

Deep Diving: 100 Fathoms Down!

— Interview with Royal Navy Diver George Wookey

Text by David Strike

Up until the '60s, the major advances in diving technology were driven by big-budget military programmes. Extending the depth limits to which divers might safely go—and still be capable of performing meaningful work when they got there—had a practical purpose. David Strike has the story, as told by George Wookey.

Submarine rescue and recovery was the incentive behind the series of deep-diving trials conducted by the British Admiralty during the '30s,

'40s and '50s. Setting out to extend the deep-diving limits, the Royal Navy programme established a world depth record in 1948, of 540ft. Wearing a Siebe-Gorman six-bolt helmet incorporating the Davis Injector system, flexible dress, and using the fast-dwindling supplies of American Lend-Lease helium, Petty Officer Wilfred Bollard set a depth record that was to last eight years. Not until 1956 would the baton pass to another.

In October of that year, Senior Commissioned Boatswain George Wookey descended to a depth of 600ft, setting a record for a helmeted diver wearing flexible dress that has never been equalled. Joining the Royal Navy as a boy,

about a year before the beginning of World War II, Wookey transferred to the submarine service, before qualifying as a diver in August 1944. Commissioned in 1948, Wookey was appointed to the Diving School on HMS *Defiance*, training "X"-Craft crews in submarine escape and boom defence net penetration, before being

sent in 1949 to HMS *Reclaim*—the Royal Navy's deep-diving experimental ship for deep-diving training.

It was a vessel that he returned to again in 1951, to assist in the search for the sunken submarine, HMS *Affray*, in which 75 men lost their lives entombed inside the hull. Perhaps as a natural consequence of a peacetime submarine disaster, there was an emphasis on trialling new methods of submarine rescue and recovery. In June 1956, Wookey found himself once more aboard HMS *Reclaim* for trials of the Royal Navy's new experimental one-man observation chamber.

Although the preliminary work took place at various sites off the western

coast of Scotland, the deeper trials were held in the fjords of Norway where the one-man observation chamber made 37 dives to depths between 400 and 1,060ft.

"At the same time that the chamber dives were taking place," recalled Wookey, "a number of flexible-suited dives using various mixtures of oxy-helium were made to moderate depths. The existing decompression tables, however, proved inadequate with a high proportion of the dives resulting in the bends.

"Clearly more investigation was necessary. A team of physiologists from the RN Physiological laboratory re-assessed the former data, and by August 1956, a new set of tables for depths ranging from 300ft to 600ft were supplied."

At Fort William, in western Scotland, preliminary dives

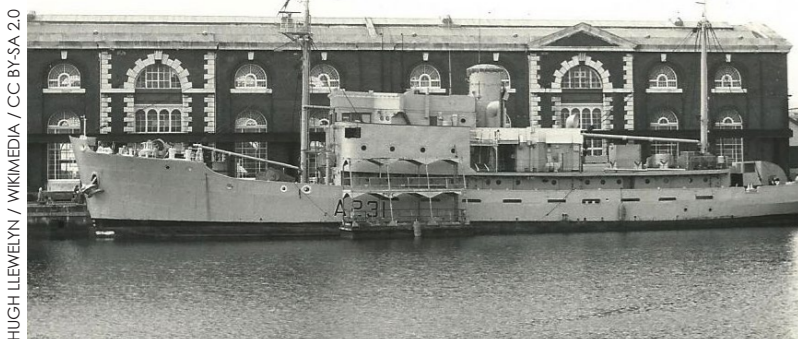
using the new tables proceeded normally and without incident. HMS *Reclaim* set sail for Norway, arriving at Osterfjord on 10 October 1956. Despite bad weather and the loss of one of *Reclaim*'s four anchors while mooring in deep water, diving operations began. The first dive—to a scheduled depth of 450ft—resulted in Chief Diver Bob Linscott and his SDC attendant contracting bends.

"Overnight, Surgeon Commander Bill Crocker and physiologist Ray Hempleman worked yet again on the decompression tables, adjusting and extending them as necessary," said Wookey. "On the morning of 12th October, the weather had moderated, and the decision was

Historical photo from the 1950s, showing Royal Navy diver George Wookey preparing to descend



COURTESY OF GEORGE WOOKIEY



The Royal Navy's deep-diving experimental ship for deep-diving training, HMS *Reclaim*, at Portsmouth



Historical photo of HMS *Affray*, lost at sea in 1951

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Historical photos taken in the 1950s show Royal Navy diver George Wookey, identified with yellow circle in a group photo (right), and being dressed for a deep dive (bottom left).



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Deep Diving

THE EQUIPMENT

The Siebe-Gorman Injector type equipment worn by George Wookey on his record-breaking descent differed from the standard (i.e. the Davis six-bolt) diving dress, and was specially designed to reduce the carbon-dioxide content of the gas breathed by the diver to the minimum.

The Deep Diving helmet is slightly larger than the ordinary, has connections for two “air” pipes, neither of which is fitted with a non-return valve, and incorporates a special outlet valve to vent air quickly from the system. Breathing gas enters the helmet through one connection and is guided over the front glass by a rubber air-chute. A mouthpiece fitted with a non-return valve enables the diver to inhale air from the helmet and to exhale through the mouthpiece.

Expired gas exits through the second pipe and passes into a weighted canister containing a CO₂ absorbent cartridge mounted on the diver’s back in lieu of the usual backweight. The “scrubbed” gas then re-enters the helmet. A bypass valve attached to the canister and mounted on the wearer’s right-hand side allows the diver to manually control the gas flow and determine whether gas enters the helmet directly or through the injector system. ■

valve inside the helmet, releasing as much gas as I could. Soon I could distinguish a faint, intermittent glow that increased steadily as I pulled myself down, hand over hand, to the workbench at 600ft.

made to continue with the trials. The ship was re-moored in 620ft—albeit with three anchors—while diver Joe Helps dressed slowly and methodically in the tense atmosphere of the diving flat below decks.

“A heavy steel workbench was lowered to 450ft and hung suspended by the shot rope down which the diver would descend. To simulate working on the hull of a submarine, Helps was to take down a wire hawser and attach it to the workbench with two shackles. The allowed time at this depth was ten minutes,” said Wookey. “Five hours later, after his dive to 450ft, both Helps and his SDC attendant were none the worse for their dive.

“The date was still Friday, the 12th of October. Our deadline was Sunday, the 14th of October, on which day the ship was scheduled to depart

for our home base in Portsmouth. It was important, since we had now achieved success at 450ft, that we attempt to reach 600ft—the main object of this series of experimental dives,” said Wookey. “The fact that this dive would have to be undertaken at night was of little consequence since there would be no material light—day or night—below about 200ft.

“The decision taken, the workbench was lowered to 600ft, and two submarine lamps freely suspended from the bow of the ship to 260ft and 600ft, some 50ft away from the workbench. A final analysis of the gas mixture in the main storage cylinders, and by 19:15 hrs that same evening, all was ready,” said Wookey. “Normal deep-diving routines for diving deeper than 300ft was for the diver to make a normal descent on compressed air to 120ft, then wait briefly at that depth while the composition of the breathing gas was changed to 9% oxygen, 91% helium. The diver would then continue with the descent to, in this case, 600ft.

The descent

With the preliminaries over and the routine tests completed, Wookey entered the water and waited, half-floating, one foot on the bottom rung of

the ladder and his helmet a couple of feet below the broken surface.

“I watched the SDC—with my attendant, diver ‘Geordie’ Clucas, inside—slowly leave the surface, bubbles gushing briefly from the opened lower hatch as the rising air pressure within kept out the invading water,” said Wookey. “Then suddenly the SDC vanished below me, the drone of the winch and the purchase wire, not two feet away, speeding it into the water to 220ft, where Clucas would await my return from 600ft.

“The order, ‘On to the shot rope and carry on down,’ boomed over my intercom. Sliding down to 120ft took less than one minute and the order to ‘Stop! Remove mouthpiece and start counting’ came as no surprise, for this is where my normal air supply, i.e. nitrogen/oxygen, would be substituted by the appropriate mixture of helium and oxygen,” said Wookey. “Helium is, of course, lighter than the nitrogen it replaces—approximately seven times lighter—and the vocal effects are quite

startling making speech difficult to interpret by those unaccustomed to it.

“Regain mouthpiece and carry on down,” came the next order, said Wookey. “Already, it was much colder as the helium permeated my system.

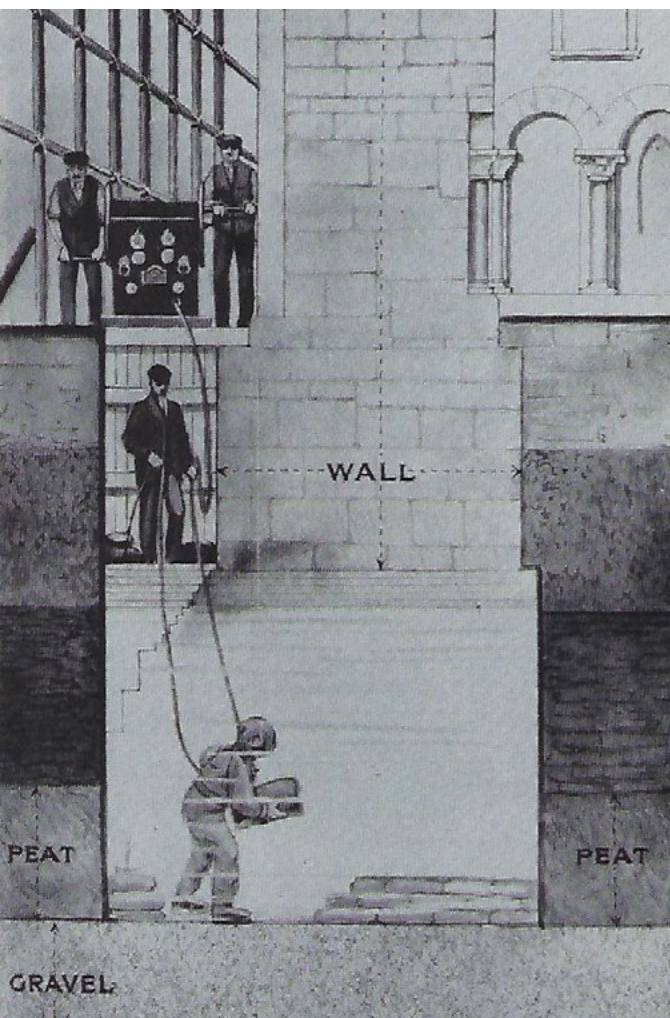
“Within seconds, my heavily booted feet were clanging on the side of the SDC where Clucas waited in his solitary confinement. He waved through the open lower hatch as I sped past, the light from within dazzling me briefly and then rapidly diminishing as I left it far above me,” said Wookey. “The water turned from a bright, crystal-clear green to a deepening opaque, then finally, and quickly, complete blackness.

“Gradually, I found my descent slowing and my legs tending to float upwards as I slid down the shot rope, and I realised that my new-found buoyancy was due to the increasing length of umbilical hose being paid out by my attendants on the surface,” said Wookey. “I knocked hard on my relief



COURTESY OF GEORGE WOOKIEY

"At last, I had made it. 'On the bottom,' I reported. A remote voice jerked my mind back to the job in hand, 'Your gauge depth is 600ft. Carry on with your work.' The screwed shackles secured by the previous diver had been screwed up tightly and seized with rigging wire. My exposed hands were fast becoming numb. Cold crept steadily through me, and I had a passing thought, 'One of these days, they'll invent heated suits!' [ed. — Water temperatures in Norway in October 1956 was approximately 1°C]



"After what seemed a lifetime, the job was done and I reported, 'Job completed,'" said Wookey. "The order, 'Stand by to come up', reached me. I tried to clamber onto the top of the workbench, but for some reason, I was being restrained—the slack telephone breast rope secured to my helmet had caught under the suspended bench, and as those on the surface pulled, I was being dragged under the bench.

"After a frightening few minutes of struggle to clear myself, and not being able to make myself understood over the intercom, I was, at last, free and hung there briefly, exhausted, before the long ascent to my first decompression stop at 260ft," said Wookey. "This was to take 12 minutes, and allowed plenty of time for reflection... Thankful that I had been able to pull myself clear of the bench; elated that we had been able to prove that a diver could do useful work, possibly vital to a damaged submarine, under difficult conditions at 600ft; and finally, that I had achieved a personal ambition of many years standing.

"The increasing cold brought me back to reality," said Wookey. "I had never been so cold in my life, and my exposed hands were really hurting. My fingers seemed swollen to the size of sausages.

"By 10ft stages, I reached 220ft, where I remained hanging on to the steel ladder suspended from the

From 1906 to 1911, former Royal Navy diver William Walker (chief diver of Siebe, Gorman & Co.), worked in complete darkness for six hours a day, moving and placing an estimated 25,800 bags of concrete, 114,900 concrete blocks and 900,000 bricks, to save one of Europe's largest Gothic cathedrals, Winchester Cathedral, from collapse (right and bottom left).

opened lower hatch of the SDC," said Wookey. "After ten minutes, the SDC was raised to 210ft where Clucas waited to assist me into the SDC.

"Let me be the first to congratulate you, George!" Clucas said as he removed my helmet—releasing air line and telephone breast rope from the helmet so that they might be pulled to the surface, then shutting the lower hatch and enclosing us both within the confined space of the SDC," said Wookey. "At 200ft, the gas mixture reverted to oxygen/nitrogen. The SDC was then hoisted inboard with Clucas and me remaining inside to complete our tediously long decompression in ten-foot stages to 30ft.

"The last decompression stop at 10ft seemed interminable, but was in fact only 30 minutes," said Wookey. "I had become numb to the discomfort after about six hours since leaving the surface, and I was so cold!

"Slowly, the pressure dropped to atmospheric, and I stretched upwards to hammer the clips off the upper hatch of the SDC when, to my dismay, I felt the distinctive pain creeping along my arms and across my back," said Wookey. "I felt transfixed and scared, having had several bends in the past, the last serious one having landed me in the hospital. I knew what a bend in the back could mean.

"Clucas scrambled over and past me and through the upper hatch. 'Better



haul him out quickly!' I heard him say," said Wookey. "Four hands grabbed me by my upraised arms and yanked me bodily out of the SDC, and I followed headlong into the main RCC after Clucas. The door slammed shut, compressed air screamed into the RCC, and within seconds, the quickly mounting pressure slowly began to relieve the now intense pain in my arms and back.

Wookey said, "Five hours later, at 07:35 on the 13th of October, I crawled tiredly out of the main recompression chamber and into a hot tub in the sick bay."

Wookey had proven that it was possible for a flexible-suited diver operating from the surface to do useful work perhaps vital to a sunken submarine, and in depths that just a few years previously was thought to be impossible. His efforts were honoured with an MBE.

During 1957, the Royal Navy abandoned this form of deep diving as being too hazardous to the

The Diver Who Saved a Cathedral

With one of Europe's largest Gothic cathedrals in danger of collapse when its 11th-century foundations began to sink into the peat bed on which they rested, the authorities in charge of Winchester Cathedral in Hampshire, England, began an ambitious reconstruction programme to underpin the walls and foundations.

Faced with the problem of heavy water seepage that quickly flooded the 7m-deep pits dug beneath the Cathedral's walls, the engineer in charge of the undertaking called on the services of Siebe, Gorman & Co., who assigned their chief diver, William Walker, to the project.

From 1906 until the job's completion in 1911, the former Royal Navy diver worked in complete darkness for six hours a day, moving and placing an estimated 25,800 bags of concrete, 114,900 concrete blocks and 900,000 bricks.

In 1964, in recognition of his singular efforts in successfully saving the Cathedral, a statuette of Walker in his diving dress was unveiled and now stands behind the Cathedral's high altar almost opposite that of Joan of Arc. ■

individual diver and concentrated efforts instead on developing the principle of diving from a manned underwater capsule from which a diver could emerge at the operating depth on the end of a short umbilical, whilst closely attended and observed from within the capsule.

"Such," said Wookey philosophically, "is progress!" ■

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