A Tour to the North of England

from 27th August to 18th September 1849

Richard Bissell Prosser

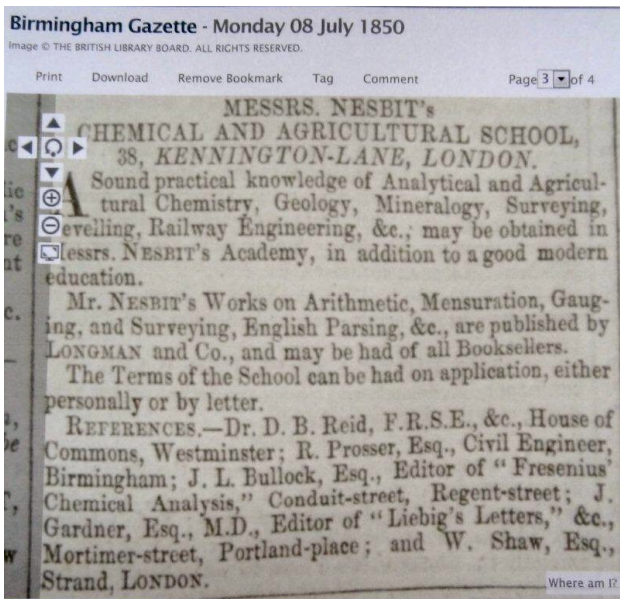
Title Page Image:
Silhouette said to be of the young Richard Bissell Prosser
(Darby Collection)

Introduction

On 27th August 1849, two days after his eleventh birthday, Richard Bissell Prosser and eleven other pupils at a boarding school in Kennington London embarked on a three week tour of the "North of England".

The group of schoolboys, whose known ages varied from between 11 to 16 years, were accompanied by their headmaster John Collis Nesbit, aged 31, and one of their teachers, 21 year old James Bailey. The proposed tour was, to say the least, to be an intensive and intense formative experience, which must have been remembered by the boys for the rest of their lives. On 18th June 1913, aged 74, Richard Bissell Prosser was to mention the "Tour" to Sir William H. Bailey of Sale Hall, Cheshire in a letter a copy of which is now held by the British Library: "I first visited Manchester in 1849 as one of a party of schoolboys who made a tour through the manufacturing district under the guidance of an enlightened master, one J. C. Nesbit".

John Collis Nesbit (1818 - 1862) was a scientist specialising in agricultural chemistry. His original entry in the Dictionary of National Biography was written by Richard Bissell Prosser (see Appendix). His father, Anthony, was also "a schoolmaster and writer of school-books .... About 1814 he set up a school at Bradford, removing in 1821 or thereabouts to Manchester, where his school in Oxford Road became well known. About 1841 he removed to London, and started a school at 38 Lower Kennington Lane" (*DNB, again written by RBP*). J.C. Nesbit had taught at his father's school in Manchester and took a "leading part" in the management of the new school in London (*RBP*); he became its headmaster on his father's retirement.


Birmingham Gazette - Monday 08 July 1850

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CHEMICAL AND AGRICULTURAL SCHOOL,
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A Sound practical knowledge of Analytical and Agricultural Chemistry, Geology, Mineralogy, Surveying, Levelling, Railway Engineering, &c.; may be obtained in Messrs. NESBIT's Academy, in addition to a good modern education.

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REFERENCES.—Dr. D. B. Reid, F.R.S.E., &c., House of Commons, Westminster; R. Prosser, Esq., Civil Engineer, Birmingham; J. L. Bullock, Esq., Editor of "Fresenius' Chemical Analysis," Conduit-street, Regent-street; J. Gardner, Esq., M.D., Editor of "Liebig's Letters," &c., Mortimer-street, Portland-place; and W. Shaw, Esq., Strand, LONDON.

Nesbit had advertised his London school in the national press from about 1845; the advert right (in which Richard is named as a referee) was placed in issues of the Birmingham Gazette during 1849 and 1850. *Image © The British Library Board all rights reserved.*

It was to this boarding school that Richard Prosser sent his eldest son at some unidentified date in the 1840s; his wife Sarah, Richard Bissell's mother, died on 29th February 1848 following the birth of their seventh child, a daughter who only survived three months. His mother's death had occurred less than eighteen months before Richard Bissell and his fellow pupils boarded the train in London and started their journey to the North.

The carefully planned "Tour" commenced in the Derbyshire Peak District where the group spent their first week lodging in Matlock, a spa town on the south east edge of the District. On long walks the boys studied the geology of the area, collected fossils and visited several mines; they were also taken to Chatsworth House and Haddon Hall and were allowed access inside these mansions, both of which clearly impressed young Richard Bissell. On 4th September the party left Matlock journeying north by carriage to Castleton where it stayed two nights in this village in the High Peaks of Derbyshire; again mines were visited and spectacular caves. The boys next destination was Manchester, travelling by carriage from Castleton to "glossip" (Glossop - one of very few spelling lapses in the journal), they there caught a train to the then great manufacturing city.

A week was spent in Manchester touring numerous manufactories; that access was allowed, and manufacturing techniques and machinery explained in detail, was unusual (manufacturer's then (and now) being keen to prevent industrial espionage - Nesbit's past reputation in the city must have been influential). The party actually lodged at a "Mrs. Nesbit's" in Oxford Street the address of the family's school in Manchester. In the 1851 census a Frances P. Nesbit, a widow and school proprietor, aged 43 was living in Sidney Street close to Oxford Street. Presumably, her late husband had been a brother of J. C. Nesbit and had continued to run the Manchester school.

On 13th September the group took an omnibus to the Liverpool & Manchester Railway Station and then travelled by train to Liverpool. It was an even busier day than usual; St. George's Hall and the docks were visited and a steamer was taken to Birkenhead to view Paxton's gardens. The boys returned to Liverpool to spend the night.

On the following day the party boarded a train for Birmingham, where after visiting "the exposition", another train was taken to King's Norton the village south of Birmingham where the Prosser family home, High House, was situated. The "exposition" must have been the 1849 Exhibition of the

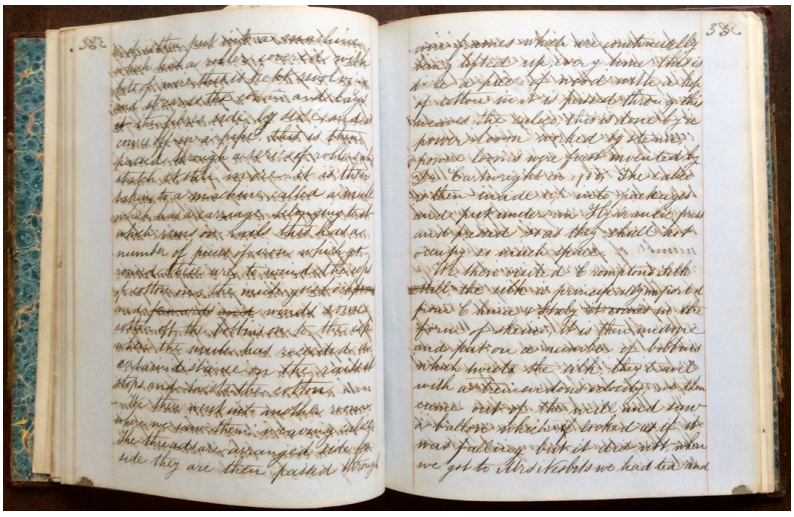
Manufactures of Birmingham and the Midland Counties that was held in the grounds of Bingley House on Broad Street.

The twelve boys and the two school masters actually stayed with the Prosser family at High House for the next four nights; their time there was spent going on an outing to Dudley and visiting yet more manufactories including a works which made Richard Prosser's tubes and a paper mill owned by the father of another pupil. On the trip to Dudley the group were accompanied not only by Richard Prosser but also by a "Miss Potter", who must have been Hannah Somerton Potter, Richard Bissell's aunt, the younger sister of his recently deceased mother, and his future step-mother.

On 18th September the adventure ended and the boys returned by train from Birmingham to London, but not before they had toured Birmingham's Town Hall and the Philosophical Institution followed by a visit to a manufactory which had been closed on their first attempt to do so. J. C. Nesbit's pupils, surely exhausted by the pace set by their inexhaustible headmaster, did not have their usual early night and arrived in London at "about 10 o'clock P.M." - the final words in Richard Bissell's journal.

Richard Bissell's account of the "Tour" is in effect a diary recording each day's events in considerable detail; apart from those on the three Sundays, which were presumably much needed rest days. The Sunday entries are limited to just three lines.

Unless young Richard Bissell was blessed with a prodigious memory, it is reasonable to assume that he wrote up each day's activities at some time on the same day, probably in the early evening in bed after having had his tea - "had tea and went to bed" or a similar comment were the last words of many of the entries. He wrote with pen and ink in a slim notebook with ruled pages and a marbled paper and cardboard cover with a leather-bound spine and corners. An image of the



front cover forms the "cover" to this PDF.

On 9th or 10th September it would appear that Richard Bissell suffered a loss - his blotter or blotting paper. From 10th September his sloping writing takes on a cross-hatched appearance caused by wet ink from one page transferring to its opposite when the notebook was closed or a page turned over. Nevertheless, the large and clear handwriting remained legible.

Richard Bissell may have been under strict instructions to restrict his diary to matters of fact only; the other boys are rarely mentioned and never by name (except in the heading on the first page). There are no reminiscences of conversations or the inter-play that must have taken place between the boys. In fact, there are virtually no significant personal statements by the author himself, except where he commented on the conditions on board the Guy Mannering, a U.S. emigrants' ship moored at Liverpool: "the accommodation for emigrants I think might be improved largely".

Facts were what was required of Richard Bissell in his journal and on the whole he appears to have recorded these with remarkable accuracy, although a detailed analysis has not been carried out. (The "Tour" would merit an accompanying commentary supported by illustrations - a project for the future.)

As for the other boys it has been possible to identify some of them through census returns and other records:

Edward Evershed Agate (c.1833 – 1913)
1851 A pupil on a farm in Saffron Walden; 1861 Farmer 295 acres, 9 men, 4 boys in Littlehampton, Sussex. Died at Worthing.

Charles James Agate (c.1835 -1909)
Brother of Edward; 1851 living with his father (a draper) and mother in Horsham, Sussex; he became a Grey Cloth Agent/ Cotton Manufacturer in Salford, Lancashire.

W Rowland - untraced.

W G Forster
Possibly William F G Forster (born c.1836 in Dublin, Meath, Ireland); he was a gentleman cadet (student at the Royal Military College) at Sandhurst in 1851.

Alfred Leney (c.1838 –1900)
In 1851 census he was still a boarder at Nesbit's school. Aged 23 he bought a Kent brewery and died in Dover a very wealthy man.
C Morgan - untraced.

John Marten (c.1838 – 1904)
In the 1851 census he was still a boarder at Nisbet's school. He returned to his birthplace, Chilham in Kent, and became farmer of 428 acres employing 29 men (1881).

Henry Iliff (c.1838 –
Only one found in census returns. In 1851 he was living with his parents in London in Newington, his father was a GP. In 1881 he was an accountant and living in Hackney.

James Baldwin (c.1836 -1894)
(On the "Tour" the boys went to tea at the Baldwin's on Sunday 16th September and visited Mr. Baldwin's Paper Mill on Mon 17th September.) In 1851 he was living in Kings Norton with his father, also James, a papermaker employing 100 men/137 acres; James jun. was a clerk. His father was Mayor of Birmingham in 1853. In 1891 James jun. was still living in Kings Norton – a paper manufacturer.

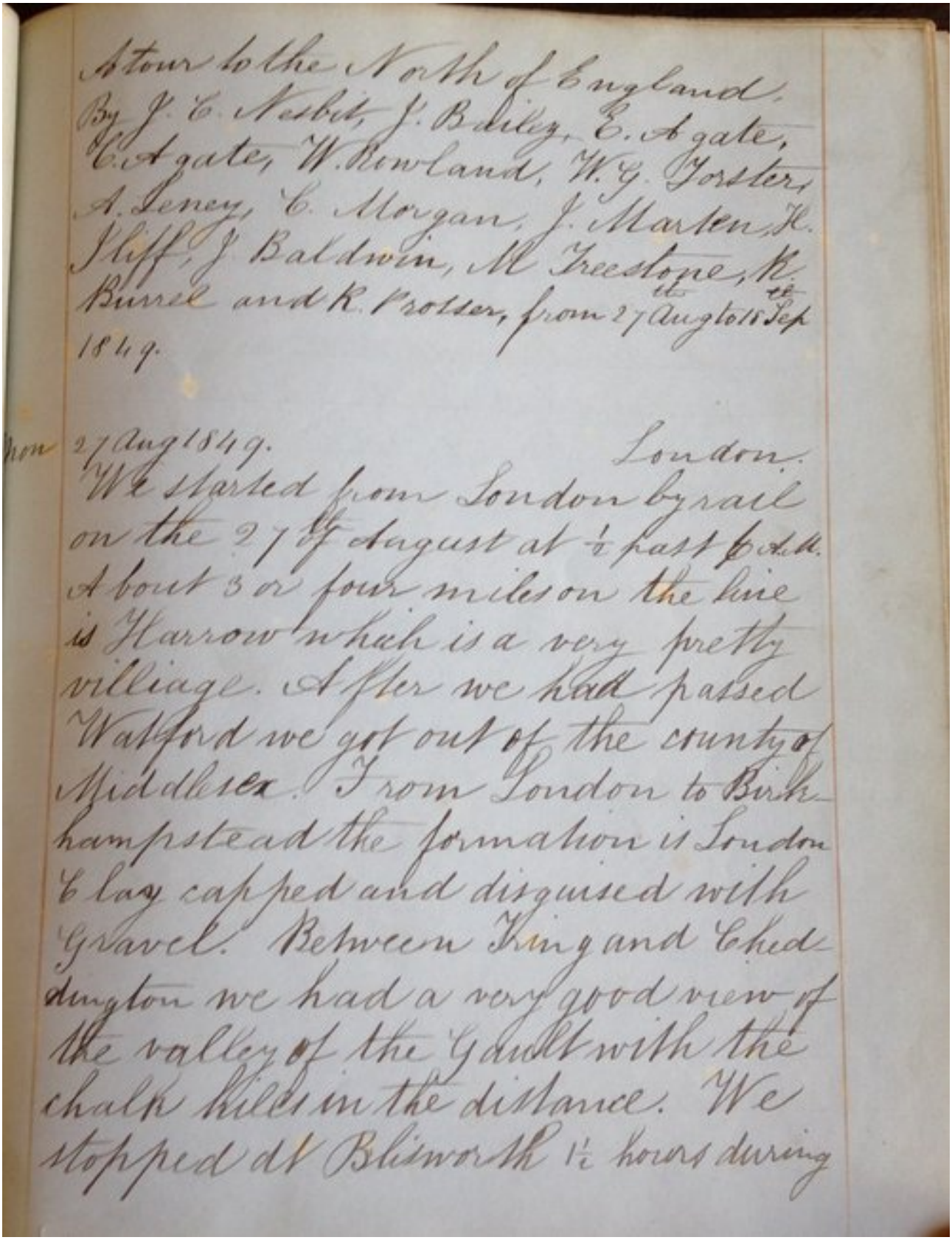
M Freestone
Most likely candidate a James M Freestone (c.1834 -); a farmer's son he was born and lived in Blyford, Suffolk. The farm appears to have passed to his brothers and he ended up an agricultural labourer in 1891.

R. Bunel - untraced

Nesbit's assistant on the tour was James Bailey (c.1828 – 1909): in the 1851 census he was described as a Chemical Teacher at Nesbit's school. He returned to his birthplace Wallop in Hampshire and became a manufacturer of artificial manure.

Footnote
J.C. Nesbit was the father of Edith Nesbit (1858-1924); she was the children's author E. Nesbit famed for The Railway Children and The Treasure Seekers.

The Opening Entry



A tour to the North of England.
By J. C. Nesbit, J. Bailey, E. Agate,
C. Agate, W. Rowland, W. G. Forster,
A. Leney, C. Morgan, J. Marten, R.
Skiff, J. Baldwin, M. Treestone, R.
Burrell and R. Prosser, from 27 August to 8 Sept
1849.

from 27 Aug 1849. London.

We started from London by rail
on the 27th of August at ½ past 6 A.M.
About 3 or four miles on the line
is Harrow which is a very pretty
village. After we had passed
Watford we got out of the county of
Middlesex. From London to Birk
hampstead the formation is London
Clay capped and disguised with
Gravel. Between King and Ched
dington we had a very good view of
the valley of the Gault with the
chalk hills in the distance. We
stopped at Blisworth 1½ hours during

A tour to the North of England by J.C.Nesbit, J.Bailey, E.Agate, C. Agate ,W. Rowland, W.G. Forster, A. Leney, C. Morgan, J. Marten, H.Iliff, J.Baldwin, M. Freestone, R. Bunel and R.Prosser, from 27th Aug to 18th Sep 1849.

Mon 27 Aug 1849 London

We started from London by rail on the 27th August at ½ past six A.M. About 3 or 4 miles on the line is Harrow which is a very pretty village. After we had passed Watford we got out of the county of Middlesex. From London to Birkhamstead the formation is London Clay capped and disguised with Gravel. Between Tring and Cheddington we had a very good view of the valley of the Gault with the chalk hills in the distance. We stopped at Blisworth 1½ hours during which time we had dinner. In the journey from London to Birmingham the rail passes several times over the canal. About 5 miles past Blisworth is Weeden, here there are some very large barracks, built when Napoleon Buonaparte threatened to invade England. When we arrived at Rugby we had to wait ½ an hour for the train to take us to Matlock. We then got on to the Midland Railway. We passed the sezenite mountains, sezenite is a sort of Granite but of a yellow colour. When we got to Conisthorpe we got on the New Red Sandstone in which are some large masses of Sulphate of Lime

(gypsum) this formation is very useful for agricultural purposes, the town of Leicester is situated on it, this town is famous for stockings.

We soon arrived at Derby where we had to wait some time.
The station is large and commodious.
The scenery is very beautiful and thickly wooded.
There are two or three tunnels but none of them are of any great length.
When we arrived at Ambergate we got out of the train, and took three carriages to Matlock.
On our road we passed the Seat of Sir Richard Arkwright.
It is built of Millstone grit which when the sun shines on it has a golden lustre, we arrived at Matlock at 7 PM.

Tues 28 Aug. Matlock

We got up at 8 o'clock, and walked to the Bullace tree lead Mine, it is 64 yards deep; the engine for pumping the water out of the mine is 45 horses power, at this mine we found some specimens of sulphurets of Lead and Zinc, carbonate of Lime etc.

We then walked back to Matlock, and changed our lodgings from the old Bath Hotel to Walkers at which place we stopped the remainder of our stay in Matlock.

In the afternoon we went to the heights of Abraham which stand somewhat south of Matlock, we went to a mine on them where some men were getting sulphate of Baryta, or, (what the mineralogists style it) heavy spar. We then went on a little farther when we came to a place on

the side of the heights where fluorspar was plentifully found. A road lay beneath us about 200 ft.

After walking some little way we entered a cavern, we first descended by a number of steps and then we began to form some idea of what the cavern was like; On both sides of it were beautiful crystals of dog-tooth spar, in some places the walls of the cavern were covered with carbonate of lime; we then walked out of the cavern, and back to the hotel.

Wednes 29th Aug. Matlock.

We rose at 9 o'clock, went to the baths and had a bathe, after which we walked to Matlock station and booked for Amber Gate.

When we arrived there we got out of the train and looked over some Lime kilns, they were situated on a brick platform in a row, about 2 tons of limestone are put to one of coal these are burnt together and the lime is produced; The quarry is 3 miles from the kiln it is brought to them by means of trucks the full ones going down pull the empty ones down (sic).

We rode in one of the trucks up to the quarry, we saw them blasting the stone. A hole is first bored and then cleaned out with a wisp of straw, some powder is then put in with a wire in the centre, and the powder is rammed some clay is then put which fills up the hole the wire is then pulled out, this is the most dangerous part of the operation as the powder sometimes explodes with the friction, a straw is then put in the hole where the wire went

filled with powder also a piece of touch paper is then put in the straw and lit, soon after the blast explodes and blows the stone into a great many fragments, the powder used is very coarse.

We then went to a quarry out of which 36,000 tons of limestone was got in three years, we then walked to a village called Hollaway where, after having had dinner, and a good game at play, we walked to Matlock 4 miles distant.

Thurs 30th Aug Matlock.

We did not do anything in the morning but pack up our fossils, and after dinner we went to Sir Richard Arkwright's seat which is not far from Matlock; The rocks were very beautiful on the side of the Derwent which we walked.

We then went up a road that leads to the mansion it is built of millstone grit; we then went along a walk with a hedge on each side and through a break in it we had a very beautiful view of the surrounding country, a little further along is a natural crack in the rock through which a man could walk with ease, a little further on is a famous gooseberry tree, it is said to be 25 years it bears a very good supply of fruit annually, it is trained after the fashion of a vine, and its longest bough is 20 ft. We then walked to the summit of a very high cliff called the lovers leap from which we had a very good view of Matlock bath, its height is 400 ft.

We then walked a little farther and descended by a road to the river Derwent where we got in a boat and were ferried

across. We then walked to Matlock High Tor Cavern and looked over that, there is some very beautiful dog-tooth spar and carbonate of lime on the sides of the cavern and also some stalactites; the railway passes over this cavern, and, while we were there a train passed over which made a noise similar to that of distant thunder.

We then came out of the cavern and went on towards Old Matlock, passed under the railway bridge. The strata about here is much contorted and broken up; we did not go any further than Matlock Bridge that night; Matlock bath has been founded now about 80 years, but Matlock is of much older standing. We then went to the hotel and went to bed.

Fri 31st Aug Matlock

We then started soon after breakfast for Chatsworth; We passed Matlock High Tor, and over Matlock Bridge: We went through Darley Dale famous for its millstone grit quarries When we got to Chatsworth we got out of the omnibus and after having waited for some time we entered, and went along a path that led to the mansion which we entered, in the first room we saw a boat made for the queen, and a smaller one the figurehead of which was made of silver, we then went along a hall the walls of which were covered with paintings, this led to the chapel, this we entered, and found a very beautiful place the sides are of cedar wood beautifully carved, the steps to the altar are made of Russian marble and the table is of malachite or carbonate of copper, the the (sic) chairs are covered with velvet, but the visitors are not allowed to sit upon them.

We then went into another hall where we saw a great many paintings with the names of the authors on the opposite side on a table was a small model of a ship very exquisitely made, we then went into another room where we saw a chest the edges of which were bound with gold, through a window in this room we saw a fountain that played 90 ft high. The cascade unfortunately was not at work, it consists of 100 steps about 1 foot high, water is let down this and thus forms a cascade.
at the top of this is a little paved archway with a number of little spouts in the floor and when the water is turned on it spouts up and would give anybody a severe wetting that was standing in it.

We then went to a tree made of brass called the willow tree and at the end of each leaflet is a little hole out of which issues water, the old tree was made of bark.

From this we went to see the great fountain, there are no engines to pump up the water but there are larger reservoirs above the level of the fountain, the water is conveyed by means of pipes to the fountain; and the water in seeking its own level flows up to the height of 272 ft. There is a garden on the South side of the house laid out in the Italian style, but I thought it did not look very well.

We then came out of the mansion, and, after having dined at a little village we started for Haddon hall.

This edifice was built in the reign of Edward III, and furnishes the best example of gentlemans country house in his time.

We went into a room in the courtyard, and saw the boots that were worn during the commonwealth, the hunting horn, a lot of plates and dishes made of Zinc and the duke of Rutland's Cradle; we then went upstairs and into a room the walls of which were covered with tapestry supposed to have been worked by the wife of William the Conqueror.

We then went into the banqueting hall it was ornamented with the antlers of stags; there was an iron collar, and if any person did not drink the quantity of liquor appointed his arm was put in this and the liquor poured down his sleeve.

After this we went into a room adorned with tapestry in which was Queen Elizabeth's bed, and also a looking glass which was not so thick as half a crown; The bed was sent to Belvoir castle for the use of George the third; we then went into a tower and when we got to the top we had a tolerable view of the country, we then descended into the kitchens which are noble structures there are two or three rooms adjoining it as the larder etc. The fire grate is very large.

The Wye runs at the bottom and that runs into the Derwent and then into the trent. We then left the mansion and rode towards the Walton Inn, on our way we passed Router Rocks they are a lot of rocks covered with heath, there are some large rocking stones one weighing 14 tons and a very small push will rock it.

We then proceeded on with our journey, a little further on we came to the ebbing and flowing well, at the bottom of which is a little hole out of which issues a tasteless gas;

before we came to the Router rocks we saw two rocks about 50 yards apart called Robin Hood's Stride, as he is said to have taken it when he was in a hurry; we then went on with our journey, when we arrived at the Walton inn, we found that there was no beds for us but another party turned out of a sitting-room so they made us some beds on the floor and we had a comfortable night.

Satur 1 Sept Dove Dale.

We got up and had a bathe in the river dove which was very cold, after this we had breakfast and then walked along Dove Dale which is a very pretty one there are mountains on each side and in some parts thickly wooded, there are some trout in the river.

There are some arches in the rock which do not extend far; we then walked to the end of the dale where we found the omnibus waiting for us, so we got in and rode to Elton Mine, this was formerly a very rich one in copper but it is not so now, we found a few specimens of copper ore and of the slag after the copper ore has been smelted; we then went on with our journey towards Matlock, we went by Manifold Dale on the opposite to the one we were is the entrance to Reynard's cave, and Gretton a little further on; When we came to Whetton we had something to eat and bought some specimens of carbonate of copper, there was a calf there which J C Nesbit bought, it was a very singular one as it had two heads, it seemed as if the spine went into both the necks and met in the back.

Soon after passing Whetton it began to rain and the young gentlemen that were outside came crowding inside the

omnibus; the sheet lightning was very beautiful but we did not have any thunder, when we arrived at Matlock we heard that two or three of the loudest claps of thunder had been heard there.

We then went to bed.

Sun 2nd Sept. Matlock.

Got up and had breakfast after which we went to church, it is small though pretty and there are seats and no pews.

After this we had a walk, came home, and went to bed.

Mon 3rd Sept. Matlock.

We only packed up our fossils in the morning and after dinner we got in a boat and had a row on the River Derwent; The Scenery is very beautiful we only went about ¼ of a mile because if we went lower there is a water fall and up higher shallow water, we then got out of the boat and walked to the hotel and soon after went to bed.

Tues Sept 4.th. Matlock.

We now bid farewell to Matlock, all our luggage was packed on two carriages to go to Castleton. On our way we passed Haddon Hall, Bakewell Ashford etc, at the latter there was some marble works, it is sawed by means of saws worked by a crank and that is worked by a water wheel, we

got some specimens of both black and white marble, soon after passing Ashford we had a very good view of one end of Monsal Dale.

We arrived at Castleton about 4 o'clock after a journey of 14 miles, it is situated in a valley, to the S.W. of the town is Peveril castle of which so many stories are told in Sir Walter Scott's Novels.

We did not go up to the castle because it was on such a high hill but we got nearly; we then had had (sic) dinner after which we visited the peak cavern at first entering we saw a lot of machines for weaving string.

We then went through a door and the ceiling became lower and a trench on each side we soon came to the river Styx where two or three of us got into a flat-bottomed boat and were drawn across all of us did the same, the greatest width is 14 yds and the depth from 2 to 3 ft, this cavern is divided into a number or at least called son of smaller ones is viz River Styx, Pluto's Hall, Roger Rain's House, so called from water dropping from the roof continually, Chancel Orchestra from its resemblance to the chancel of a church, the old gentlemans Cellar, at this you descend 22 steps which take you to a cellar, Half Way House, this has its name from its being halfway through the cavern, 4 or 5 natural arches, Tom of Lincon, Victoria cavern. There are very few stalactites, as it is not celebrated for them but for largeness, being one of the largest in the world, we then came out, had tea and went to bed.

Wednes 5th Sept. Castleton.

After breakfast we walked to the Speedwell mine, after descending about 100 steps we came an underground canal we all got in a large boat and a man with us and we were pushed along about ½ a mile. When we got to the end we found ourselves in a natural cavern, on one side there is a chasm and a hole in the side and by pulling an handle the water comes out of the canal that we came along and forms a cascade, the water of which falls 90 ft.

This cavern was discovered by accident where the men where blasting the rock for lead ore a gush of wind came and blew all their candles out, they also heard a gush of water and they thought the water was running in that working, but it was the cascade; the workings are extended through this cavern but we did not go along them; when we were coming out we had a blast which blew out all our candles, we then got out of the boat, and walked up the steps, when we got into the open air the temperature was much above that in the cavern.

We then came out of the mine we walked through the Winnets to the Blue John Mine, and looked over it we saw the largest specimen of Blue John ever found, we went in the cavern and saw a great many veins of blue john in different parts; there are also a great many stalactites in one part there is a lot of them protected by iron bars, in one large cavern there is a lot of stalactites and, in order that we might perceive the beauty of the place a chandelier was pulled up by a pulley.

We then ascended Mam Tor or the shivering mountain, this soft Millstone Grit and every year crumbles away from

the action of the weather more especially in the winter huge masses fall down; from here we had a very good view of the country round about, on our road to Castleton we passed a heap of fluor spar from which we got some good specimens, we then went to the hotel and had dinner after that walked about the village came in, had tea and went to bed.

Thurs 6th Sept. Castleton

We took two carriages to go to glossip, on our way we passed Hope smelting works, our road lay on the millstone grit moors, the grit is composed of quartz, mica, etc conglomerated together and if you look at them with a microscope you can see them very plain; when we arrived at the snake inn we got out of the carriages and had a ramble among the heath on the moor, the river derwent runs at the bottom but it is rather shallow, we then went into the inn and got something to eat, we then proceeded on with our journey across the millstone grit moors, on our way we saw some grouse, there are here some glens where they get in; we soon got to glossip where we took the railway to Manchester on our way we passed Ashton under Lyne a very large manufacturing town for cotton etc, we passed two or three tunnels, when we got to Manchester we got out of the train and took a cab to Mrs Nesbit's house in Oxford St. when we got there we got out of the cab, had tea and went to bed.

Fri 7th Sept Manchester

In the Morning we went to Sharp Brothers & Co. locomotive engine makers, 1000 men are here employed, we saw the motion of the eccentrics or the part of the engine by which the motion of the engine is changed; the boilers are made of plates of wrought iron riveted together, and in the interior of it are put tubes, the fire is put in the tubes and the water around them; the tender is an appendage belonging to the engine for carrying of coals, water etc the latter of which is contained in a large tank of iron and as the engine goes along it keeps pumping the water into the boiler; The spokes of the wheels are of wrought iron and the centres are of cast which are put on afterwards; the tyres are of wrought iron, we then came back to Mrs Nesbit's and had dinner.

After dinner we came back to the same place, we saw the cranks cut for the engine; they are both on the same shaft but in different directions.

The method of cutting bars of iron is very good, a steel knife worked by an eccentric is made to do the work; the friction is very great so that you cannot hold them in your hand when they first come off the machine on account of them being so hot; the eccentric is the most powerful motion that can be obtained.

The cylinders are cast and then bored so as to fit the piston, the slide valves are made in the same way; the steam is first let into the cylinder and the piston is pushed up, the steam is then condensed and the piston falls; the ends of the axle trees are case hardened that is done by putting the ends of them in iron cases filled with hoofs

horns etc, and these are put into a strong fire for about 24 hours; when they are taken out they are found to be covered with steel to the depth of about 1/4 of an inch; we then came back to Mrs Nesbit's had tea and went to bed.

Satur 8 Sept. Manchester

We got up about 8 o'clock and went to a cotton factory, the cotton is first put on a table and a boy with a stick comes and beats it so as to lay it quite smooth, he then rolls it up, and draws over it a board that is covered with wires sticking up, there are a number of these which are supported over a roller covered with a similar lot of wires but in a contrary direction, the roller is kept revolving which lays all the fibres one-way they are then drawn off through a hole and it comes off in a pipe; this is then passed through a machine consisting of a series of rollers which stretches it out again; when the cotton comes out of the first machine it has to be stretched 200000 times and passes through 5 machines, the bobbins that wind the cotton go round very fast; in the next room we saw some machines called mules spin, this spins the cotton from twist into sewing cotton, it consists of a carriage with a lot of bobbins on the top some cotton is wound on these and then it is twisted; at this manufactory we saw some of the finest thread that has ever been spun 460 hanks to the pound, or 230 miles to the pound.

We then went to a file manufactory, the files are made of steel, it is cut in the soft state by men with chisels, they are then heated to a pale red heat and then quenched with oil

which hardens them, the steel generally comes from Sheffield but some is made in Manchester.

We then took a cab to the Manchester cricket ground where we saw a match being played between All England and Manchester; we then came back to Mrs Nesbit's had tea and went to bed.

Sun 9 Sept. Manchester.

After breakfast we went to chapel and had a very good sermon, we then we came home and had dinner after which we went a walk came home, had tea, and went to bed.

Mon 10 Sept. Manchester.

After breakfast we visited Wood and Westhead's small ware manufactory, comprising tape, braids etc; the tape is made arranging the threads side-by-side and putting through three frames of wire, these frames are then lifted up, which interweaves the threads with each other, when one of these frames has been lifted up a piece of wood with a hop of cotton in which is left free to unwind is pulled through and weaves the tape.

We then went into a room where the braid machines were at work, they consist of a number of bobbins made to revolve around each other and twists the thread into braids; it is then taken and cut into proper lengths for stay laces, the tags are made of tin they are bent half round by the same machine that cuts them, the lace is put in here

and the piece of tin closed up; a boy can cut 36000 tags in a day.

We then visited Johnson's wire mill, the wire is first put through a die which is fixed this is then put on a drum and the drum is turned around so as to pull the wire through the die; the operation makes the wire thinner because the die line scrapes of a portion of it; the dies are oiled to make the wire go through with the least amount of friction.

In the afternoon we went to a calico weaving and cotton cleaning mill; the cotton is put into a machine called a devil this cleans the cotton, and it comes out free from all grit etc; it is then put into a machine which has a roller covered with bits of wire, this is kept revolving and it cards the cotton and lays the fibres side by side and it comes off in a pipe, this is then passed through a series of rollers which stretch it still more; it is then taken to a machine called a mule which has a carriage belonging to it which runs on rails this has a number of pieces of iron which go round. These are to wind the cops of cotton; the mule goes back and forward and winds some cotton of the bobbins onto the cop, when the mule has receded a certain distance on the rail it stops and twists the cotton.

We then went into another room where we saw them weaving calico; The threads are arranged side by side they are then passed through wire frames which are continually being lifted up; every time this is done a piece of wood with a *Scop?* of cotton in it is passed through this weaves the calico, this is done by a power loom worked by steam, power looms were first invented by Dr Cartwright in 1785. The calico is then made up into packages and put under

an Hydraulic press and pressed so as they shall not occupy so much space.

We then visited Crompton's silk mill, the silk is principally imported from China and Italy it comes in the form of skeins, it is then undone and put on a number of bobbins which twist the silk, they travel with a tremendous velocity; we then we came out of the mill and saw a balloon which looked as if it was falling but it did not, when we got to Mrs Nesbit's we had tea and went to bed.

Tues Sept 11 Manchester.

After packing up our fossils we went to Chadwick and Phillip's large drapers, we saw here every article relating to dress, and cloth etc; the silks were very beautiful and of beautiful colours also; we saw some boas some made of sable which are generally the most prized, there is a large assortment of umbrellas, parasols etc the most common of which cost about 6d while on the contrary the best quality cost 16s and there are umbrellas of every price between 6d and 16s.

We then visited McLeans where we saw the cutting open of the ribs in the fustian it is stretched on hot rollers and then a sharp knife is pushed up which opens the ribs of it another length is then cut.

We then went to Curtis, Parr and Walton's card manufactory; there is coil of wire which is working when the wire is pushed through a small hole in a piece of iron the right length a vice comes and takes hold of it, as soon as this is done a knife comes and cuts it off then two little

piercers come and bend the wire a little more than at right angles it then springs back so as to be at right angles to each other; the vice is then thrust forward and the bit of wire goes through two little holes, two pieces of wire on the other side come and catch these ends and bend them down, the machine works on a bed which places the wires in their respective places.

We then visited Hoyle's Calico Print Works, this is done by copper rollers with the figures cut on them, they are first engraved upon a roller of steel this is then rolled upon a copper rollers which mark out places these are then picked out with a sharp bit of steel; these rollers are then put into a machine in a trough of colour the rollers are then turned round in it and the colour is scraped off all but that in the holes, the calico is then passed over; which absorbs the colours out of the crevices in the roller, it is then passed over cylinder rollers filled with steam to dry it.

The way in which spotted clothes are made is this, where the dye is not required to take tartaric acid is put on and that dissolves the dye so that it will not take; when clothes are required to be dyed they are first put into cow-dung and water or solution of Phosphate of soda, it is then taken to the dye tub after this operation is finished the dye is fixed by means of immersing it into sulphate of copper, the cloth is then washed and it is ready for sale.

We then visited Newton's dying and bleaching works; after the fustian has had the ribs cut open it is pulled several times over red hot copper rollers this puts on the nap, it is then bleached which is done by means of chloride of lime it is put into a solution of it and left there about 20 minutes it is then washed with dilute sulphuric acid which

combines with the lime and forms sulphate which may be washed off, the fustian if necessary is then dyed with logwood fustic or madder etc; it is then put into a machine which puts the size on, the object of this is to make it stiffer.

We then went back to Mrs Nesbit's had tea and went to bed.

Wednes 12 Sept. Manchester

After breakfast we got into an omnibus to go to the Earl of Elesmere's coal pits, on our way we passed Eccles famous for its cakes; when we arrived at Worsley we found a boat ready for us so we got in and two men with us a man lay down at each end of the boat and with his feet against the ceiling pushed us along; after having travelled in this manner 2 miles we came to an opening in the rock at this we got out and having walked about 20 yards we came to an opening in the shaft where we found a bucket three or four of us got in to it and were let down the shaft 90 ft when we got to the bottom we got out of the bucket and got into a boat and were legged about 300 yards at the end of which we got out and went to a working the air of which was very foul, we then came to the boat and were legged back again, we then ascended the shaft which was 150 yds deep; we then went to an inn and got something to eat, we then proceeded to Dixon green coal pit, but we did not go down so we came away, got into the omnibus, and rode to Manchester, had tea, and went to bed.

Thurs 13 Sept Manchester.

We collected all our luggage together and put it into an omnibus, we then got in ourselves rode to the Liverpool & Manchester Railway Station, and booked for Liverpool; on our way we pass Chat Moss which is a vast marsh of 3000 acres, near here the famous Mr Huskison engineer of this line was killed; a tablet bearing an inscription is erected to his memory.

When we arrived at Liverpool which is situated on the river Mersey we took up our abode at the George Hotel, where we had dinner after which we visited St Georges Hall for trying prisoners, law cases etc in; we then walked to the docks which are 3 miles in length and looked over the Guy Mannering, the accommodation for emigrants I think might be improved largely; we then left this and went to the floating pier, this covers nearly an acre of ground and is kept in it its place by chains, we got into a steamer that was going to Birkenhead and went there when we arrived we took a cab to Birkenhead parks which was laid out by Mr Paxton gardener to the Duke of Devonshire, there are a few swans on a pool there; we then walked back to Birkenhead pier got into the steamboat and rode to Liverpool where we took a cab to the Collingwood docks where the great Britain lay; their engines are 800 horses power each and each of them had two cylinders but they are in such a state so as not to be able to be worked.

It had six masts but they are all in a very dilapidated state; we then rode back to the hotel had tea and soon after went to bed.

Fri 14 Sept Liverpool.

We went to the railway station and looked for Birmingham; we were drawn through a tunnel by a steam engine with a rope, we then went on with our journey until we came to *blank space* station where we branched off to go to Birmingham and on approaching towards which we saw a number of coal pits; we passed very near to Stafford castle.

At length we arrived at Birmingham after a journey of 98 miles, we got into an omnibus which took us to Dee & Royal hotel and after having waited some time there we walked to the exposition where we saw guns, pistols and other arms, fire grates of every description, models of agricultural implements etc, there was also a chandelier made wholly of glass, we then got into some cabs and rode to the railway station where we got into a train and rode to King's Norton to our house where after having had supper went to bed.

Satur 15 Sept King's Norton.

We got into an omnibus and proceeded towards Dudley; we did not go through the town of Birmingham but only on the outskirts of it; on approaching towards Dudley the district was very smoky and there were great many coal pits about; when we arrived at Dudley we put up the omnibus at an inn and walked to the castle which is now in ruins but the gateway is in a tolerable state of preservation; we then walked to the cavern there was a great crush to get in, and it was splendidly illuminated, Sir Roderick Murchason F.G.S. had gathered together a number of

people in a wide place in the cavern and was giving them a lecture on the Geology of the neighbourhood of Dudley, three of us having missed J. C. Nesbit came out with Mr Prosser and Miss Potter and ordered dinner to be brought up to the castle which when we had finished we took a cab to the wren's nest to try to find the others and on our way we met J. C. Nesbit but we did not find anybody else, so we came back and found them having their dinner.

We soon ordered the omnibus and went home had tea and went to bed.

Sun 16 Sept King's Norton.

In the morning we went to King's Norton church came home and had dinner, after which we went to Mr Baldwin's came home, had tea and went to bed.

Mon 17 Sept King's Norton.

We went by train to Birmingham when we arrived there we got out of the train and walked to a pen manufactory, the steel is sent to them in bars these are heated and rolled they are then taken to a punch and the pen is punched out; it is then taken to a similar machine which stamps the maker's name on, it is then turned up after this operation is finished it is hardened by being put into an iron barrel and turned round over a fire; they are then scoured bright by being put into iron barrels with emery and being turned round, the nibs are then cut and the pen is finished.

We then went to a nail manufactory the nails are cut by a machine out of iron; the head is then put on by the same machine the small ones are made in the same manner, the 7 inch nails are made by a different machine which we did not see.

The next place we went to was Collis's Papier Machee works; They also make plated goods as teapots etc we did not see the operations because the men were not at work.

We then visited Smethwick Tube Works, a sheet of iron red hot is first drawn through a hole in a block of iron, it is then taken and welded, there are four wheels with grooves in them the tube is put in here when red hot, the rough edge is then cut off, the tubes are then cut the proper length by means of a piece of steel going round very fast they are then proved by means of passing water into them.

We then went to Mr Baldwin's Paper Mill, paper is made from rags they are first cut up into small pieces and then boiled with potash and water to free them from grease they are then put into a machine called a devil which rips and tears the rags, they are then ground between two stones with water this is then let onto an endless band of wire gauze which keeps shaking backwards and forwards and shakes all the water out the paper is then passed through several rollers some of them are filled with steam which dry it.

We then went to a gun barrel manufactory the iron is sent to them in pigs it is melted and converted into wrought iron the barrels are twisted by a machine which is worked by hand they are then welded, and hardened they are then ground on large stones they are then proved, which is done

by ramming a certain quantity of powder into the barrel and firing it; we then rode to King's Norton in two carriages.

Tues 18 Sept. King's Norton

We went to Birmingham by rail and looked over the town hall the organ is the largest in the world in effect; we then went to the Philosophical Institution where we saw a very good collection of minerals, fossils and other curiosities of nature.

After this we went to Collis's Papier Machee works, we saw them cutting out the Papier Machee for making tables etc it is blacked over with paint and then it is painted on with different colours.

We then walked to the railway station and went to London at which place we arrived at about 10 o'clock P.M.

APPENDIX

Dictionary of National Biography, 1885-1900, Volume 40

Nesbit, John Collis

by Richard Bissell Prosser

NESBIT, JOHN COLLIS (1818–1862), agricultural chemist, son of Anthony Nesbit [q. v.], was born at Bradford, Yorkshire, 12 July 1818. He was educated at home, and assisted his father in his school. At an early age he turned his attention to chemistry and physical science, and when only fifteen he constructed a galvanic battery which was purchased by the Manchester Mechanics' Institute for thirty guineas. He studied chemistry under Dalton, and also attended Sturgeon's lectures on electricity and galvanism. He commenced lecturing at an early age, and he acquired great facility as a speaker upon scientific subjects. He took a leading part in the management of his father's school upon its removal to London, and he was one of the first to introduce the teaching of natural science into an ordinary school course, the instruction being given partly by himself, and partly by Charles Johnson (1791–1880) [q. v.], John Morris (1810–1886) [q. v.], and George Fleming Richardson. Particular attention was paid to chemistry, especially as applied to agriculture, and each pupil received practical instruction in the laboratory. Eventually the school was converted into a chemical and agricultural college under his sole direction, and as the use of superphosphates and other artificial manures became general, Nesbit began to undertake commercial analyses for farmers and manufacturers. New laboratories were built, and he obtained a large practice as a consulting and analytical chemist. He was elected a fellow of the Geological Society and of the Chemical Society in 1845. Reasoning from certain geological indications, he was led to suspect the existence of phosphatic deposits in the Ardennes, and in the summer of 1855 he discovered several important beds of coprolites in that region. For many years he was a prominent member of the Central Farmers' Club, which in 1857 presented him

with a microscope and a service of plate in recognition of his services to agricultural chemistry (Farmers' Magazine, May 1856, p. 415; January 1858, p. 6).

Nesbit wrote: 1. ‘Lecture on Agricultural Chemistry at Saxmundham,’ 1849. 2. ‘Peruvian Guano: its history, composition, and fertilising qualities,’ 1852. This was translated into German, with additions, in 1853 by C. H. Schmidt. 3. ‘Agricultural Chemistry and the Nature and Properties of Peruvian Guano,’ 1856. This consisted mainly of lectures delivered at various times. 4. ‘History and Properties of Natural Guanos,’ new edit. 1860.

His contributions to periodical literature include: 1. ‘On an Electro-Magnetic Coil Machine,’ in Sturgeon's ‘Annals of Electricity,’ 1838, ii. 203. 2. ‘Analysis of the Mineral Constituents of the Hop,’ in ‘Journal of the Royal Agricultural Society,’ 1846, vii. 210. 3. ‘On the Presence of Phosphoric Acid in the Subordinate Members of the Chalk Formation,’ in ‘Journal of the Geological Society,’ 1848, iv. 262. 4. ‘On the Quantitative Estimation of Phosphoric Acid, and on its Presence in some of the Marls of the Upper Greensand Formation,’ in ‘Journal of the Chemical Society,’ 1848, i. 44. 5. ‘On the Phosphoric Acid and Fluorine contained in different Geological Strata,’ ib. p. 233. 6. ‘On a New Method for the Quantitative Determination of Nitric Acid and other Compounds of Nitrogen,’ ib. p. 281. 7. ‘On the Formation of Nitrates and Nitre Beds,’ in ‘Journal of the Royal Agricultural Society,’ xiv. 391. 8. ‘On the Relative Value of Artificial Manures and their Adaptation to Different Crops,’ in ‘Farmer's Magazine,’ May 1856, p. 416. 9. ‘The Mechanical and Chemical Principles applicable to Drainage,’ ib. January 1858, p. 7.

Nesbit died at the house of a friend at Barnes on 30 March 1862. He married, 22 Dec. 1850, Sarah, daughter of H. Alderton of Hastings, who survived him. His daughter Edith, now Mrs. Hubert Bland, is known as an authoress, under the name of E. Nesbit.

A son, Alfred Anthony Nesbit (1854–1894), also an analytical chemist, for some years had a laboratory at 38 Gracechurch Street, London. In 1881 he called attention to the facility with which the obliteration could be removed from postage stamps, and in 1883 he patented an improved ink for obliterating postage stamps (No. 949).

His patent for preventing the fraudulent alteration of cheques (No. 2184 of 1880) was well received, but was never practically applied (cf. Morning Post, 17 Feb. 1881; Standard, 5 Feb. 1881). He made experiments on the action of coloured light on carp (cf. Journal of Science, June 1882, p. 351), and he was very successful in colouring white flowers by causing them to absorb aniline dyes of various shades (cf. ib. July 1882, p. 431; Globe, 5 July 1882).

[Mark Lane Express, 31 March 1862, p. 458; Illustrated London News (portrait), 19 April 1862, p. 394; Quart. Journal Geol. Soc. 1863, p. xix; and personal knowledge.]

R. B. P.