LETTERS TO THE EDITOR

To the Editor:

During the course of a literature search for articles written by Dr. John Richardson, the most distinguished of Britain's surgeon-naturalists (1, 2), I found an interesting medical case report, overlooked by both of his biographers (3, 4), which Richardson presented at the British Association for the Advancement of Science in Manchester in 1842, titled "Abstract of the case of a diver employed on the wreck of the Royal George, who was injured by the bursting of the air-pipe of the diving apparatus."

The article is worth reporting in its entirety:

In the operations that have been carried on at Spithead for two years past, for the removal of the wreck of the Royal George, under the superintendence of General Pasley, the divers are clothed in a water-tight caoutchouc [India rubber] dress. The legs of the dress are of one piece with the body and end in close feet, like stockings; the arms are open at the wrists to admit of the passage and free use of the divers' hands, but are rendered air-tight there also, by the application of bandages. The diver enters the dress at the neck, which is then gathered into folds and closely secured to a brass collar, on to which the capacious helmet that incloses the head is screwed. This helmet is furnished with a window of thick glass in front of the eyes, a valve behind to permit the escape of air, and an aperture near the crown through which, by the intervention of a flexible tube of a length proportional to the depth of water, atmospheric air is propelled by a forcing-pump. An external coarse canvas frock protects the dress from injury, and thick woollen shirts and trowsers, worn next the skin, suffice for warmth. The shoes are heavily loaded with lead, and weighty plates of the same metal are hung over the shoulders and tied to the back and breast. The last act of the diver's toilet generally consists in the screwing on of the glass window; the forcing-pump instantly begins to play, the dress is distended by the air, balloon fashion, and the diver, having a signal or safety-line tied to his waist, passes over the ship's side, and descends leisurely into the sea by a rope ladder which reaches to the bottom. There he remains working on the wreck from half an hour to an hour and a half or more at one time. The forcing-pump, which is fitted with three pistons, is worked by double cranks manned by four labourers, and throws in a constant stream of air from the time that the helmet is closed before the diver descends until it is opened after his ascent. The heat generated in the air-pump friction is abstracted by a stream of water which flows round the chambers, and the air is thus kept cool. The gauge, which stands at 15 under the pressure of one atmosphere, generally marks 34 when the diver is below—about equal to two atmospheres and a quarter. The dress loses its balloon shape and is pressed pretty closely to the limbs before the diver reaches the bottom. The helmet weighs 17½ lbs., the leaden weighs 80 lbs., and the whole dress, these included, 130 lbs.; but the weight is not felt as an incumbrance at the proper depth, which in the operations is from 13 to 15 fathoms [78 to 90 ft.], according to the time of the tide. The diver generally takes about a minute and a half to ascend from the bottom, but can be drawn up in somewhat less than a minute when an alarm of danger is given. Six divers are constantly employed; they perform their work with much cheerfulness and alacrity, and they are very seldom known to suffer any inconvenience. Some persons, however, who have attempted to descend so dressed, always bleed at the nose and spit blood after they reach the bottom.

On the 14th of October 1841, Roderick Cameron, a private in the Royal Engineers, a well-made, tall, active and intelligent man, who had been trained for some time as a diver, descended to the bottom in 13 fathoms, and in a few minutes afterwards the air-pipe burst close to the pump. The air escaping with a loud rushing noise, which was heard at the distance of 50 fathoms, instantly made the accident known, and the workmen commenced immediately to haul the man to the surface by the safety-line, the air-pump being kept in action all the time. Cameron himself imagines that he became aware of the accident sooner than those upon deck, and he had time to make the signal of danger before he felt that they were pulling him up. His first sensation was that of suffocation, from a want of air, and he felt the collar of the helmet, the leads on the back and breast and the dress on the body generally pressing upon him, as if he were about to be crushed, after which he lost all perception. It is supposed that he was brought to the surface in less than a minute, and air was immediately admitted.
Letters to the Editor

into the helmet by unscrewing the eye-piece. No water had entered within the caoutchouc dress. In less than a quarter of an hour he recovered his consciousness and was soon afterwards able to speak. He was immediately removed to Haslar Hospital, three miles distant from the scene of the accident. When first examined at Spithead, the face, neck and breast were discoloured, and the tint became darker before he reached the hospital. When he arrived there, his face was considerably swollen, his neck more so; both had a dark, purple hue, and large patches of extravasated blood separated the conjunctiva from the sclerotics of both eyes. He felt no uneasiness in the chest or head, but had much pain in the larynx and considerable difficulty in swallowing. P. [pulse] 65, rather full. Leeches were applied to the throat, and he was placed in a warm hipeath.

He passed a comfortable night; next day he felt giddy, the pupils were dilated, the eyes were pained by light, and objects were seen double, though his vision was less hazy than on the preceding evening. The pain in the larynx and difficulty of swallowing were almost gone, the swelling of the face and neck had greatly subsided, and parts of the face were resuming their natural hue. The conjunctiva of both eyes was punctured, and the more fluid portion of the extravasated blood allowed to escape. The discoloration of the face and neck went entirely off in a few days with the exception of the upper and under eyelids, which retained their dark purple tints for above a week, and the blood extravasated beneath the conjunctiva was not absorbed for a month. The natural vision was restored on the fourth day from the accident, and after that time till his discharge from the hospital he had no uneasy sensations. He was anxious to return at once to his duty as a diver but was not permitted to do so again that season. The principal question of interest excited by this case is, [respecting] the cause of the crushing sensation experienced by the diver, and the extensive discoloration of the chest, neck and face. As the air must be propelled into the helmet with a force superior to the pressure of the water at any given depth to which the diver may descent, it appears obvious that the bursting of the pipe must have produced a sudden diminution of pressure.

An accident of a similar nature occurred in the operations carried on by Captain Dickenson for the recovery of treasure from the Theis, wrecked off Cape Rio. Two men were employed in the diving bell, in 15 fathoms of very clear water, when the air-pipe burst. They both dived under the edge of the bell, and one of them, named Haynes, reached the surface in from 11° to 15°, but perceiving that his companion, named George Davies, lingered below, he dived again and assisted him up. This was witnessed by John Leary, armorer, who was also present at the operations of the Royal George, and, in his opinion, Davies was more swelled about the neck and blacker from the waist upwards than Cameron.

C. Stuart Houston, M.D., FRCP, DLITT
Department of Medical Imaging
University of Saskatchewan
Saskatoon, Saskatchewan S7N 0J8


To the Editor:

This letter describes administration of alcohol to 4 marine fishery divers and 2 salvage divers who were diagnosed as having decompression sickness (DCS) by diving history, symptoms, and signs. With a Doppler ultrasonic gas bubble detector, we graded bubbles in flowing blood according to the method of Spencer (1). The detector was located on the patients’ intercostal space between the third and fourth rib, near the left sternal margin.

After diagnosis, dry alcohol in a dose of 100–150 ml (equivalent to about 50–75 ml of pure ethanol) mixed with 100 ml of 5% glucose solution was administered per os within 3 to 8