



# A Learning Resource

Explore Coniston's copper mining heritage with your learners



## About this learning resource

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This learning resource has been produced to help you explore Coniston's copper mining heritage with your learners. In it you will find information about the copper mines as well as suggestions for activities and links to resources.

This learning resource and the activities within were produced in partnership with Coniston Church of England Primary School and John Ruskin Secondary School. Over the course of two years the schools learnt about their local copper mine heritage through visiting the sites and exploring primary sources.

## Purpose

This learning resource is aimed to help bring the copper mining heritage to life and to help learners understand the relevance of the activities in the past to today.

Copper mining at Coniston dates back 400 years, to the time of Queen Elizabeth I. The remains of the Copper Mines sites are an exceptional group and an important part of Britain's history.

**Activities included are suitable for KS1 – KS4** and they are supported by resources and background information. Subjects that can be explored range from history to geography, science, literacy, maths, drama and art. Resources for further exploration are also included.



# Contents

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<b>Coniston Copper Mines – a short history</b> .....	<b>4</b>
<b>Activities for Key Stages 1-2</b> .....	<b>7</b>
Activity 1 – Exploring a mining family .....	8
Activity 2 – An Inspector reports .....	12
Activity 3 – Looking at a school logbook .....	16
Activity 4 – An unfortunate death .....	20
Activity 5 – Discovering history through maps .....	24
<b>Activities for Key Stages 3-4</b> .....	<b>28</b>
Subjects .....	29
Activities .....	33
Resources .....	34
<b>Safety &amp; heritage notices</b> .....	<b>34</b>

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## Acknowledgements

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Rydal Estate

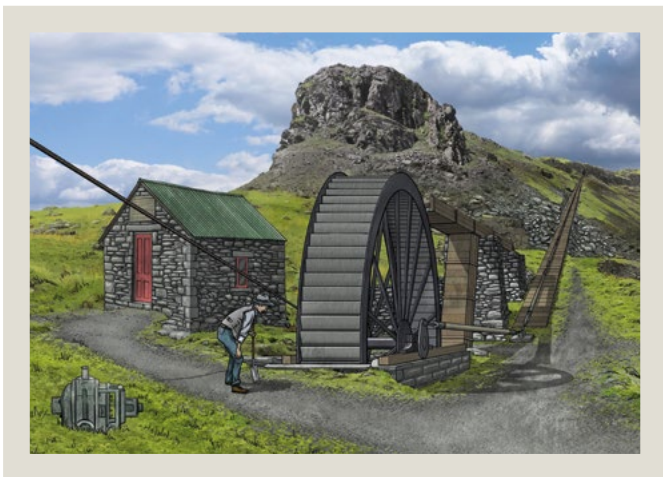


## Coniston Copper Mines – a short history

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### Summary

Copper mines at Coniston date back at least 400 years. Queen Elizabeth I brought German miners to Coniston to extract this valuable mineral. The town of Coniston grew around the copper industry. Copper mining stopped in the mid-1900s but its remains survive.



### The Early Days

In the 16th century, **Queen Elizabeth I** brought skilled **German workers** to Coniston. Copper was important to the country's emerging industries. It was used in weaponry and for coins. Copper hulls were a secret weapon for the Royal Navy for centuries – copper sheathed ships' hulls as they sailed the seven seas, giving them superior speed and agility.

Copper-mining probably didn't start in earnest until 1563 with the arrival of the experts from Germany. In 1568 the **Company of Mines Royal** was formed as a joint enterprise between Elizabethan society and the German miners.

Around **1590 the Company of Mines Royal began work on the copper veins at Coniston.** Archaeological traces survive at Red Dell as 'coffin' levels, which are access tunnels dug by hand. German-led mining continued until the Civil War (around 1642). The German mines go down more than 180 feet (55 metres) below the ground. Work continued after the Civil War but perhaps not much.



## The Industrial Revolution

From **1758 to 1795 the Macclesfield Copper Company worked Coniston's Bonsor Vein.**

This company went below the German workings, and opened up mines at Paddy End and Tilberthwaite. Gunpowder made it far quicker to dig out tunnels and so 'win' the ores from which copper was recovered. By 1795 the mines had gone more than 300 feet (90 metres) below the surface. In 1795 the company decided to abandon the mine as unproductive.

An experienced mine engineer from the south-west, **John Taylor, came to Coniston in 1824.** He transformed Coniston into the largest and most profitable copper mine in the north. Taylor drove new tunnels into the Bonsor Vein at Red Dell, and went below old German workings at Paddy End. In 1825 Taylor opened the Deep or Horse Level. Taken with its branches this measured one-and-a-half miles long. The level took water away from an enormous area of the copper mines. It also provided a superb tramway serving the horse-drawn wagons that drew ore out from all the faces in the mines.



**Coniston mining reached a peak around 1849.** Mines had reached 90 fathoms (165 metres) below the Deep Level. In 1850 they began work on another deep level to drain older workings in Tilberthwaite. This 915 metre-long level took ten years to complete and was named Barratt's Level after the mine manager. 1856 saw the highest production figures at Coniston (3659 tons of ore, valued at £27,861).

**In 1858 the Furness Railway built a branch-line from Foxfield to Coniston.** The line opened 18th June 1859. This replaced the traditional boat transport from Coniston Water to Ulverston Canal. Barges had carried the ores since the mid-17th century.



## Decay and Dereliction

**From the 1860s copper ore output began to drop.** From 1860 to 1864 it fell from 3000 tons of dressed copper to under 2000 tons. The mines at Bonsor Vein were so deep that its costs were immense. To illustrate its complexity as many as 16 waterwheels are said to have been operating around 1870. Below 170 fathoms (310 metres) the mineral magnetite was mixed with the copper ore in increasing quantities. At the time this mineral was difficult to separate.

Technological advances – for example dynamite (1877) and compressed air drills (1883) – improved efficiency.

**From the 1880s cheap imported ore made Coniston copper uncompetitive.** In 1897, the Old Engine Shaft Wheel was stopped for the last time, the New Engine Shaft wheel and machinery were dismantled and much of the mine was abandoned. Some ore was won from higher and older workings at Paddy End and Red Dell until around 1900.

An Anglo-French company (**Coniston Electrolytic Copper Company**) set up a new plant to process the spoil heaps around the Bonsor mills. This only operated until 1914.

Remaining waterwheels were removed as scrap in the 1930s. The last to go was from the Bonsor Upper Mill in 1939. Some prospecting took place in the early 1950s.

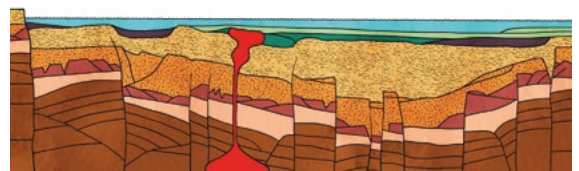
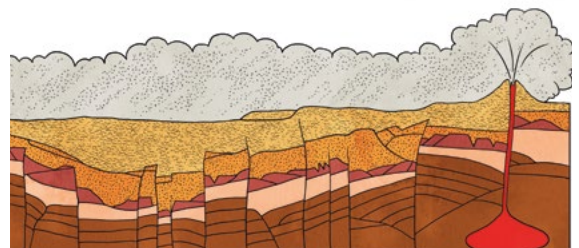
The mines were left to rot until recently. They reflect times past of busy prosperity and abundant employment. They were key to the development of Coniston.

## Why is copper here?

It all began 500 million years ago. Volcanoes forged the land and earthquakes twisted open large underground fissures.

Red-hot lava and ash clouds flowed from thundering super volcanoes. As they cooled they formed hard rock. Massive earthquakes lifted and twisted the land over millions of years.

Cracks and fissures wrenched open within the rock, to be filled by hot mineral-rich fluids forced upwards from within the Earth. As these cooled they hardened into veins, with copper minerals being the most common.



# Activities for Key Stages 1-2

These activities were developed with teaching staff from Coniston Church of England Primary School and delivered during 2017-2018.

## Activity Key



Draw



Act



Find

## Activity 1 – Exploring a mining family

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### Background

Thomas Millican, Copper Miner,  
aged 50 (in 1841 Census).

In 1850 when he died the newspapers reported that he was a much-respected old man about 60 years of age.

We don't know where Thomas was born although it may well have been Cumbria. The surname Millican is a variant of the Irish rooted Milligan, and in the 19th century its English distribution concentrates in the historic county of Cumberland. A Milligan family appears in the church records around 1800, and a John Millican witnessed a marriage in 1836.

In 1841 Thomas Millican lived in the Old Office at Coniston, with his wife Mary (50), and their four sons John (25), Thomas (20), Mark (15) and Wesley (12). All four sons give their trade as 'Copper Miner'. Apart from two joiners on this page of the census, everyone is a copper miner. There was probably another, older, son Joseph, not present at the time of the census.

We know that hThomas Millican had worked at Coniston Copper Mines for at least 13 years when he died in 1850 (Weds 21 August). This probably means he started his Coniston career in c 1837 when he was aged 46.

Thomas' wife Mary was born at Garrigill, Cumbria, and in 1851, after Thomas' death, the family lived at Far End, Coniston. Their eldest son Joseph by now had married and lived with his wife Elizabeth, the daughter of a local gardener and by trade a servant, and their young family at Silver Bank, Coniston.

The Millicans seem to have had a lodger with them at the Old Office in 1841, a Martha Fisher (then aged 14). She was still staying with the family in 1851 (then aged 24), and in the census of that year she says she was born on the Isle of Man. She may have been a relative perhaps, but in 1851 she was a servant at the Mines Office.



Source

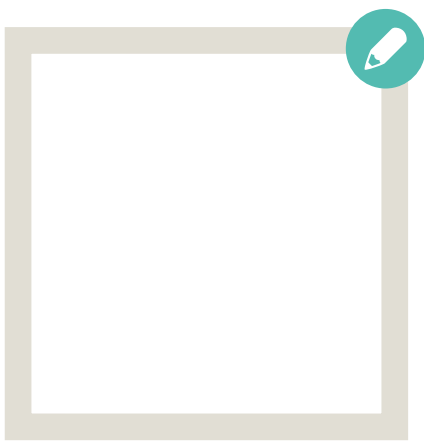
City or Borough of <u>Chicago</u> Wards or Township of <u>Chicago</u>		Enumeration Schedule		1		2	
PLACE	SEX	NAMES of each Person who shall answer the preceding Page	AGE		PROFESSION, TRADE, EMPLOYMENT, or of INDEPENDENT MEANS	When Born in this County	When Born in Scotland, Ireland, or Foreign Parts
			M	F			
Chicago	1	Thomas Williams	50		Employer		
		Mary do		10			
		John do	25		Apprentice		
		Thomas do	20		do		
		Mark do	15		do		
		Walter do	12		do		
		Robert Fisher	14				
		Thomas Gray	20				
		John Jones	30		Employer		
		Peter do	25				
		Robert do	25				
		William Jones	35		Employer		
		Robert Jones	35		Teacher		
		Thomas Jones	30		Employer		
		Joseph do	25				
		Francis Jones	20		Farmer		
		John do	40				
		William do	40				
		William Adams	30		Employer		
		George do	30				
		Thomas do	6				
		Thomas do	4				
		Thomas do	1				
		John Williams	25		Employer		
		John Jones	20		do		
TOTAL in 1	30		178				
Page 1							
City or Borough of <u>Chicago</u> Wards or Township of <u>Chicago</u>		Enumeration Schedule		1		2	
PLACE	SEX	NAMES of each Person who shall answer the preceding Page	AGE		PROFESSION, TRADE, EMPLOYMENT, or of INDEPENDENT MEANS	When Born in this County	When Born in Scotland, Ireland, or Foreign Parts
			M	F			
Chicago	1	William Jones	30		Employer		
		George do	25				
		John do	20				
		James do	15				
		John do	10				
		John do	5				
		James do	35		Employer		
		John do	30				
		John do	25				
		John do	20				
		John do	15				
		John do	10				
		John do	5				
		John do	30		Employer		
		John do	25				
		John do	20				
		John do	15				
		John do	10				
		John do	5				
TOTAL in 2	35		172		23		
Page 2							

## KS1 Family and Home

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### 1. Where did the Millican family live in 1841?

Draw a picture of each person who lived with Thomas Millican in 1841.

A large, empty square box with a light grey border, intended for drawing a person. A small teal circle with a white pencil icon is in the top right corner.

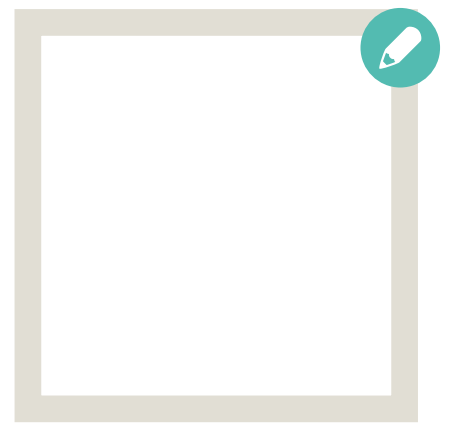
Name .....

Age .....

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Name .....

Age .....

A large, empty square box with a light grey border, intended for drawing a person. A small teal circle with a white pencil icon is in the top right corner.

Name .....

Age .....

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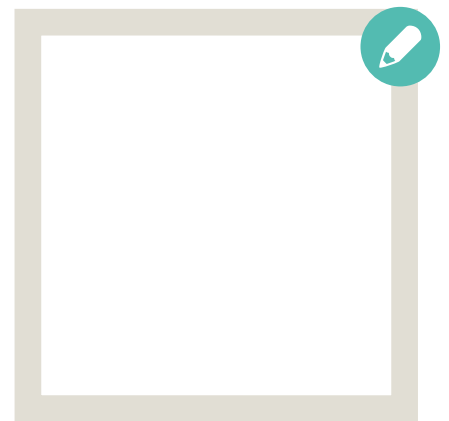
Name .....

Age .....

A large, empty square box with a light grey border, intended for drawing a person. A small teal circle with a white pencil icon is in the top right corner.

Name .....

Age .....

A large, empty square box with a light grey border, intended for drawing a person. A small teal circle with a white pencil icon is in the top right corner.

Name .....

Age .....



## KS2 Family and Home

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**1. What is a census?**

.....

.....

Use the 1841 Census to answer these questions:

**2. Where did Thomas Millican live?**

.....

**3. Write the names and ages of all the people in Thomas Millican's family?**

.....

.....

.....

.....

.....

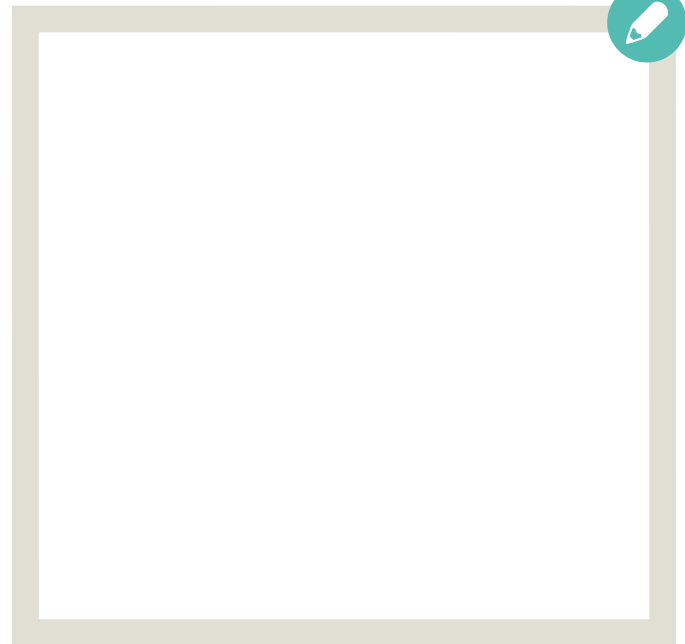
.....

**4. Using the page of the census return, can you list any jobs the people of Coniston did in 1841?**

.....

.....

**5. Draw a picture of the Millican family here:**

A large rectangular box with a light grey border, intended for drawing. A small teal circle with a white pencil icon is in the top right corner of the box.

## Activity 2 – An Inspector reports

### Background

These are extracts from an 1842 inspector's report on the employment of children and young persons in the mines and quarries of North Lancashire. It was written in 1842.

The inspector came to view the copper mines at Coniston and interview people working there, including children. At the time there were up to 97 children working here, some as young as six.

#### No.24 John Borricks.

He is 11 years old and has been at work in the mine for 2 years.

His employment is sometimes picking (ore) sometimes wheeling [in barrows]. The wheeling is the hardest work.

He comes to work at 7 o'clock in the morning and goes away at 6 o'clock at night but never works later.

He brings his dinner with him and breakfasts before he comes. He does not go home. He has 1 hour allowed for dinner and no time allowed for tea.

His hours of work are in winter only from daylight to dark. He has 1s. 6d. a week. He attends Sunday School and can read very little. He is a fine, robust, healthy looking boy.

#### No.25 Mark Millican.

He is 16 years old and works at the copper mine tubbs, that is, works the **jigging machine**.

He does not work in the winter and has been at work for about 6½ years.

He gets 1 shilling and 2 pence a day.

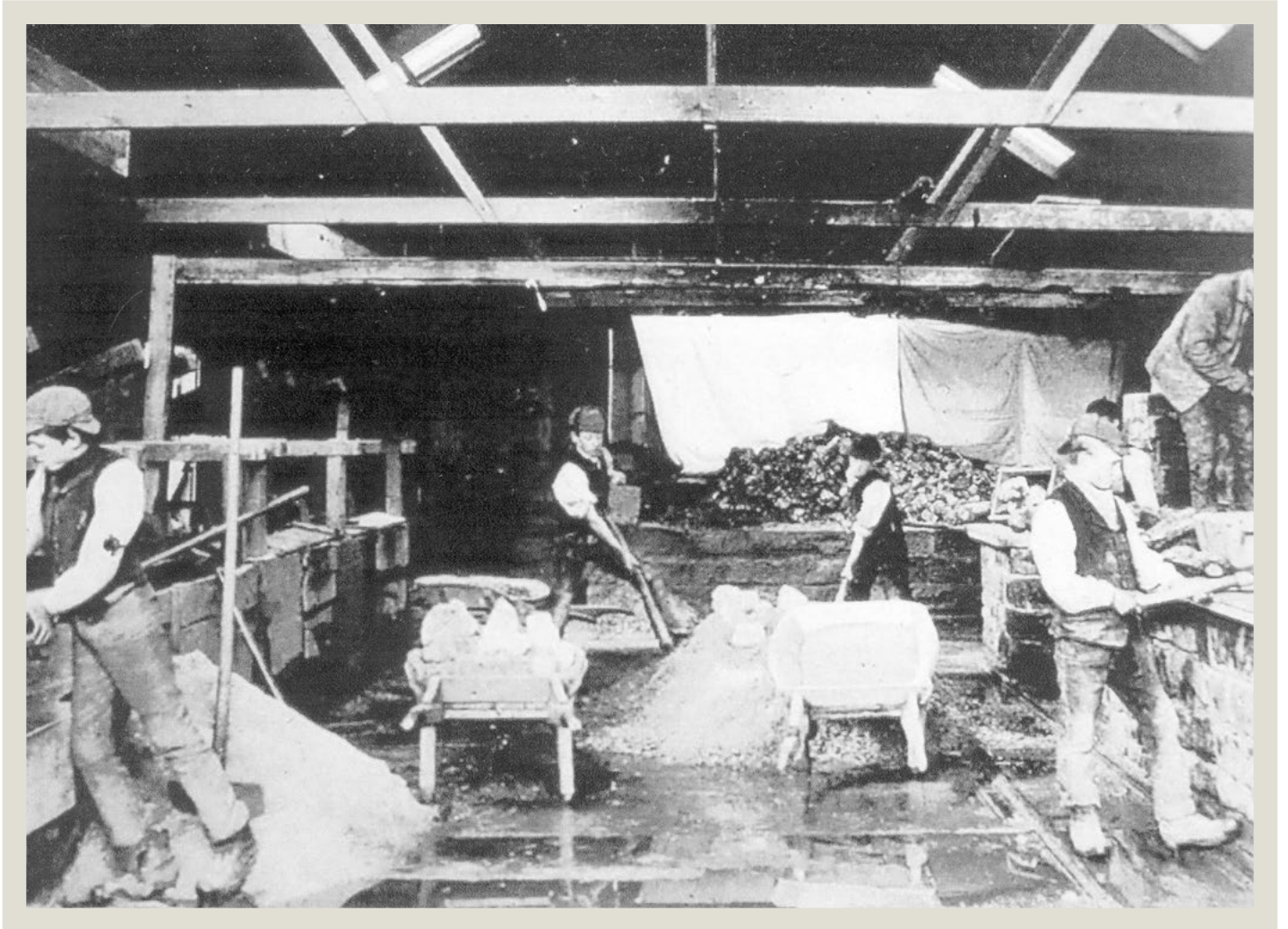
He never went to day school but learned to read at Sunday School and to write at night school. He learns ciphering and knows figures but has not yet learned much.

He works 10 hours a day.



## Source

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“The next operation would have been tubbing (or jigging). the stamped ore was shovelled onto wooden trays with sieve bottoms, and equipped with handles, and these were agitated by hand in large tubs of water with an up-and-down motion. this practice, unchanged over the years, effected a good separation of the heavier ores from the lighter dross but was an arduous task, and in winter a severely cold one. It was performed by boys stooping uncomfortably over the tubs.”  
(from Eric Holland p129)

Grinding and washing  
works at the Harris  
Shaft, Greenhow Hill.  
© Nidderdale Museum

## KS1 Inspector report

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Read about Mark Millican,  
Thomas Millican's son:

**1. How old was Mark Millican?**

---

**2. What job did he do?**

---

**3. Can you act out what he did?**



## KS2 Inspector report

---

Use the 1842 Inspector's report extracts to answer these questions.

Read about John Borwick:

**1. How old was John?**

.....

**2. What time does he start and finish work?**

**Starts at:** .....

**Finishes at:** .....

**3. How much time does he get for his dinner and tea?**

**Dinner** .....

**Tea** .....

Read about Mark Millican, Thomas Millican's son:

**4. How old was Mark?**

.....

**5. How old was Mark when he started working at the mine?**

.....

**6. What job did Mark do?**

.....

**7. Can you act out what he did?**



## Activity 3 – Looking at a school logbook

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### Background

School log books were written by the head teacher. They recorded important events in school life such as the visit of an inspector or governor, closure of the school or a new member of staff. They recorded attendance numbers, as well as epidemics and visits of the school nurse. Inspectors' reports were written out in full.

If the school held a celebration for a national event such as Queen Victoria's Jubilee it may be recorded. If you are lucky there might even be a programme or photograph tucked into the book.

Pupils were not generally recorded unless they did something out of the ordinary, like having an accident or passing an exam.

The earliest log books date from 1862. Although head teachers are no longer required to keep them some still do.



# Glossary

These extracts were taken from the Coniston Church of England School log books. Thanks to the school for allowing their reproduction.

19 March 1866

16<sup>th</sup> Nothing to remark  
 19<sup>th</sup> Attendance small several boys gone to work at the mines.  
 20<sup>th</sup> Admitted Gibson. Miss Robson visited  
 21<sup>st</sup> Exam<sup>d</sup> classes 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> in Christ<sup>y</sup> several failures - questions rather difficult.  
 22<sup>nd</sup> Nothing to remark  
 23<sup>rd</sup> The school to 2<sup>nd</sup> class Attendance very small only 42 present in morning none in afternoon.  
 26<sup>th</sup> Attendance better took most of 1<sup>st</sup> & 2<sup>nd</sup> classes to Church - being

26 June 1870

22<sup>nd</sup> Ordinary work - F. T. away  
 23<sup>rd</sup> Attendance small - pay at mines - wet day - Rev. C. Chapman visited the school, and took the third standard in Arithmetic.  
 26<sup>th</sup> Attendance improved - F. Mitchell left school to serve his apprenticeship at the mines as Wheelwright - Mr Chapman took sewing children at lessons 5' longer than reg<sup>d</sup> time + 15' in afternoon. Total 20' for day -  
 27<sup>th</sup> opened school 9 prompt - Boys read 6 chap. Acts - Prepared Time table - Closed school,

13 October 1876

ber 20<sup>th</sup> Av. Att. this week 78.  
 6<sup>th</sup> Ordinary progress Av. Att. =  
 13<sup>th</sup> Admitted some boys who have during summer been working at mines.

4 June 1878

1878  
 Since 4 The Coniston Mines having been closed many children are absent ~~this week~~ and today being very wet only 75 are present.  
 June 10 Whit Sunday. Holiday.  
 " "  
 12 Opened school with 27 children sent after absent ones, but was told "they won't come to pay for 3 days"  
 21<sup>st</sup> Usual routine during week - Committee meeting  
 27<sup>th</sup> closed school for summer vacation  
 29<sup>th</sup> Reopened school attendance fair etc. C.

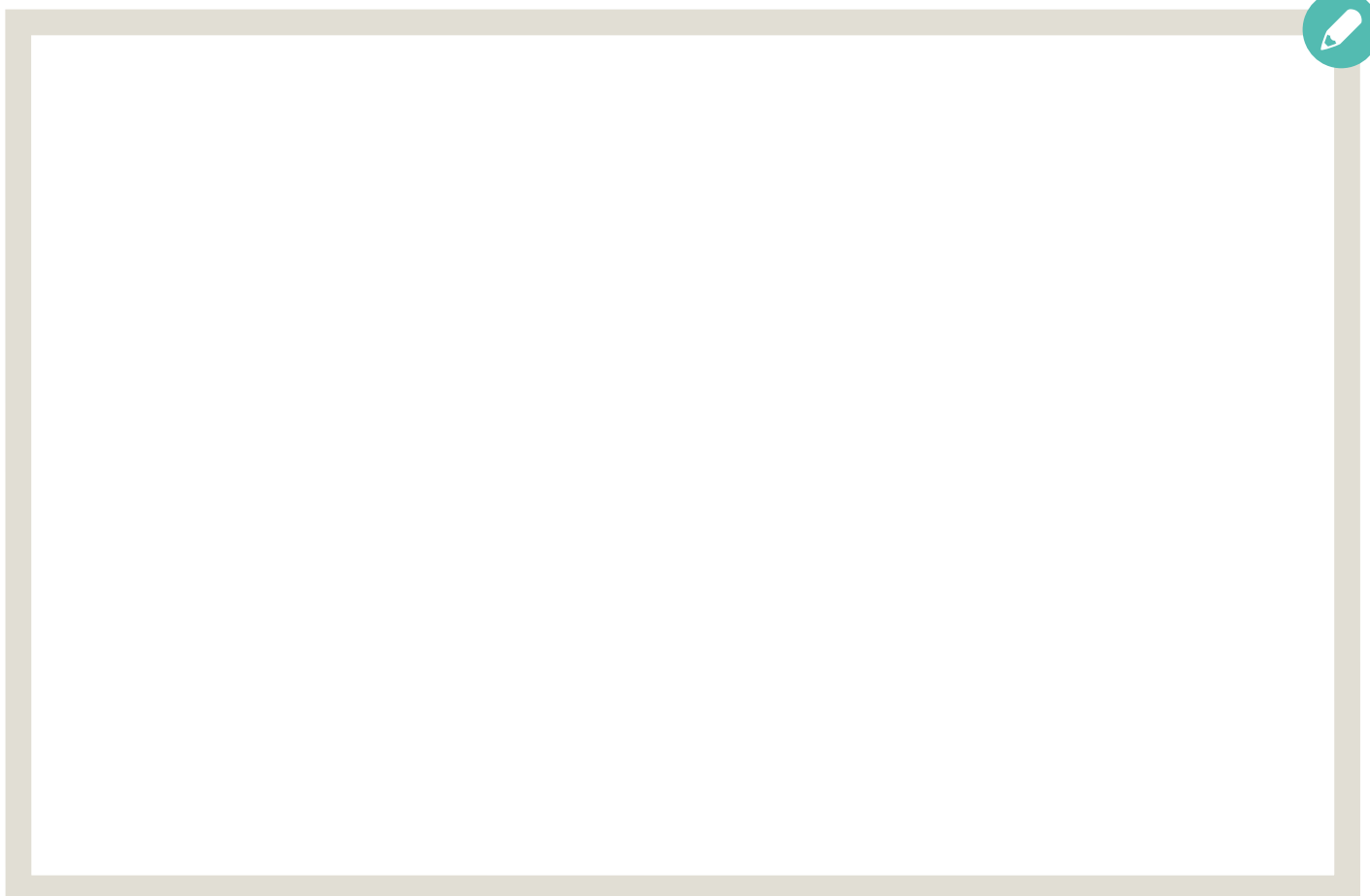
## KS1 School logbook

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1. Look at the school log book.  
What does it tell you about?

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2. Find 27 November 1870 in the log  
book. Draw a picture of the boys who  
had come to the school from the mine.

A large, empty rectangular box with a light grey border, intended for drawing. A small circular icon with a pencil is located in the top right corner of the box.

## KS2 Inspector report

1. What is a school log book?

.....

.....

.....

Use the school log book to answer these questions:

2. Why were many school children absent from school on 19 March 1866?

.....

3. What job was J. Mitchell training to do at the copper mines?

**hint** – find out on 23 June 1870

4. What was happening on 13 October 1871?

.....

.....

.....

5. Many children worked up at the mines in the summer and went to school in the winter. Why do you think this was?

.....

.....

.....

6. How many children were present on 4 June 1878?

.....



## Activity 4 - An unfortunate death

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### Background

On 21 August 1850 Thomas Millican was killed in an accident up at the mine. His death was reported by local newspapers.



## Source

### Activity 4 – An unfortunate death

#### Background

On 21 August 1850 Thomas Millican was killed in an accident up at the mine. His death was reported by local newspapers.

Carlisle Journal – 30 August 1850

Newspaper image © The British Library Board. All rights reserved.  
With thanks to [The British Newspaper Archive](#)

**SHOCKING ACCIDENT AT CONISTON.** — A fatal and most painful accident occurred on Wednesday morning week, to a much-respected old man, named Thomas Millican, about sixty years of age, while attendant upon the large water-wheel that serves to pump and draw the work from the deepest part of the Coniston copper mines. The unfortunate man met with his death by his falling into the wheel case, or rather into the inside of the wheel itself, during the time it was revolving at a most rapid rate, owing to which his body was literally torn to pieces by the arms of the wheel and the hundreds of screw-bolts that project some inches through the casing, like so many iron teeth, in the midst and upon which he was hurled for some time. The wheel is placed high upon the mountain side above the works, and was tended by the deceased alone; therefore it is not known how he got precipitated into the wheel. The deceased not attending to repeated signals from a person employed down the shaft, gave rise to a suspicion that something had befallen him, and on the party ascending, he was horror-struck at finding the mangled remains of the old man.—*Preston Guardian.*

## Shocking accident at Coniston mines

On Wednesday the 21st, inst., a most distressing accident (unparalleled we are happy to say, in the accidents of these mines.) occurred at the above place, attended with loss of life, in the most shocking manner to one of the workmen, Thos. Millican, senr., aged 61 years.

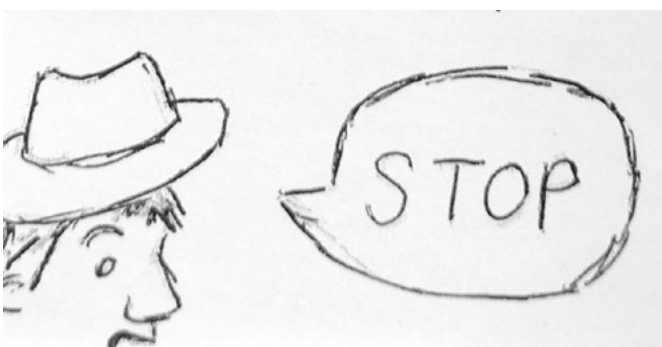
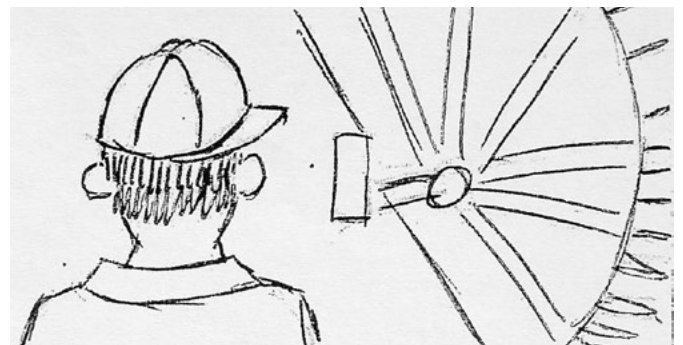
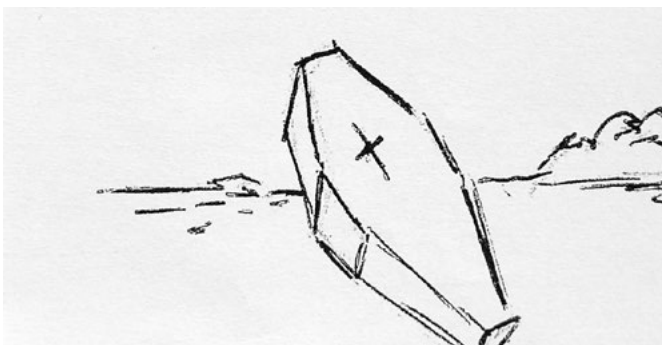
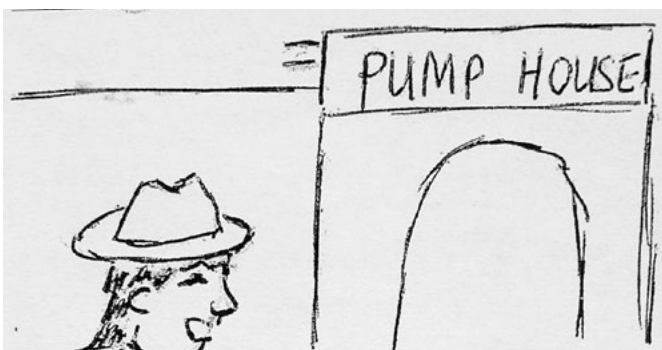
The deceased it appears on the day mentioned, proceeded to his usual employment at the works, an occupation in which he had been engaged for upwards of 13 years past, viz., attending the engine which draws the water and Ore out of the mine; and his first job in the morning in question was to pump out the water, and as usual to stop the pumps on a signal being given him by the person in care of them. When the water was all drawn out, the signal to stop was repeatedly given but not being attended to, the pump master proceeded to the engine house to ascertain the cause, but poor Millican could nowhere be seen, and the engine was immediately stopped, when he was discovered at the bottom of the wheel, in the inside, his body literally torn to pieces, and divested of every thread of clothing. The head of the unfortunate man was

found completely severed at the outside of the wheel pit, and his bowels after having been dashed out, were, with other portions of the body, carried down the watercourse. We will not however, further pursue our revolting description, suffice to say that the mutilated remains were carefully collected, and deposited in a coffin at the mines to await a Coroner's Inquest, which was held on the following day, and the interment took place on Friday. As the wheel (which is 30feet high) is placed upon the mountain side above the works, and which was tended by himself alone, it is not known how he got in, but it is thought that he was in the act of greasing the axle, which it was necessary to do daily, and that owing to the slipperiness of the ground, near the pit, from the constant splashing of water from the wheel, he had slipped or stumbled, and fallen in. The wheel, was revolving at a most rapid rate, and deceased must have been immediately pierced by the almost innumerable screw bolts that project through the casing to the inside, like so many iron teeth, in the midst and upon which, as in an immense cylinder he had been hurled round and round upon them.

# KS1 The Death of Thomas Millican

## 1. What happened to Thomas Millican?

Put the pictures in the correct order.



## KS2 The Death of Thomas Millican

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1. How do we know about the death of Thomas Millican?

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2. What happened to Thomas Millican?



## Activity 5 – Discovering history through maps

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### Background

The learners have a copy of a map from the 1851 Ordnance Survey collection. Used in conjunction with documents and photographs, maps and plans can provide many insights into the past in the local area, as well as a rich, cross-curricular learning experience.

We can build up a detailed picture of Coniston and its past inhabitants by examining historic maps and plans. They can show:

- Change over time
- How settlements and their features have grown, shrunk or disappeared
- What principal landmarks were at a particular time
- Where and what the communication routes were, e.g. road and rail
- How place and street names have changed or stayed the same



# Glossary

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## KS1 Map

Look at the 1851 map of Coniston Copper mines.

### 1. Below are the names of some Coniston Copper mine-related places.

Fill in the gaps:

C ..... C ..... Works

L ..... Water

G ..... C ..... Level

S ..... Nick

M ..... Race

P ..... Magazine

Thomas Millican worked near the place labelled as 'Shafts' in between Kernal Crag and The Red Dell Footbridge.

### 2. Can you find and highlight this on the map?



## KS2 Map

Look at the 1851 map of Coniston Copper mines.

**1. There are three copper 'Works' named on the map. What are their names?**

a. ....

b. ....

c. ....

**2. The coppermines needed water to power the mine machinery. Which 'Water' at the head of Coppermines Valley provided this?**

.....

.....

.....

**3. A horizontal passage into a mine was called a 'level'. Can you find and name three?**

a. ....

b. ....

c. ....

**4. Thomas Millican worked near the place labelled as 'Shafts' in between Kernal Crag and The Red Dell Footbridge. Can you find and highlight this on the map?**



# Activities for Key Stages 3-4

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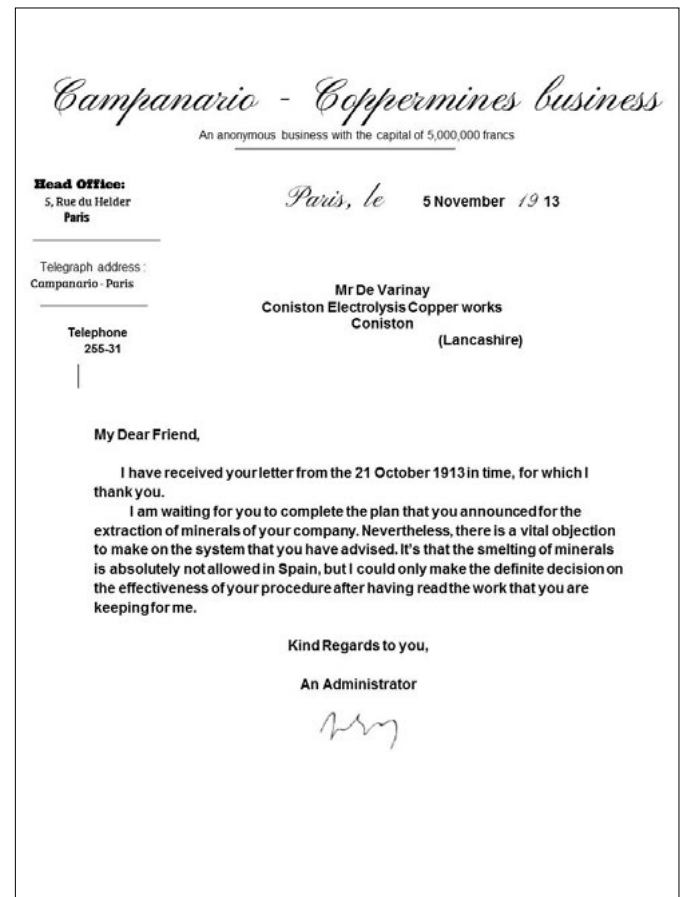
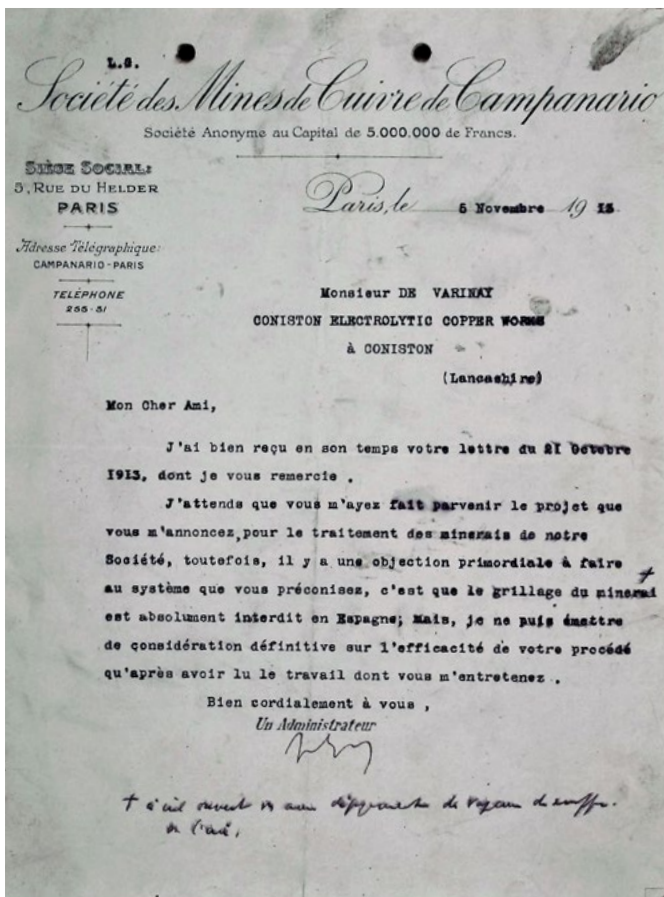
These activities were developed with teaching staff from John Ruskin Secondary School and delivered during 2017-2018.



## Subject – French

A group of Year 10 students from John Ruskin School used some original French-language documents of the electrolytic company to practise translating texts. The source material meant the learners had to develop a range of unfamiliar French vocabulary. The activity required comprehension of original materials

to understand purpose, important ideas and details. The original documents provided short, suitable material for learners to accurately translate into English. Learners also used their science knowledge to understand the contents of the letter, and their IT skills to present their translated versions using the same format.



From the papers of the Coniston Electrolytic Copper Works, © courtesy of Ruskin Museum, Coniston.

Translation of texts by John Ruskin School students.

## Subject – Geography

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A group of Year 9 students from John Ruskin School spent an entire day learning outside the classroom. Observing different building materials in Coniston was followed by a trip up onto the fells and down into a mine level to experience geology in the landscape.

At Mouldry Bank and Long Crag, students can view a well-exposed and accessible example of a section through the uppermost formations of the Borrowdale Volcanic Group.

Visiting Coniston's copper mines can also help to explore:

- What we mean by geology
- How rocks can be categorized
- Geological periods
- Successive sediments, faults and mineral deposits
- That the oldest rocks are the hardest
- Volcanoes and lava flows
- How rocks are altered by nature and people
- How different rocks are used in building

## Subject – History

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Coniston Copper offers opportunities for learners to develop their knowledge of local history.

The story of mining at Coniston also presents opportunities to explore significant events and trends over long periods.

A variety of different historical sources can be employed to examine historical claims, and to challenge interpretations of the past. Relevant maps can be used to support a local history study.

## Subject – Science

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A group of Year 11 students at John Ruskin School took part in a day-long science trip to the Coniston copper mines site. After a brief introduction at school, the students explored the old electrolysis works, one of the former mine levels, and other mining features in the landscape. The trip put the electrolytic processes into context and brought the science to life.

As a follow up to the site visit, students were able to extract copper from ore in the classroom using electrolysis.

Mining, and in particular the Electrolytic Company at the Coniston copper mines, provides opportunities to explore mixtures and dissolving, chemical reactions and changes, and chemical industries.



## Background

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In 1911 the Coniston Electrolytic Copper Company was established, a joint Anglo-French venture.

The new company intended to extract copper from the dumps of rejected ore surrounding the old dressing floors by the means of the newly developed electrolytic recovery process.

### **Electrolytic process**

In September 1913, the French mining engineer, Count Henri de Bonnifonte de Varinay came to oversee this work. He constructed a new laboratory on the Bonsor Upper Mill.

### **Crushing and grinding plant**

Ore was crushed and ground.

### **Concentration plant**

The material from the crushing and grinding plant was then passed to here where the crushed and grinded material was mixed with oil. The waste sank and the metallic ores were lifted to the top.

### **Lixiviation process**

After draining the concentrate was weighed.

It was then fed onto a roasting furnace to stir the concentrate and break lumps. Ore was roasted as 'sweetly' as possible. Heat drove off sulphur and arsenic, and hot gases were dragged through a lead-lined cooling chamber.

After cooling the gases were forced upwards through two wooden lead-lined towers (aka scrubbers, filled with small coke),

and against a downward trickle of water which dissolved the gas forming a weak sulphurous acid. This acid was collected in lead-lined vats. The vats were later flushed with water and the sludge allowed to settle in the ponds at the back of the youth hostel.

Concentrated sulphuric acid was added from an overhead lead-lined reservoir, creating a copper sulphate solution that was sent to the electrolysis building.

### **Electrolysis plant**

Each vat was fitted with perforated anodes of lead, and revolving cylindrical cathodes smeared with conductive graphite grease on which the copper was deposited. The grease afforded easy removal. The cylinders of copper were virtually pure and weighed from 120 to 160 pounds (54 kg to 72 kg). These were sold as formed, or melted down in graphite crucibles in a high.

### **Water power**

Electricity was needed for the electrolysis process. Water was delivered to a large pelton-wheel from an iron pipeline. This pipeline took its water from the earlier Tongue Brow Water race. Sluice gates were used to control the water flow. The French called this 'La Grande Canalisation'. However they struggled with the control of water – electrolysis requires low voltage but high amperage which means not much pressure but constant flow.



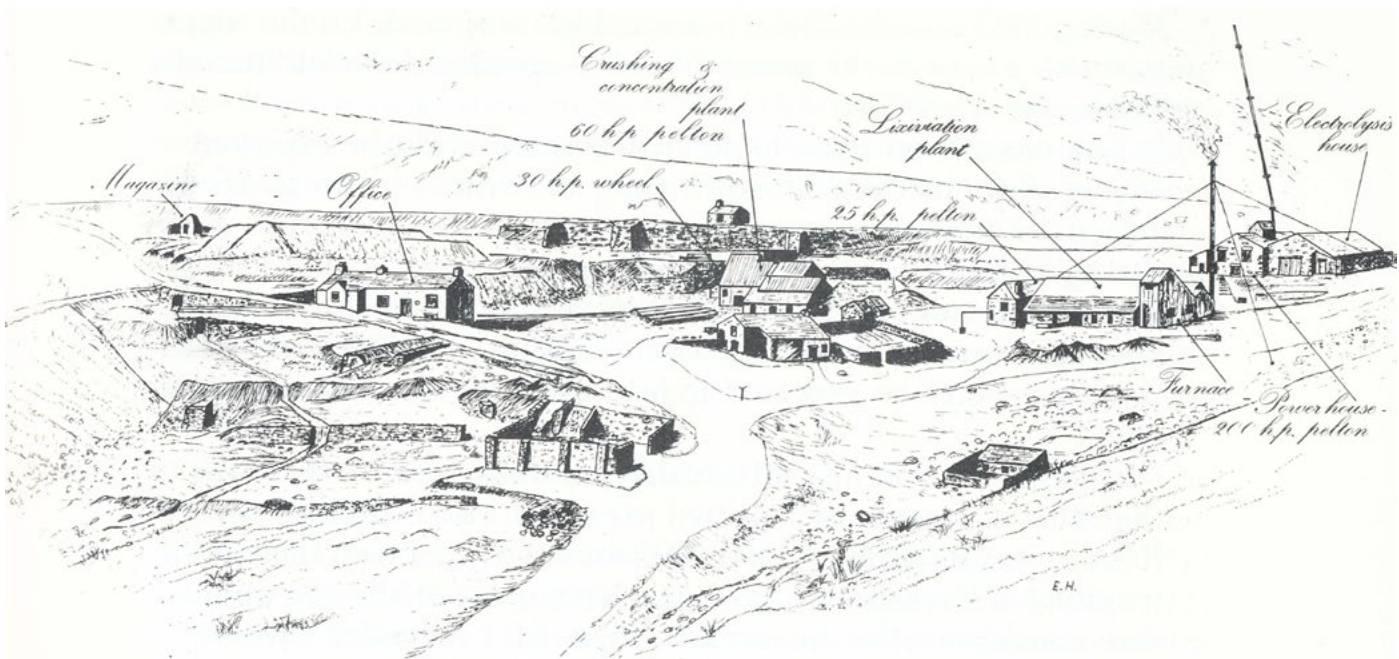
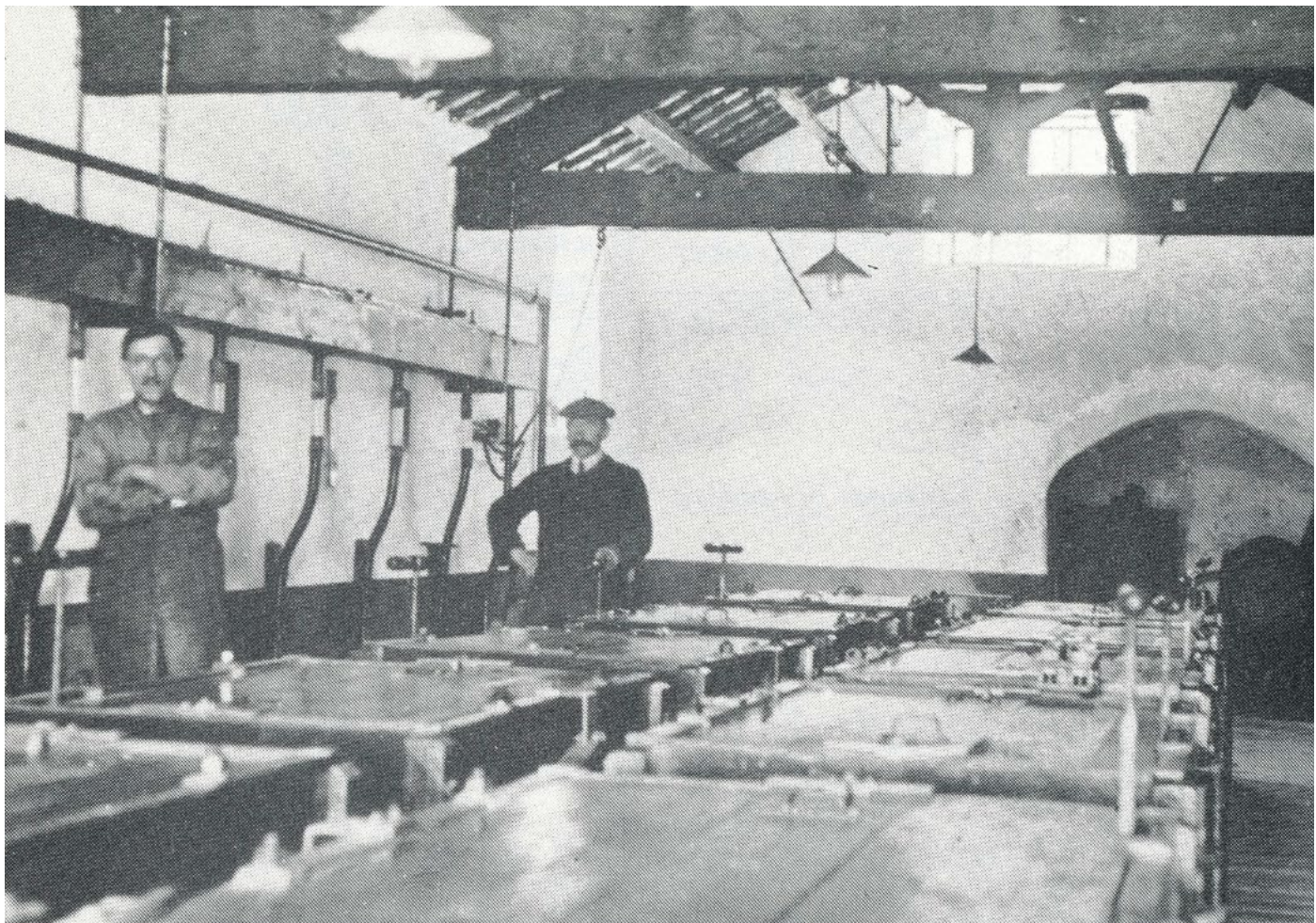


Fig. 85. The old Upper Mill of the Bonsor Dressing Floors, when occupied by the Coniston Electrolytic Copper Works, c.1914.

## Activities

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The following activities were developed as part of the Coniston Copper project. Take a look at them to inspire your own projects.

- Building a model of some mine equipment – a water wheel, or kibble – and then use stop-motion animation to ‘bring it to life’.
- Acting out and filming scenes from the history of the mine. See [these](#) for inspiration.
- Building Coniston copper mines in Minecraft or through Twine. See [game here](#) for inspiration.

## Resources

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- A [video](#) showing how the copper mines may have looked in their heyday.
- You can also visit some of the historic copper mine sites and related sites:
  - Self-guided trails
    - [Miner’s lives](#)
    - [Introducing coppermines valley](#)
    - [Land of power and ore](#)
  - Mining spotter’s guide

### Ruskin Museum, Coniston

[Ruskin Museum, Coniston](#) has displays about Coniston copper mines and miners, and a good geology display that shows how the rocks and the copper in Coniston were formed.

### Cumbria Amenity Trust Mining History Society

[The Cumbria Amenity Trust Mining History Society \(CATMHS\)](#) is a society interested in historical industrial sites with an emphasis on mining remains above and below ground. It is actively involved with the exploration of these sites. Contact them to find out more about Coniston’s copper-mining heritage and for support to visit the sites.



### **Safety notice**

Old Mines and industrial workings can be extremely dangerous. For your own safety, please take care when walking around the site.

### **Heritage notice**

Though it has survived hundreds of years, the site can be easily damaged. The site is legally protected as a Scheduled Monument and a Site of Special Scientific Interest. The Lake District is recognised as a World Heritage Site with outstanding universal value. Local industries like copper mining have contributed to its unique character. Please help preserve the Lake District's heritage by leaving the site exactly as you find it.

