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LAMB LEER CAVERN 1880-90 : THE LAKE AND THE TALKING MACHINE

by

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ABSTRACT

Lamb Leer Cavern in the Mendip Hills near West Harptree was discovered by miners in 1676 and was explored by John Beaumont, however the entrance shaft was lost some years later. This paper gives particulars of the people and events connected with the re-discovery of the cave in June 1880, by the miner Andrew Lyons, and its exploration in the next decade. Also examined are Lyons' claims, made in 1937, that he came across a lake in a passage off the Great Chamber, and that a talking machine, presumably some kind of telephone, had been used there. Secondary evidence is introduced which suggests that the lake was a temporary feature formed during heavy rainfall. It is also shown that the mining personalities connected with the cave at that time, would have been aware of the development of the telephone and its use in mines. It is argued that an electric or mechanical telephone was used in the cave after its re-discovery and before February 1885, making this the earliest recorded use of a telephone in cave exploration anywhere in the world.

INTRODUCTION

The history of Lamb Leer Cavern in the seventeenth century has been fully researched by Shaw (1962), who corrected the many erroneous references to Beaumont's classical descriptions of the cave (1676 & 1681). Beaumont was the first to be lowered into the Great Chamber and he subsequently directed mining operations in the cave, which yielded some good lead ore. In the Great Chamber a shaft was sunk in the boulder floor and a natural passage, now called Beaumont's Drive, was enlarged to give access to a rift chamber terminating in what is now called The Cave of Falling Waters.

In the early 1870s, a business partnership, which had obtained mining rights in the area, hoped to profit from Beaumont's report that lead ore had been found in the cave, but knowledge of its exact location had been lost. A reward was offered to find the cave and after a prolonged search it was re-discovered by miners in June 1880. Mining activity in the cave included improving access to, and the sinking of another shaft in, the Great Chamber. Although some mineral ores were worked, the enterprise proved unprofitable. However, in the next few years the cave was visited by several interested groups and it was thought that some profit might be derived from opening it to the public. These events have been documented in a number of descriptive and historical accounts of the cave, including those of Balch (1937), Ashworth *et al* (1965 & 1966), Duck (1937, 1938 & 1966), and Johnson (1967). In this paper only a resume is given of the contemporary accounts used by these writers. However, the accounts of Winwood (1881a & b) and other sources, including contemporary newspaper reports, which provide fresh information will be highlighted.

This is followed by an examination of the statement made by Andrew Lyons, to Jack Duck in 1937, that after re-discovering the cave he had come across a lake in the Great

Chamber and that some kind of telephone had been used there. For clarity the sources for biographical details are not quoted in the text, but are listed in the Appendix.

THE RE-DISCOVERY AND EXPLORATION 1880-1881

Contemporary newspaper reports

The Wells Journal, 24 June 1880, carried an anonymous report of the re-discovery of the cave, which had occurred "... within the last few days... ". This stated that "Explorations have been carried out there [at West Harptree] in search of iron ore, and [as] the existence of spacious caverns in the immediate neighbourhood have been recorded by historians of the county, a reward was offered to the miners engaged in the search for ore if they could discover the entrance to the subterraneous caverns. The shaft leading to the caverns, which had been closed, it is estimated, for nearly a century was found". There followed a fairly accurate description of the entrance shaft and the upper parts of the cave, but then it erroneously states that "... A second shaft, 80 feet in depth, leads from the first cave to a vaulted chamber of extensive proportions". From the dimensions quoted this is clearly the Great Chamber. It was also reported that "In all [the chambers] there are some beautiful varieties of coloured lichens and other vegetable growth, showing an utter absence of deleterious gases". It then gave the account of the cave published by Rutter in 1829. It is clear that the correspondent did not enter the cave himself. The Times newspaper, 30 June 1880, carried a short item about the re-discovery which seems to have been drawn from the Wells Journal report.

Another article, under the pseudonym 'Limestone', appeared in the Wells Journal, 1 July 1880, which points out the errors in the previous report. Beaumont's 1681 account of the cave was offered "...as being a correct description... ", adding that "... he [Limestone] had been in the caves as far as have been explored since their re-discovery". There followed a quotation from Beaumont's account, which had been loosely transcribed, the use of 'rock plants' being changed to 'flowers', which 'Limestone' considered meant stalactites. He continues "There is not a single specimen of vegetable growth, Cryotogamous or otherwise, in any of the caverns that have been explored since their re-discovery, and if there were, it would not show an utter absence of deleterious gasses". Although not identified the well-informed correspondent may well have been one of the mining experts associated with the cave.

McMurtrie's account and survey

James McMurtrie, the Waldegrave estate agent and colliery manager, gave his first account of the cave in a paper read to the Somerset Archaeological and Natural History Society, at Glastonbury on 17 August 1880, and subsequently published in the society's Proceedings (McMurtrie, 1881). He said that heard of the re-discovery of the cave "... through a brief notice in a local paper... ", presumably the reports in the Wells Journal. McMurtrie explained that a Colonel Bolton and a Mr T. E. Bewick of London were determined to find the lost cave to further their mining explorations in the area, and that "... with the aid of Captain Nichols [sic], the mineral agent, their efforts were crowned with success, and in the month of June last they had the gratification of rediscovering the caves...". The entrance shaft dug at that time, now known as the 1880 shaft, is close to Beaumont's shaft.

McMurtrie described his descent of the cave on 13 July 1880, with the Reverend Winwood and a party from Bath and presented "...a ground plan and vertical section prepared from an actual survey", carried out during a subsequent visit.

Winwood's report of the descent

McMurtrie's account and survey are well known, but the Winwood reports which contain additional points of interest have been virtually ignored by later writers. The Reverend H. H. Winwood (1831-1920), M.A., F.G.S. was a member of the Bath Natural History and Antiquarian Field Club 1861-1898 and secretary until 1886. His reports, in their annual proceedings, were part of a series of articles on local geology.

His report of the descent on 13 July 1880 (Winwood 1881a) was compiled soon after the event. A small party travelled from Bath by wagonette to the Waldegrave Arms at East Harptree, where they met their fellow club member Mr McMurtrie and "...a Mr Nicholls, Captain of the mines in these parts". Winwood's report gave this acount of the search for the cave: "It seems that Mr Moreing, a civil engineer, having during the autumn of last year [in 1879] visited these parts, and being familiar with the above description [Beaumont's], determined to find out the entrance, but after some fruitless researches, and not liking to give up altogether, it was agreed that a reward of £2 should be offered, and the sum at the rate of 3s. per day for the work done should be given to the discoverer." Andrew Lyons told Duck (1938, p.107) that he and his two mates received £5 apiece for their good work. Balch (1937) must therefore have been wrong in his claim that the Waldegrave Estate offered £100 to find the cave. McMurtrie, their agent, only heard about the re-discovery through a newspaper report. It is clear that the reward was the responsibility of Bolton and his mining partners. The involvement of Moreing in the mining activities will be discussed later.

Only Winwood and McMurtrie of the Bath party were persuaded by Nicholls to enter the cave and Winwood provides a colourful, but accurate, description of the upper parts of the cave. When they reached the entrance to the Great Chamber, Winwood notes that "...preparations had been made for further descent; two bars of wood round one of which a rope was passed, another in the dim distance over which one end of the rope was run through a pulley, and five stalwart men at the brink of the darkness, indicated the nature of the further method of proceeding". After watching Nicholls and McMurtrie make the perilous descent, Winwood remarks that "... not being to the manner born, and not liking to spin round in mid-air like a leg of mutton at a fire, and moreover thinking of the little pledges he had left at home, came to the conclusion that he would stay further progress, and remain behind to chronicle events" .

Winwood's description of further exploration of the cave that day came from his companions and does not add anything to the account of McMurtrie (1881) except for his comment that "The only trace of the presence of man consisted of a broken tobacco pipe and the markings in the clay of corduroy trousers, which Mr Nicholls noticed on his first entrance, and which he considers must have been there for a hundred years at least". Irwin (1994) points out that ribbed corduroy weave was invented in 1789 and would have been available after it was patented in 1795, which suggests that the imprint was left after that date.

McMurtrie's second account of the descent and survey

Winwood (1881b) reported in a further paper on the descent on 13 July 1880, read by James McMurtrie to a meeting of the Bath Natural History and Antiquarian Field Club on 2

February 1881, which "...was illustrated by carefully drawn plans and sections from the hand of Mr Ward, jun., of Radstock. (vide p. 344)". Winwood may have intended to have these illustrations published in the club's proceedings, but they did not appear. Four different copies of the relevant volume have been checked, but none contain any illustrations of the cave. Actually inserted at page 344 is a folded drawing illustrating a section cut across the Fosseway Roman road at Radstock, the topic of another paper read by McMurtrie on the same date. The graphic style of this illustration appears identical to the plan and section of Lamb Leer Cavern published in McMurtrie (1881).

The draughtsman, Mr Ward junior, has been identified as Horacio Nelson Ward, born at Radstock on 31 July 1858, the son of the Reverend Horacio Nelson Ward, the Rector of St Nicholas Church at Radstock. They were grandson and son respectively of Mrs Horatio Nelson Ward, the daughter of Admiral Lord Nelson by his mistress Lady Hamilton. The Radstock census of 1881, lists Ward junior as being a single man, aged 22 years, living at the Rectory. His occupation is recorded as a coal mining engineer, probably employed in this capacity by James McMurtrie, a near neighbour and a lifelong friend of the Reverend Ward. Under McMurtrie's patronage he became a student member of the South Wales Institute of Civil Engineers in 1880 and was elected to full membership the following year.

Winwood reported that Nicholls, who contributed to the discussion following the lecture, "... exhibited a section made in the passage leading from the Beehive to the Great Cavern. From this it appeared that the stalagmite floor was one foot thick, succeeded by a bed of clay of the same thickness containing stalactites broken off and washed into their present position at the same time as the clay. Under this was another bed of stalagmite thinning out towards the Great Cavern, but thickening and even joining the upper bed as it approaches the Beehive Cavern. Below this, and to as yet an unknown depth, the fissure is filled with large blocks of reddish colored [sic] spar and clay, and an occasional piece of limestone". This section was no doubt recorded when Andrew Lyons was helping to undercut the aragonite floor (Duck, 1938) and seems to demonstrate several phases in the development of this part of the cave.

DESCENTS 1882-1890

Descent by The Times party

On 10 August 1882 The Times newspaper carried an article by an anonymous correspondent of his experiences when a member of a party making a recent descent of the cave. This entertaining account has been reprinted in full by Ashworth *et al* (1965, pp. 6-8) and commented on by other writers, so the following are only brief extracts. After relating Beaumont's account and the subsequent loss of the cave, it was said that "Colonel Bolton, a leading member of a mining company, which had leased land for miles round from Lord Carlingford, after no less than 37 borings, rediscovered it". The descent was guided by Mr Nicholls, the captain of the company's mines, and the party comprised the correspondent; a Mr Sopwith and a Mr Wynne, both members of the Institution of Civil Engineers; and Mr McMurtrie and his son. These persons and the mining background are discussed below. When they reached the entrance to the Dome Chamber (Great Chamber) they found that "A small platform had been erected, with a windlass and bucket, and one by one we stepped into this, and were lowered into the abyss by four sturdy miners". This is the first mention of these facilities, which were

probably installed soon after the descent on the 13 July 1880 to improve access during mining operations.

Descent by the Downside party

The Downside Review contains two articles (Richards, 1883 & 1884) about the cave by the same anonymous author. Father Aiden Bellinger, the present headmaster of Downside Abbey School, in letter dated 6 June 1994, states that the name of Father Wolston Richards has been placed after the article in the school copy of the 1884 Review. Father Richards, born in 1835, became a monk at Downside in 1853, was working in Swansea in 1884, but died at Downside in 1923. His flowery prose style is evident in both articles and it is here assumed that he was their author.

The first article described the re-discovery of the cave in June 1880 and in the introduction stated "To give our readers some idea what is in store for them when the Harptree caverns are opened for public inspection, we cannot do better than quote The Times' account"; long passages of which are then quoted. This is the only contemporary reference suggesting that the caves might be opened for public view. An undated pamphlet, which reproduced the account of McMurtrie (1881) and The Times article (10 August 1882), was published by Bolton and Partners Limited. It was probably distributed to create public interest in the cave in the hope that like those at Cheddar and Wookey it could be opened up on a commercial basis.

The 1884 article described how on 17 July 1883, a large party from Downside descended the cave with Mr Kemble of Eastwood Manor, who had extended the invitation with the permission of Colonel Bolton. One of the select friends who joined the Downside party of about sixteen or seventeen, was "... our old college neighbour, Mr Hippesley...". The surname of this family is usually spelt Hippisley and he is likely to have been H. E. Hippisley (1832-1917), B.A., M.A., J.P., of South Lawn, Ston Easton. His connections with local coal mining are discussed later. Father Richards reported that the descent of the cave was guided by Captain Nicholls and his fellow agent, with assistance from three sturdy miners. All of the party entered the cave and Father Richards reported "...that so catching was the exploration fever that Policeman "X", who had come to guard our valuables during our sojourn below, closed up our rear, and for five hours the peace of Mendip knew no guardian". As the threat of supervisory rebuke is long past, this officer can now be identified as almost certainly Police Constable William Best, then aged 45 years, who lived with his family at Middle Street, East Harptree. The highly entertaining account of the descent has been quoted elsewhere and does not provide any fresh information about the cave.

Access to the cave 1884-1890

After the descent by the Downside party the next recorded visit to the cave was eleven years later, in 1894 when Thomas Wilcox, the manager of the Priddy Lead Works, carved his initials, T.W., on the stalagmite bank at the end of the Cave of Falling Waters; Herbert Balch added the date, 1894, the following year (Balch, 1937, p.43). H. B. Woodward (Winwood and Woodward, 1891, p.191) reported that whilst leading an outing of the Geologists' Association in the area on the 6 August 1890, he saw the entrance of Lamb Leer Cavern, which was carefully padlocked. They did not descend, but it was noted that the cavern could be visited upon application to Mr Thomas Caple of West Harptree. In the 1891 census he was listed as a farmer living at Beaconsfield House.

THE MINING BACKGROUND

The Bolton - Waldegrave - McMurtrie connection

The senior partner in the mining partnership, whose activities led to the re-discovery of the cave, was Colonel Sir Francis John Bolton (1830-1887) of Westminster. He joined the army as a Private in 1847, but soon earned commissioned rank and was a Major on half pay from 1868, being fully retired in 1881 with the rank of Colonel. In his photograph, reproduced as Figure 1, he is wearing a uniform which appears to have the collar badges of a full colonel, so it was probably taken 1881-1887. His was knighted in 1883 for his military inventions of the 1860s, which included the development of a system of telegraphic and visual signalling used in military and naval operations for many years. In 1863, when an instructor in telegraphic signalling at the Royal Engineers Depot at Chatham, Bolton was elected as an Associate of the Institution of Civil Engineers, and in 1866 assisted in laying the Atlantic telegraph cable.

Bolton was the prime mover in the foundation, in 1871, of the Society of Telegraphic Engineers, being honorary secretary until he died, and for some years edited the society's journal and electrical review. He invented a type of secondary battery (accumulator) patented in 1882, and earned public acclaim for designing, and operating himself, displays of prismatic fountains, illuminated by electricity, installed in the South Kensington exhibitions 1883-86. Bolton held the important public office of water examiner to the metropolis from 1871 until he died on the 15 January 1887.

He probably heard of mining prospects on the Mendip Hills through his maternal cousin, Francis Elizabeth Ann Fortesque, *nee* Braham, the Dowager Countess Waldegrave (1821-1879) of Chewton Mendip, Westminster and Strawberry Hill in Sussex. She held the mineral rights over a large area of the Mendip Hills. Her brother, Colonel Augustus Frederick Braham (1819-1889) of Winchester, besides being Bolton's cousin, was also a business partner.

In 1863 the Countess Waldegrave employed McMurtrie to manage her collieries in the Radstock area and to be agent of the Waldegrave estates. Following the death of the Countess in 1879 her estate passed to her fourth husband, Chichester Samuel Parkinson-Fortesque, the Baron Carlingford (1824-1898), who retained the services of McMurtrie. As well as taking an interest in archaeology, McMurtrie was an acknowledged expert in the stratification of the Somerset coalfields. He was a member of the South Wales Institute of Engineers, being president 1881-82, and in 1873 was elected as a Fellow of the Geological Society. McMurtrie's photograph, which is undated, but probably taken in the 1890s, is reproduced as Figure 2.

Mining business activities

In 1872, Bolton corresponded with McMurtrie about mining prospects on Mendip and on 28 September 1873, the Countess Waldegrave granted Bolton and T. J. Bewick, a licence to search for lead, iron and other mineral ores, except coal, on her lands at Chewton Mendip and East Harptree. Subsequent mining licences granted to them included rights to search for minerals, mainly iron ore, at Lamb Bottom, West Harptree. Bewick (1821-1897), was a successful railway and mining engineer, whose lead mining and smelting operations in Northumberland in the 1870s yielded considerable profits. He also established a partnership of consultant mining engineers and mine managers in London, styled Bewick, Moreing and Company, with branches world-wide. A senior partner was Bewick's former pupil, C. A. Moreing, who in the 1890s was connected with gold mining ventures in Western Australia. He was no doubt the Mr Moreing

who was searching for the cave at Lamb Bottom in 1879.

The partnership of Bolton and Bewick ended when a new company, Bolton and Partners Limited, was incorporated on 20 March 1880. Bolton was registered as a director and the major shareholder. Bewick did not invest in the new company, but Moreing and Bolton's cousin Colonel Braham were shareholders. Existing Mendip mining licences were re-negotiated between the company and Lord Carlingford 1880-1883, including the continuation of mining activities at Lamb Bottom in West Harptree. The company was still attracting investment in 1885, but mining activity seemed to wane after Bolton's death in 1877, and in 1889 the company's works and mining rights were taken over as a going concern by another mining company.

Figure 1. *Colonel Sir Francis John Bolton (1830-1887), a founder of the Society of Telegraphic Engineers. Photographic print from an image on a glass half-plate, probably made in the period 1881-87.*

Reproduced by permission of the Institution of Electrical Engineers.

The four persons who accompanied The Times correspondent on a descent of the cave in 1882, were all connected with mining. James McMurtrie was accompanied by his son, probably his eldest son George Edwin James , born in 1864, so aged eighteen in 1882. He was later elected as a member of the Institution of Civil Engineers and in 1900 took over the management of the Waldegrave collieries from his father. The two other members of the party were also members of the Institution of Civil Engineers. Mr Sopwith was probably S.F. Sopwith, who was a surveyor for Bewick, Moreing and Company. He was engaged in gold mining at Cue, Australia, 1901-1904, and was later the manager of collieries in Staffordshire. Mr Wynne appears to have been Thomas Wynne (1807-1891), a celebrated mining and

railway engineer, who was H.M. Inspector of Mines for Staffordshire and Salop, 1853-1888. Although aged 75 in 1882, he was said to have been "...a man of powerful physique who displayed excessive activity almost to the end of his life". A letter dated the 9 March 1882, from McMurtrie to a London solicitor acting for the Waldegrave estate, notes that "...a Mr Wynne, representing Colonel Bolton, visited Chewton Mendip today to discuss the terms of new mining licences".

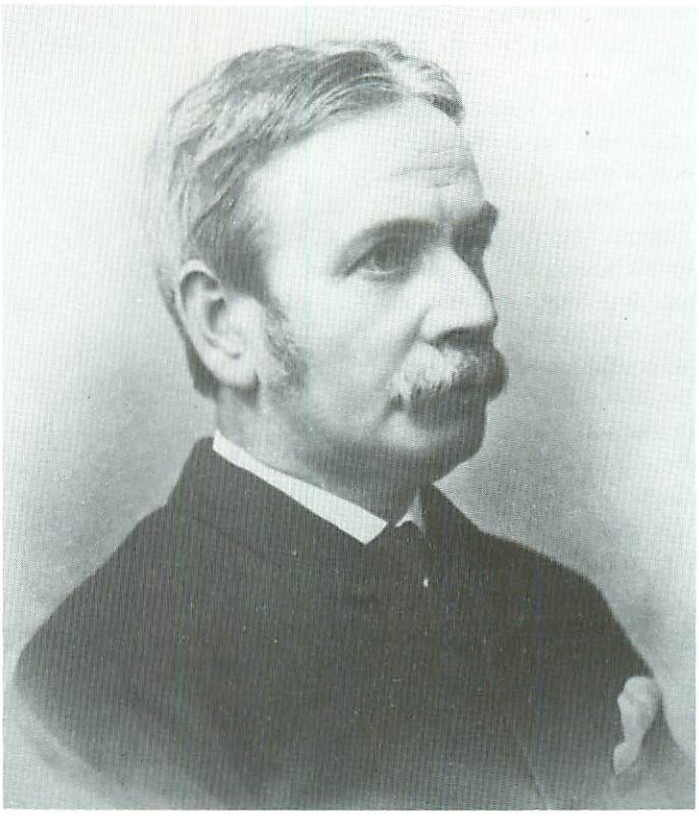

Figure 2. *James McMurtrie (c.1839-1914), the Waldegrave estate agent and colliery manager. Photograph probably taken in the 1890s.*

With the permission of the Somerset County Archivist.

As already mentioned, H. E. Hippisley, of Ston Easton, was with the Downside party who descended the cave on 17 July 1883. He owned coal and iron mines, and a brick yard, at Temple Cloud, 1879-1886. On the 23 October 1880 a party from the Bath Natural History and Antiquarian Field Club, which included James McMurtrie and the Reverend Winwood, visited Hippisley's drift mine at Temple Cloud, when he gave an authoritative account of the coal measures (Winwood, 1881c).

The miners

It was Mr Nicholls, the mining Captain in the employ of Bolton and partners, who supervised the search for the cave and its subsequent exploration. He has now been identified as Joseph Nicholls, born in about 1839 at Buckland Monachorum, a mining village in south-west Devon. He was married in 1859 at Goginan Melindwr, a centre of lead mining in north Cardiganshire. Records of the birth places of his children show that between 1866 and 1869 the family were living in the mining towns of Bersham and Minera in Denbighshire, but by 1873 they were resident in East Harptree. He had presumably been engaged to supervise the mining operations on Mendip started in that year by Bolton and Bewick. More children were born in the village between 1873 and the census year of 1881, when Nicholls was described as a mining engineer. Nicholls proved to be a confident guide in the cave and his last recorded descent was

with the Downside party on 17 July 1883. No other record of the Nicholls family has been traced and they had certainly left the area by the time of the 1891 census.

In 1937, Andrew Lyons, the miner who actually re-discovered the cave in 1880, was traced and interviewed by Jack Duck (1938). Lyons was said to be "...a fine old fellow of 83 years, and still able to work a full day at haymaking...". Lyons was born at East Harptree and was baptised in the parish church on 13 August 1854. He was married in the village in 1879 to Alice Griffiths from Chew Magna and they subsequently had at least eight children. Andrew was recorded in the 1881 census of East Harptree as a miner, living at the Waldegrave Arms Inn, where his father Joseph was licensee. Baptismal records of his children show that he was still living at East Harptree in May 1884, but by February 1885 he had given up mining, having taken his family to live at the Seven Stars beer house (now a private house) in Hinton Blewitt, where he was the licensee. He was still there in 1897, but by 1902 the family had moved to West Town House (a farm) in Hinton Blewitt. Andrew Lyons was active as a farmer and cattle dealer until he died, on the farm. He was buried at Hinton Blewitt on 15 July 1937, only a few months after being interviewed by Duck. A photograph of Andrew Lyons, taken at West Town House in about 1930, is reproduced in Figure 3.

The account of the re-discovery of the cave by Andrew Lyons was recorded by Jack Duck in 1937 (Duck, 1938, pp.106-108), and was reproduced in full by Ashworth *et al* (1965). In this paper only the claims about the lake and the talking machine will be examined, but the background to and method of recording the interview will be noted. In 1936-37 Jack Duck, with E.W. Sharp and others, had explored and completed a survey of the cave, so was well equipped to test the recollections of Lyons. The interview took place over a period of two hours so it is likely that Duck would have only have taken note of relevant pieces of information. It would seem that Duck made contemporaneous notes as the account contains a number of verbatim quotations attributed to Lyons. As a result of this selective process some events are not in chronological order and the time scale appears to have been contracted, but there is no reason to doubt the accuracy of the recording. Despite the fact that Lyons was an elderly man recalling events which happened 57 years before, Duck thought that he "...possessed a very clear memory of those far off days..." and that he "... had given widths and distances of passages which were absolutely correct".

THE LAKE

Duck's addendum

Ashworth *et al* (1965), in the first part of their history of the cave, reproduced the papers of Duck (1937 & 1938). The latter contained Lyons' story, but made no mention of his seeing a lake in the cave. This prompted Jack Duck to come forward with the information that during the 1937 interview Lyons had spoken about the lake. This addendum by Duck appeared in the second part of the cave's history by Ashworth *et al* (1966, p. 63). Duck explained that he thought that he had included this information in the draft of his 1937-38 articles and that the editor may have cut it out.

Duck reported that Lyons had claimed to have found at the bottom of the 70 foot ladder, facing the wall, a cavity through which he was able to crawl, when he discovered a 'girt lake'. He made a small raft from a piece of wood, placed some lighted candles thereon and

floated it out, when he was unable to see the sides or end of the lake chamber.

Duck then commented , "A tall story ? Perhaps. But the old man kept returning to his lake right through our long talk; this was his deepest impression of the Lamb Leer, the rest, which I have already written of, he gave quite casually as of little interest to him". Duck considered that 90% of what Lyons told him had proved to be fact, and although there did remain some sense of mystery about the remaining 10%, he doubted whether Lyons imagination had got the better of him.

Figure 3. *Andrew Lyons (1854-1937). The miner who re-discovered Lamb Leer Cavern in June 1880. Photograph taken at his farm West Town House, Hinton Blewitt in about 1930.*

By permission of Mrs Rosemary Walker, Hinton Blewitt.

Evidence of water accumulation in the Great Chamber

Murrell (1954) reported that when in 1937 he was involved with Duck and others in exploration of the cave "... much thought was given to the whereabouts of the fabled lake". A dig was begun "...in a hole at the lowest part of the Great Chamber where there is a pit leading to a horizontal passage which can take a large volume of water". This seems to be the Little Water Passage marked on Duck's survey. In the same period Murrell also dug in a passage about 3 yards to the west of the north-east corner of the Great Chamber. This became known as Murrell's Dig, and Glennie (1965) says that flooding was a problem there, adding "In this dig water comes up in the sand floor at the far end (perhaps after a wet period?)". He went on to explain that a trench was excavated in the floor of the Great Chamber to allow water to drain away from Murrell's Dig. After giving details of the trench, Glennie said that if it was dammed, and accumulated water was released, it would flow down the slope to disappear under the south wall of the Great Chamber. The water would then re-emerge at the bottom of the pit dug below the winch platform. This was called Downstream Passage by Deasy (1966) who with Glennie and others renewed digging there in 1962. It became known as the Water Dig and was continued for several years by Deasy and others, but without success.

Rainfall records 1880-1882

McMurtrie (1881, p.12) reported that the summer of 1880 was exceptionally dry. The Times correspondent, (anon, 1882) reporting on a visit before 10 August 1882, having descended into the Great Chamber, noted that "In one corner, where the ground was level, small pools had collected...". When the party returned to the Great Chamber after exploring as far as the Cave of Falling Water, it was said "Having washed our hands in a pool of clear water, we sat down to luncheon...". Although obviously not Lyons' 'girt lake', it does suggest that water accumulated in the chamber, perhaps during periods of heavy rainfall.

Blomefield (1885) reported that 42.294 inches of rain fell in Bath during 1882, with figures for the months of June and July being twice the average. He said that not only was this total the largest quantity registered in any one year since records began in Bath in March 1865, but it was nearly ten inches above the average for seventeen full years from 1866. Blomefield also noted that the published record of rainfall at Clifton, Bristol, during 1882 was 44.047 inches. Horton (1995) states that 1882 was then the wettest year on record in this region and it remains the second wettest even now. Bath and Bristol are both about 20 km from the Mendip Hills, where the rainfall is usually heavier, so it follows that in 1882 much more water then usual may have flowed into the Great Chamber of the cave.

Discussion

Johnson (1967, p.65), although accepting that Lyons had re-discovered the cave, commented that as the lake had not been mentioned by either Beaumont or McMurtrie, it can safely be dismissed as imaginary. This seems to be a harsh verdict. Whilst seeking out workable ores Lyons would have examined every corner of the Great Chamber, and he would have helped to sink the shaft in the boulder floor. His association with the cave probably continued until he moved to Hinton Blewitt between May 1884 and February 1885. He would therefore have observed the conditions in the Great Chamber during the very wet weather in 1882. It is suggested that in periods of heavy rainfall there could have been a build-up of water as a result of a blockage in one of the outlet passages, such as the Downstream Passage or Murrell's Dig. Another deluge could subsequently have cleared the blockage allowing the lake (or pool) to subside. On the other hand the cavity into which Lyons was able to crawl may have become completely blocked and has remained undiscovered to this day. Lyons had to rely on candles on a raft to illuminate the lake, so can be forgiven if he exaggerated its size.

THE TALKING MACHINE

The statement of Andrew Lyons

As noted above, some of the events related by Andrew Lyons to Jack Duck were not in chronological sequence. In Duck (1938), after describing how he broke through to re-discover the cave, Lyons spoke of his involvement in improving access facilities in the entrance and undercutting the aragonite floor. He then returned to events before the erection of the platform and windlass at the brink of the Great Chamber. Lyons claimed that he was the first to be lowered over on a rope with thirteen candles in his hat, all of which were extinguished before he was down. Duck's record of the Lyons' account continues "He took a revolver with him which he fired to signal to those lowering him, and a 'talking machine' (presumably some kind

of telephone) [Duck's parentheses] by means of which he could converse when below." Lyons' use of the phrase 'talking machine' in 1937, by which time he would surely have been familiar with telephones, although there is no evidence that he owned one himself, might imply that the device used was mechanical rather than electrical. This is the only primary evidence that a telephone was used in the cave and so an attempt will now be made to seek out secondary (circumstantial) evidence to support it.

The availability of a suitable telephone

The following information is taken from Baldwin (1925, p.15). The box telephone invented by Alexander Graham Bell was patented in Britain on 9 December 1876, and Bell came to England in August 1877, bringing with him a complete set of up to date telephones. On 31 October 1877, he delivered a paper to the Society of Telegraphic Engineers in London, describing his inventions and particulars of some of his researches. In the course of a lecture to the Society of Arts on 30 November 1877, Bell related that on the previous day he had held a conversation with a diver who had descended into a water tank. He explained that the connection was established through a wire coil contained within the breathing tube as a stiffening device.

Baldwin (p.110) noted that in March 1879 the first telephone was installed in Bristol and by December of that year there was an exchange with 25 subscribers, which had increased to 100 by August 1881. Baldwin (appendix A, pp.674-5), reproduced a letter, dated 19 December 1879, from William Last Carpenter addressed to Bell's telephone company. Carpenter, after giving details of the installation of telephones for internal use in his business premises in Bristol, wrote "I have recommended the use of the telephone to many of my friends and, as a member of the council of University College, Bristol, have promoted a private line between the College premises and the residence of the principal". The college premises were at that time in Park Row and the principal lived at Tudor Villa, Clifton Wood, about a mile distant.

The following are extracts from The Telegraphic Journal and Electrical Review, which are prefixed by the date of the relevant issue.

1 April 1880. A new diving helmet, with a telephone attached, was successfully tested at Earl Gray Dock, Dundee.

3 June 1882. Telephones installed in the Oak and Manver's collieries in South Yorkshire, provide distinct communication between the workings and the surface.

20 October 1883. A direct telephonic communication was demonstrated between the Mining Institute in the centre of Redruth, Cornwall, to the 150 fathom level of the Pednandrea mine on the edge of town.

11 May 1888. The Empire mechanical telephone, installed by Messrs Davis and Son of Bath, at the Camerton collieries, Somerset, is being used to converse between the bottom of the pits and the surface.

10 August 1888. Telephones installed by the West of England and South Wales Telephone Co., in collieries in Cornwall and the West were effective down to the 388 fathom level.

The mechanical telephone

All of the telephones mentioned in these reports appear to be the electric type, except those used at the Camerton collieries, which were described as mechanical. Walker (1885), presented a paper to the South Wales Institute of Engineers in 1884, on the development of the mechanical or acoustic telephone and the following is a summary. This type of telephone almost sank into oblivion upon the introduction of the electric telephone. However, because of the restrictive practices of the Bell-Edison companies, a number of other telephone companies had, by the early 1880s, started to manufacture improved mechanical telephones, which were much cheaper than the electric type. The diaphragm and other component parts of the receiver were improved, and the introduction of rubber insulators reduced the resistance to the passage of sound-waves along the connecting wire. The performance could vary according to the depth, but good results could be obtained up to 500 yards, and much further if the route was straight. Walker considered that it could have a use in pit shafts provided that the wire was insulated and kept taut. A drawing of an improved mechanical telephone being manufactured at that time was illustrated in the paper.

The mining personalities: Awareness of the development of the telephone

Colonel Bolton, a pioneer electrician and inventor, was closely concerned with the development of communication systems. As a founder and secretary of the Society of Telegraphic Engineers he was no doubt present when Bell gave to the society the first demonstration in this country of his newly invented electric telephone. Bolton as editor of the society's journal and review, would certainly have been aware the success of the electric telephone and the renewed interest in its mechanical counterpart. Bolton invented an accumulator battery in 1882 and was an expert in electric switch gear. Although there is no evidence that he was directly connected with any of the telephone companies, he was well qualified to advise on how to install and supply sufficient electric power to operate an electric telephone underground.

Bolton is known to have visited the Mendip Hills, and although there is no evidence that he had descended the cave, he would have been kept informed of developments by his experienced mining associates. Of these Nicholls, Sopwith, Wynne, Ward, James McMurtrie and his son George, are known to have explored the cave. Included amongst others who made a descent were Hippisley, a local mine owner, and the correspondent 'Limestone', who seemed to have professional knowledge of mining. These were all men of enterprise and innovation, who would have be very much alive to the scientific developments of the period, including the use of the telephone in mines.

Discussion

The first recorded use, found by the present writer, of telephones in mines was in June 1882, but before they were operational there must have been a period of consideration and trial. This may have influenced the mining engineers connected with the cave to install a telephone, either electric or mechanical, in the Great Chamber. It may have only been used for a short period, sometime after the re-discovery in June 1880 and before Lyons had moved to Hinton Blewitt, by February 1885. It is suggested that this event, particularly if it occurred after 1882, would not necessarily have been regarded as remarkable.

Hitherto the first use of the telephone in caving has been attributed to E. A. Martel and his cousin Gabriel Gaupillat, during exploration in the Causses area of France in 1898. Their

apparatus was fairly light, being about 8 cm in diameter and weighing 480 g., and they used it successfully with as much as 400 m of wire. They found this telephone useful on deep pitches, especially any that were more than 100 m deep. (Martel, 1890, p.104 cited in Shaw, 1992, pp.50 & 256).

CONCLUSIONS

There is no reason to suggest that Lyons was not telling the truth and his recollections, so long after the event, were remarkably accurate. He seemed adamant about the lake and perhaps some exaggeration about its size can be explained by the conditions under which it was observed. The hydrology in the Great Chamber and the high rainfall of 1882, would have been conducive to a pool forming in one of the outlet passages, perhaps only temporarily. Lyons description of a talking machine being used to communicate in the Great Chamber to those above, implies that ordinary speech was being transmitted. This rules out a loud hailer or telegraph and Duck's conclusion that it was some kind of telephone is logical. Lyons would not have known about developments of the early telephone. However, Bolton and his mining associates were well placed to know that suitable telephone apparatus, either mechanical or electric, was available for use underground. This provides convincing secondary evidence that a telephone was used in the cave before February 1885. Those who were involved would not have known that this was the earliest known use of a telephone in cave exploration anywhere in the world, but this can now be claimed on their behalf.

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