with a modification to the algorithm to calculate deep stops but I can't say much more about it right now. Divers who are doing it, are doing it on an ad hoc basis. And it's now getting the attention of one of the experts so we'll see what comes of it. But when you start adding stops arbitrarily, you can screw up the rest of the dive, so you have to be careful. You have to consider the whole picture.

Q: What do you think about the decompression software programs that are on the market?

A: Well, the thing that bothers me about them is the way they measure conservatism. If you put in a 20% conservatism factor, well, what does that mean? I don't know and I don't know if anyone else does either. But I haven't heard of anyone getting themselves into real trouble with them, or with a dive computer for that matter. There have been some cases of DCS.

Q: Does physical fitness play a role in decompression?

A: Fitness is very important but it's probably more helpful in terms of your ability to perform, for instance to swim, than at a cellular level. Someone who's extremely fit can probably decompress a bit more aggressively than someone's who isn't. But someone who's overweight could have problems because of circulation and the way fat takes up gas.

Q: Should all tech divers be routinely tested for PFO?

A: That's a tough question. We're fairly sure that people have bubbles on what I'd call ordinary dives. Now, some bubbles are tolerable, but we don't really know the point at which they become troublesome. If you start to have underserved problems, then you should have it checked. But the pressure pattern in the heart doesn't just push bubbles from the right side to the left because there's a hole there. The flow is more likely to be in the other direction because the pressure is higher on the left side. You have to have a PFO and some kind of a pressure disorder, such as you get when doing a valsalva maneuver, or when you're upside-down or coughing or something. But I don't think the returns are in on this one yet. Researchers are trying to get data on decompression and PFO but I don't expect the relationship to be terribly strong.

Q: What don't we know about decompression that we will know 10 to 15 years from now.

A: How about the answers to most of the questions you've just asked. We're still trying to find better mathematical algorithms to model what happens to the body during decompression. We don't have that down at all. What we have works but it's not under control. And there are all kinds of questions about oxygen exposure and repetitive diving that need answers. Unfortunately, though, when it comes to decompression, we're probably not going to get orders of magnitude better at it. We're pretty close to edge of the envelope now. It's the variables we could get a better handle on, such as temperature and exercise. We know they have effects, and we know the direction to a certain extent, but it is hard to include these in a decompression calculation in a quantitative way.