

University of Strathclyde

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Centre for Lifelong Learning within the School of Education,
Faculty of Humanities and Social Sciences

WHAT WAS THE GENEALOGICAL EFFECT OF THE DECLINE OF
THE LEAD MINING INDUSTRY IN THE NORTHERN PENNINES
BETWEEN 1851 AND 1901?

by
Mike Kipling

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of MSc in Genealogical, Palaeographic and Heraldic Studies

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ABSTRACT

A peak of production and employment in the Northern Pennine lead mining industry occurred around 1850. After that, the industry declined to virtually nothing within less than 50 years, due to exhaustion of easily accessible ore and competition from more efficient mines overseas. Census records for relevant registration districts show a significant decline in lead mining activity after 1861 and the price of lead steadily declined, particularly after 1871.

Approximately fifty households have been selected at random from the 1871 census returns of each of three lead mining areas: Nenthead, Arkengarthdale and Greenhow Hill. Using commercial on-line sources in the main, the fate of as many as possible of these 155 households/742 individuals has been tracked over the following thirty years. The resulting data has been analysed with particular regard to changes in occupation and place of residence.

Similar analyses for comparison purposes have been carried out for the Northern Pennine farming region of Baldersdale and the west Cornwall tin mining parish of Towednack. Individual family case studies have been included for each of the five areas to illustrate typical - or atypical - migration patterns.

The results generally demonstrate compliance with accepted migration theory. In particular, employment in the Durham coal fields can be seen to be significantly more attractive to those from lead mining communities than from farming communities. Ease of access and informal communications networks are important factors, evidenced not just by the lack of migration there from the more southerly Greenhow Hill but also by the significant preference of Towednack miners to travel overseas rather than to elsewhere in the United Kingdom.

Family dispersal is found to be higher in the declining mining communities. A contributory factor is the migration of daughters on marriage.

ABBREVIATIONS

BMD – Records of births/baptisms, marriages and deaths/burial

CEB – Census Enumerators' Books

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“You could tell Greenhow Hill folk by the red-apple colour o’ their cheeks an’ nose tips, and their blue eyes, driven into pin-points by the wind. Miners mostly, burrowin’ for lead i’ th’ hillsides, followin’ the trail of th’ ore vein same as a field-rat”.

On Greenhow Hill Rudyard Kipling

1. Introduction

Lead has for thousands of years been valued for its malleability and resistance to corrosion, so suiting it particularly for water transportation and proofing purposes. It is primarily obtained by the smelting of galena, or lead sulphide, ore. Lead ore is found in ‘veins’, generally vertical faults in the bedrock into which the ores and other mineral have been forced under pressure. Lead ore veins are almost always found in Carboniferous age rocks, so limiting the areas of the country in which lead is mined¹.

Lead ore is rarely found alone, many mineral veins also containing smaller quantities of other metallic ores and non-metallic minerals such as barites, quartz and fluorspar (known collectively to the miners as ‘gangue’).

The processing of lead ore involves ‘dressing’, a physical separation of the mineral ores from the gangue, and then smelting, a chain of chemical reactions at high temperature leading to the production of the pure lead. Sometimes, further processing is carried out to separate small quantities of silver from the lead.

The Northern Pennines are for this research defined as that part of the chain lying in or to the north of Airedale, hence mainly in Yorkshire and Durham, spilling over in the far northwest to Westmorland, Cumberland and Northumberland. The other main Pennine lead mining area, Derbyshire, is not considered in this study.

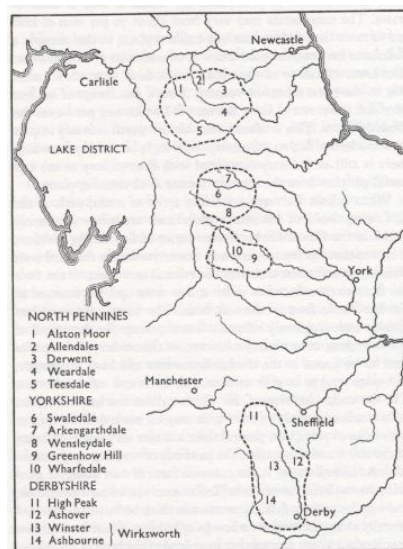


Fig 1: Map of Pennine Lead Mining Areas²

Lead ore has been mined and processed in the Northern Pennines since Roman times. Mining continued in the middle ages under the auspices of large religious houses such as Jervaulx and Fountains. Following the dissolution, many manorial and mineral rights reverted to and were sold or awarded by the state to a variety of owners. For example, the rights to Alston Moor came to belong to the 3rd Earl of Derwentwater, although he subsequently forfeited them following his participation in 1715 uprising, after which the state gave them to the Greenwich Hospital.³

Whilst individual or partnerships of local miners continued to lease mining rights from the owners for fixed periods, the late 1600s saw the rise of the involvement of joint stock companies. Most prominent in the region was the Quaker-run London Lead Company, which after 1750 had extensive interests in the northern districts⁴.

Raistrick and Jennings identify ten separate lead mining districts in the region, although there were also smaller pockets such as Connonley in Airedale. Three of these regions have been selected for detailed study; Alston Moor in the north, Arkengarthdale in the centre and Greenhow Hill to the south. It is anticipated that this will most efficiently identify the main differences and similarities in family development and migration patterns throughout the region.

As with most commodities, the supply and demand for lead fluctuated over time, leading to periods of increased price and expansion of productive capacity followed by periods of lower prices and layoffs. These fluctuations in labour requirements resulted in periods of significant migration into or out of the mining districts.

During the period of this study, 1851-1901, the product of lead in England and Wales fell from around 60,000 tons a year to under 20,000 tons a year, the decline coming mainly after 1871, the last year production exceeded 60,000 tons.⁵ It was no coincidence that the price of lead was also falling throughout much of the period, from a high of £24 a fodder in 1856 to a low of £9 11s a fodder in 1894. A fodder is a weight varying locally between around 19.5 and 24 imperial hundredweight (cwt), a ton being exactly 20 cwt.⁶

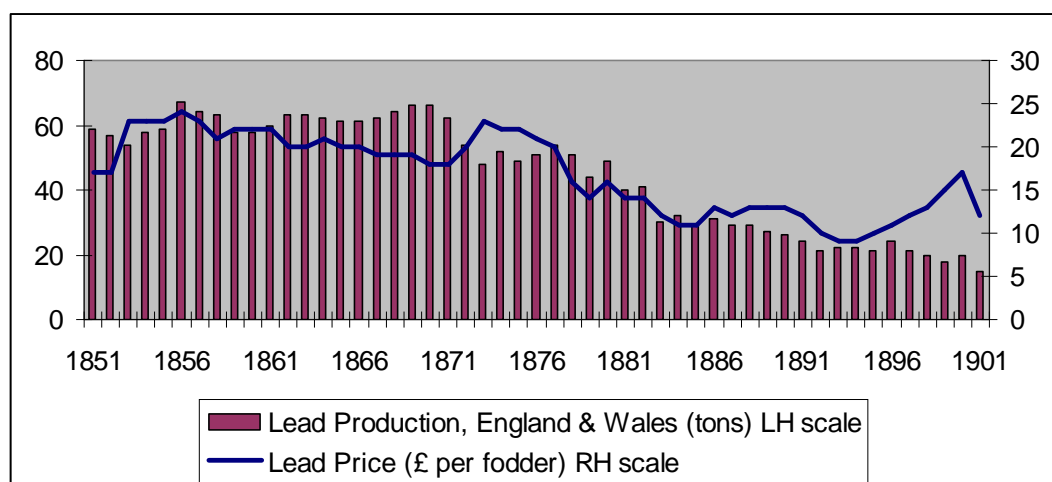


Fig 2. Lead production and price in England & Wales 1851-1901^{5,6}

Average wages in the UK had also more than doubled over the period, significantly exacerbating the decline in the lead price on mine profitability.⁷

Cause of the decline in price, and so production, was primarily related to the successful development at much lower cost of lead fields overseas. The volume of lead imported to the UK rose from 14,000 tons in 1851 to over 100,000 tons by 1880, showing that it was not a fall in internal demand which led to the decline⁸.

The problem in the UK was that most easily accessible veins had already been exhausted and further production required major investment in digging deeper shafts and longer levels and in machinery to drain water, provide fresh air and remove the mined ore. Richer and shallower mines were being discovered in many parts of the world, often ironically by British prospectors. World production of lead actually quadrupled between the early 1870s and the first decade of the twentieth century.

Not surprisingly, employment in the industry fell steeply. Burt provides figures for the region, derived from the official reports produced after each decennial census of England and Wales (Fig 3).

	No. of Miners
1851	7977
1861	8016
1871	5952
1881	3905

Fig 3 : Miners employed in the North Pennine region 1851-1881

The official census reports can be used to derive the decline with greater granularity (Fig 4). The totals for 1861-1881 closely match those of Burt and the numbers for the North Riding closely match those of Hallas (1999) for Swaledale and Wensleydale 1861-1891.⁹

County	1861	1871	1881	1891	1901
Northumberland	1287	920	644	381	253
Durham	2589	2264	1448	804	384
Cumberland	1603	1082	645	517	417
Westmorland	299	226	164	151	n/a
Yorks. North Riding	1409	1019	712	269	112
Yorks. West Riding	703	412	261	85 inc. in NR	
TOTAL	7890	5923	3874	2207	1166
% Change	-	-25%	-35%	-43%	-47%

(Cumberland data also includes the Lake District ore field)

Fig 4: Decline in Lead Mining employment in the North Pennine region 1861-1901

Figs 3 and 4 point to the period after 1861, particularly the decade 1871-1881, as the peak period of movement away from lead mining in the region. The statistical analysis which forms a major element of this study therefore focuses on households with one or more members engaged in lead mining at the time of the 1871 census, tracking them as far as possible until 1901.

It is clearly infeasible to investigate other than a small proportion of households of the 5923 workers in Fig 4. Whilst a random sample of, say, 150, could have been drawn from the 5923, the approach has been taken instead to select three small areas from across the region and to select 50 households from these alone. It is considered that this may reveal more about the factors influencing migration and will also leave results of more coherent benefit for other genealogists.

The regions selected are Nenthead (Cumberland), Arkengarthdale (Yorkshire, North Riding) and Greenhow Hill (Yorkshire, West Riding).

To assist in identifying the specific impact of the decline in the lead mining industry on families, it is also necessary to consider typical migratory behaviours in the absence of mining industry decline and also in areas subject to decline in similar industries. The almost exclusively agricultural area of Baldersdale, in the high Northern Pennines, and the tin-mining parish of Towednack in far west Cornwall have been selected as suitable comparison areas.

Nenthead

Nenthead is a district in the parish of Alston, on the upper reaches of the South Tyne river. It is in Cumberland, although Alston parish borders onto Northumberland, Durham and Westmorland. However, it is to the east of the Pennine watershed and historically came under the ecclesiastical jurisdiction of Durham rather than the nearer Carlisle.

Nenthead is arguably the highest village in England, rising from 1460 to 1600 feet above sea level, and is about five miles up the short tributary River Nent from Alston town¹⁰.

Nenthead was an almost exclusively lead mining village which had largely grown up around several lead mines in the mid to late 18th century, the rights to which were acquired by and which were greatly expanded by the London Lead Company ('LLC'). Being Quaker-run, the LLC took a greater interest in the welfare of its workers than most industrial concerns of the time.



Fig 5: Remains of the LLC Smelting works at Nenthead and entrance to mine level.

Whist lead mining took place elsewhere in Alston parish, especially Garrigill to the south-west, this study will focus on Nenthead rather than the parish as a whole for reasons of greater homogeneity and also of increasing its value to social and family historians of this interesting mining village.



Fig 6: Location of some of the Nenthead mines¹¹

Alston parish abuts onto a number of parishes in its surrounding counties, most pertinently the lead mining parishes of Stanhope and Middleton-in-Teesdale in Durham and Allendale in Northumberland.

Arkengarthdale

Arkengarthdale is a tributary valley on the north side of Swaledale. It forms a small part of the larger Swaledale lead mining area. Lead has been mined there from at least the 13th century and the mines were subsequently developed first under the ownership of the Bathurst family (the dale's hotel, the C.B. Arms, is named after Charles Bathurst) and, by the period of this study, the Gilpin-Browns.

The value of the lead mines in the dale in 1854 is indicated by the fact that two of 31 shares of a lease of the mines changed hands then for £2500 (plus an extra £500 if lead rose over £20 per ton).¹² In today's money, this values the whole venture at around £27m adjusting for the growth in average earnings since then¹³.

In 1857, Dr T.H Jackson wrote an article in the *British Medical Journal* critical of the working conditions in the mines of Arkengarthdale and Swaledale.¹⁴ Not surprisingly, the main diseases suffered by the miners were lung-related.

In 1890, the lease on the mines was not renewed and production declined steadily, to a low of 72 tons in 1902. By 1904, only 4 men were employed in the mines.¹⁵



Fig 7. Map of some of the Arkengarthdale mines¹⁶

Arkengarthdale parish abuts onto the Teesdale parishes of Bowes, Barningham and Kirby Ravensworth to the north, and the Swaledale parishes of Grinton and Marrick to the south.¹⁷



Fig 8: A typical Arkengarthdale miner-farmer's cottage (often shared by more than one family in the 19th century)

Greenhow Hill

Greenhow Hill is situated on the watershed between Nidderdale and Wharfedale in the West Riding of Yorkshire. It is the meeting point of the boundaries of three parishes, Pateley Bridge from the east, Burnsall from the West and Thornthwaite from the south. Greenhow Hill households can be found in the census extracts for all three parishes.

An area with a Roman and monastic mining history, in more recent times there had been sporadic investment by a variety of owners and lessees. However the ore field was not large and the water table was high, access to additional ore seams requiring either substantial investment in pumping or in draining via lower levels (tunnels) to the valleys through much unproductive ground.¹⁸

In 1867, local dialect poet Thomas Blackah wrote:

*“T’Moor’s nowt like itsen noo, it’s altered for t’war;
An’ few o’t oade folk can finn’d living thar;”*¹⁹

Baldersdale

The valley of Baldersdale lies approximately equidistant between Arkengarthdale and Nenthead. Like both, it is in the high Pennines. It consists of isolated farmsteads and three hamlets (Hunderthwaite and Hury on its north side and Briscoe on the south). It forms part of the extensive parish of Romaldkirk, along with Lunedale and the villages of Cotherstone and Lartington. Romaldkirk was then in the North Riding of Yorkshire and abutted the parishes of Middleton-in-Teesdale in Durham to the north and east, several moorland parishes of Westmorland, especially Brough and Stainmore to the west and the Yorkshire parishes of Bowes and Startforth to the south.



Fig 9: Clove Lodge, a typical Baldersdale farm

Successive censuses show the occupation of the residents is almost exclusively agricultural. There was little change in the dale between 1851-1901 other than the construction of two reservoirs for the Stockton and Middlesbrough Water Board which brought temporary employment and inwards migration.

Baldersdale therefore makes a useful subject for comparing the underlying migration trends in an area not affected by a declining mining industry, but still potentially subject to the impact of birth rate and the attractions of expanding industrial regions.

Towednack

Towednack is a parish in the far west of Cornwall, situated to the west of St Ives. In the 1850s, its population of a little over one thousand was engaged partly in tin mining and partly in agriculture. The mining industry in the parish suffered a rapid decline between 1861 and 1881. The remote location, size and date of decline match those of the Northern Pennine lead mining areas and so favour it for comparison purposes.

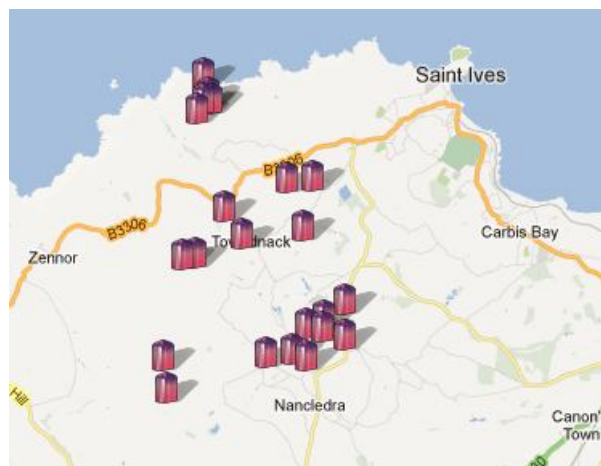


Fig 10: Location map of some of the tin mines in Towednack parish²⁰

The immediately adjacent parishes are St Ives, Uny Lelant, Gulval, Ludgvan and Zennor.

By 1871, the largest mine, employing several hundred, was Wheal Sisters, located near Nancledra and largely in the neighbouring parish of Uny Lelant. Other smaller mines such as Giew and Georgia Consols were active for parts of the period.²¹ Unfortunately, Wheal Sisters closed in August 1888, as anticipated by *The Cornishman* (see Fig 11).²²

fit awaits them. As we understand the position of affairs the present proprietary and work - people are ready to put a staunch shoulder to either wheel, and, if sympathising onlookers will pull or push a pound or two, **Wheal** Sisters will progress. Lacking that aid many a ten thousand pound will lie unremunerative in the depths of Trencrom ; and many a bold miner, as much his county's pride as Goldsmith's peasant was that of England's taking heart by the words of a comrade—

‘ Let's profit by the ills of life,
Through heat, through winter's cold,
And conquer crooked circumstance,
And turn it all to gold, ’

will have to seek the employ Cornwall cannot yield and the gold that lies in foreign climes, and quit the Cornish homes which now dot many a landscape in Ludgvan, Towednack, or Lelant.

Fig 11: Wheal Sisters article in *The Cornishman* - Thursday 05 July 1888

2. Literature Review

Literature relevant to this study includes that on the topic of population migration generally, especially where focused on the United Kingdom, and that relating specifically to the Northern Pennine area of this study (and the selected comparison area of Cornwall). The latter group contains material varying from those majoring on the history of the lead (or, in Cornwall, tin) mining industry to individual or group family history studies.

Population Migration (General)

Of prime importance in analysing any migration pattern is an understanding of the underlying drivers. Ravenstein (1885) sets out seven 'laws' of migration based on analysis of the 1881 census summaries for the United Kingdom.²³ His theories are predominantly based on the hypothesis that growing towns or regions of new industry attract migrants from the immediate locality and that migrants from further away then move in to fill the labour deficit created in the vacated locality. This leads to his first 'law', which states that migrants rarely move long distances. Ravenstein also observed that, if migrants do move long distances, then this is generally to a major centre of industry rather than, say, to another agricultural region. He also observed that females were generally more locally migratory than males, mainly for the reasons of domestic service and factory employment.

Lee (1966), expanding upon the work of Ravenstein, argued that there are additional factors at play, especially reduced employment opportunity in the home locality and ease of travel, both physical and legal.²⁴ He proposes a 'push-pull' theory of migration, under which the rate of migration between location *i* and location *j* were dependent on the attraction of *i*, the disadvantages of *j* and the difficulty of travelling between them. Lee adds that migration takes place in identifiable streams, sometimes with a quantifiable counter-stream of returning migrants, both successful and unsuccessful, although postulating that the return migration pressure is weak where the main driving factor is reduced opportunity at *i*.

Baines (1985), adopting a more statistically-based approach, identifies the difference between family or 'folk' migration and individual migration, proposing that the development of the railway and, for overseas emigration the steamship, made possible a relatively easy return to the home region, even from across the Atlantic²⁵. This made it possible for younger prospective migrants to envisage a return to their family, 'fortunes' made.

Baines also examines in detail the census and registration data for England and Wales for 1861-1901 and constructs a complex, multi-state population model to estimate the net internal and overseas migration by county for the four decades. For example, he estimates that the male net migration rate in 1861-70 from Yorkshire to other counties of England was 3.4% and that to overseas was 1.8%. For Cornwall, the equivalent values were 6.4% and 13.3%.

In a recent review of literature in this area, Hagen-Zanker confirms that broadly similar understandings of the drivers of migration exist today, although having perhaps been rationalised more in the context of macro, meso and micro level economic theory.²⁶ The migration-decision making of families at household level is given prominence in a general theory of migration, with the object of increased wealth and hence social status seen as key. The development of networks between early migrants and those back home also has an important facilitation effect for further migration, including the remittance of funds for its finance.

Turning to more focused publications, White (1996) presents a case study of mid-Victorian family migration in Grantham and Scunthorpe based on the 1881 census enumerators' books (CEB).²⁷ The work is based on inward rather than outward migration, as the former would have been much easier to analyse before widespread CEB digitisation. The Lincolnshire study presents a way of analysing inward migration by whether individuals or whole families migrated. The authors conclude that single-person migration predominated in Grantham, as it was a market town with opportunities for young people via apprenticeships and domestic service. Whereas in Scunthorpe, the growing iron industry demanded strong, more mature male workers who generally already had families.

Turner (1996) similarly analyses the migration of textile workers into Accrington in the 1850s²⁸. He discerns a number of influencing factors, including the desire to continue to practice existing skills no longer needed at the individual's current location, a factor not observed by White.

Hallas (1988, 1999) examines migration from Wensleydale and Swaledale in 1851-1891, looking in particular at the fate of various traditional occupations including lead-mining, agriculture and textiles, and the impact of the improvement of the transport infrastructure both on those remaining in the dales and on migration²⁹. Migration from, to and within the dales is analysed, with some individual family examples noted. Hallas notes that there is little documentary evidence of the migration of females from the dales but that there is a strong local oral tradition that young women entered service elsewhere in the West Riding, some later returning to marry.³⁰ This is an area on which a census-based family tracing study should be able to cast light, hopefully confirming the observations of Ravenstein, which Hallas expects to apply.

In 2010, the Upper Dales Family History Group published a collection of one hundred short essays by its members covering a wide range of example of individual or family migration from Wensleydale and Swaledale³¹, including an example of the informal communication channels mentioned by Hagen-Zanker (a letter of 1841 from lead miner Edmond Alderson in Illinois to his mother and brother in Arkengarthdale setting out how he has prospered and encouraging his sibling to join him).

Conclusions on Population Migration (General)

Over the past 140 years, the factors motivating migration have been analysed from the perspectives of statistics, economics, geography and behavioural science. A series

of common factors have been identified, most significantly ‘push’, ‘pull’ and ease of access. These factors can combine to make whole family migration more or less likely between locations.

This study will investigate migration from a particular area of rapidly declining employment prospects with a view to determining whether individual or family migration predominated and of identifying what other roles are played by other factors, including ‘pull’ attractors, transport links and more or less formal communication networks.

Past statistical studies have mainly focussed on destination areas rather than source areas because of the format of the available CEB data or have been at the macro (county) level such as in Baines. The recent public availability of large relational databases of CEB and BMD data enables individual to be tracked across decades and locations in ways not previously feasible in practice and this study will use these databases to produce meso (parish/township) and micro (family/individual) source analyses.

Lead Mining and Migration from Lead Mining Areas

An overview of the economic history of British lead-mining has been provided by Burt (1984)³². In a chapter on the organisation of the labour force, he considers employment prospects, working conditions, health, wages and occupational mobility, including some comparisons with the Cornish tin mining industry. He notes that the production of lead in England and Wales peaked in 1856 and by 1883 had halved, foreign imports increasing by a factor of ten over the same period. Production in England and Wales had halved again by 1901. He notes a preference of Cornish lead miners to migrate overseas and of those from the North Pennines to move to the Durham coalfield, often following friends and relations, which is of specific relevance to this study.

The seminal work on the Pennine region is Raistrick and Jennings (1965).³³ Although the majority of the work covers periods earlier than that of this study, it provides useful as background, illustrating the relative maturity of the industry as well as the nature and origins of the population, particularly in villages created by lead such as Nenthead or Greenhow Hill. The authors examine social conditions and population movements, mainly using census data and, as with Burt, providing some subjective commentary migration destinations. The authors draw parallels with a previous decline in the lead-mining industry in the first half of the 19th century and identify that similar migration destinations applied then. This might suggest residual family ties to these areas acted as a facilitator for subsequent generation to move. Raistrick and Jennings are more specific than Burt that only a small proportion of the migrants went abroad but does not cite any statistical evidence.

Flynn (2000) compares the socio-economic effect of the decline in lead mining in Wensleydale, Swaledale (including Arkengarthdale) and Teesdale³⁴. He identifies the main driver of the decline as being the increasing availability of imported lead at lower cost than domestic production. However, he also concludes that the rate and

timing of decline was affected by local factors in each of the areas, such as inefficient and fragmented management, lack of investment and the ability to extract other minerals in substitute for lead. For example, the more efficient management of the London Lead Company (LLC) in Teesdale, also the predominant employer in Nenthead, was able to maintain production for longer than the array of smaller lessees in Swaledale. However, even the LLC sold out eventually to others more able to finance the switch to mineral and zinc extraction. As with earlier authors, Flynn identifies that the most common migration destination were either the Durham coal mines or the Cumbrian iron ore mines, with only minimal numbers venturing overseas. However, he also notes that the Reeth school register of September 1881 showed a reduction of eighty-one pupils, reporting families moving to Lancashire and Keighley, Yorkshire. Farming and quarrying are cited as two occupations which kept some former miners local.

The attractive influences of migration destinations are of significance. The development of the coal industry in the 19th century is the subject of Church (1986), who identifies that whilst 450,000 migrated into the English and Welsh mining districts between 1851 and 1901, natural population growth accounted for a far larger increase of 2.7million.³⁵ The factors drawing Cornish copper and tin miners to North America are detailed in Rowe; greater opportunity to own land outright was one attraction identified relative to the English manorial tenancy system.³⁶

Alston and Nenthead

The major work from a mining history perspective is Fairbairn (2008), although Robertson (1998) describes the wider development of the town of Alston and surrounding villages, inextricably linked as it was with the success or otherwise of the local mining industry.³⁷ Thain (1957) is in a similar vein but is more focused on Nenthead, the subject of this study.³⁸ A common theme of all the works is of the exhaustion of the lead seams and of the increasingly fruitless attempts to continue production. Exploitation of zinc ores in the mines preserved some employment in the area longer than others. The harshness of climate, Alston being England's highest town, is shown to be a potential 'push' factor, both directly and indirectly in the unsuitability of the land for most agricultural purposes. In particular, Robertson refers to a number of natural events in the latter part of the 19th century injurious to local farmers.

Individual family stories can be found in Robertson (2004), which tells the tale of the rise over several generations of the Walton family, successful Nenthead lead mine owners and managers and their eventual dispersal, and in Richardson (1979), which is the personal recollections of one of the last Nenthead lead miners.³⁹ As expected, there is considerable contrast between the lifestyles although the decline of the industry underlies both works.

Individual studies like these may unconsciously be taken as indicative of the overall migratory behaviour of the population. This study adopts a deliberately statistical approach to validate or otherwise the 'conclusions' from subjective observation.

The history of the Quaker-run LLC is documented by Raistrick (1938), especially its particular influence on Nenthead where it was by far the largest mine operator in the second half of the 19th century.⁴⁰ Its benevolent behaviour in providing for the wider needs of its workforce, its more stable remuneration approach and its all-round management ability allowed it to continue in production for longer than others and may also have moderated some of the factors otherwise tending to outward migration.

Greenhow Hill

The technical difficulties leading to the decline of the Wharfedale and Nidderdale mines, including Greenhow Hill, are explained in Raistrick (1973).⁴¹ Dickinson and Gill (1983) additionally provides detailed plans of the mine workings and also some relevant information on the output, numbers employed and dates of closure of individual mines and also in some cases the names of local management.⁴²

Of more direct relevance to genealogy is *Life on the Hill*, published by the Greenhow Local History Club⁴³. The stories of a number of mining families are told and some information is provided about both leavers and stayers in the study period. Additional material and a number of local data files are available from the Club's website.⁴⁴

Arkengarthdale

Tyson (1995) is similar to Fairbairn in that it is aimed squarely at mining historians.⁴⁵ However, it contains rather more narrative, including an analysis of the causes of the final decline in the area. Management of the mines by less than competent managers acting on behalf of absentee city shareholders is a contrast to the conclusions of Raistrick and Jennings about the more competent management of the London Lead Company in Nenthead, although even the latter could only defer the inevitable effect of the falling global price of lead.⁴⁶

Other literature about the dale itself is sparse; although it is covered in several more general works about Swaledale (the Arkle beck is a tributary of the Swale) including Raistrick (1955) and Hardy.⁴⁷ The latter, whilst being mainly about exploration of the long abandoned mine workings, contains an interview with the son of a miner who had worked in the mines before they closed at the start of the 20th century. The father's first name was Fremont, named after a settlement in Canada to which some of the family had moved.

Marion Hearfield, has carried out CEB-based analysis of the migration (or non-migration) of the 1881 population of Swaledale over the decade to 1891 and also of lead miners between 1891 and 1901.⁴⁸ She has summarised her findings, both statistical and individual, listing for example the 30 families that moved from Swaledale to Haworth in the West Riding between 1881 and 1891 to work in the textile industry and noting that 14% of the 1881 Arkengarthdale population were in County Durham a decade later. This micro level analysis can be seen to accord with the macro level subjective findings of Burt, Raistrick and Jennings and Flynn.

Migration from Cornish Tin Mining Areas

The decline and occasional false revival dawns of the tin industry from the start of the 19th century until the middle of the 20th is analysed in Barton (1967), which also covers the preceding periods in outline.⁴⁹ His focus is largely on the economic history of the mines. However, this is done in sufficient depth to enable migration pull or push factors to be conjectured for the neighbourhood of named mines, including several in Towednack, the chosen comparison area for this study. Copious statistics on tin prices and production, mine profitability and employments are included.

The migration of the Cornish, especially copper and tin miners, to various parts of the globe is a well-studied phenomenon, albeit often from the perspective of the receiving regions than the sending. Payton (2005) takes its reader through the vicissitudes of the copper and tin mining industry and the resultant migrations, in particular to mining opportunities in the USA, Australia and South Africa.⁵⁰ The book presents nothing in the way of statistics; rather it collects and collates a very large number of individual facts about the emigrants in their new environments and their relationships with those back home, confirming by overwhelming example the finding of Burt that Cornish miners had a strong propensity to migrate overseas.

The specific topic of migration from Cornwall to South America in the late 18th and 19th centuries is the subject of Schwartz (2003).⁵¹ She notes that frequently many of those at a single mine in South America hailed from the same Cornish parish, drawn there perhaps by the recommendations of earlier migrants or perhaps recruited by a well-respected local mine ‘captain’ (manager). Single male migrants often left their families behind in Cornwall, and Schwartz examines the Cornish economy’s use of their remittances and the strengthened role of women as de facto head of household. Her work fills a useful gap due to the paucity of census or BMD data for that continent.

Continuing the theme, Brayshay (1980) examines the impact of the decline of the copper and tin mining industry on household structure.⁵² He dates the decline west Cornwall from 1866 and comments, as does Schwartz, on the increased proportion of female heads (up five percentage points between 1851 and 1871) but also a decline in family size which he attributes in part to reduced fertility from absent husbands but also to an increase in abortion and infanticide. He notes from CEB records a significant proportion of female heads describing themselves as charwomen or washerwomen, having to work to make ends meet in the absence of adequate remittance from an absent husband. He also remarks that the census did not, other than exceptionally, record whether a person was currently in employment or not, so the numbers of working miners may well be fewer than apparently shown in the CEB.

Conclusions

As Hagen-Zanker reports, the socio-economic theory of migration has been extensively studied and progressed since the first ‘laws’ were derived by Ravenstein based on the earlier Victorian UK censuses. Economic betterment of the family is a key driver and more or less formal networks and remitted earnings facilitate follow-

on migration. Migration was mainly to the nearest developing industrial centre although from Cornwall, given the relative ease of access to and familiarity with the sea compared to the rest of the UK, and a strong history of overseas migration, this was generally less the case.

Due to cheaper imports, the lead mining industry peaked during the first two decades of the study period (1851-1871) and suffered material declines in production thereafter.⁵³ Miners had to seek employment elsewhere as a consequence and subjective analysis and some local CEB-based statistical analysis (Hearfield) suggest migration patterns conforming with various aspects of the theory.

Apart from Hearfield, most micro-level studies have focused more on the receiving localities than on those from which migrants originated, due to the difficulties of tracing migrants, especially females, before CEB data in particular was digitised and became sufficiently flexibly searchable. This study essays a mass tracing of populations across three decades, enabling stage migration to be reflected as well as initial destination migration.

3. Methodology

Initially, an analysis was made of the Northern Pennine lead mining areas to identify which census registration districts contained a significant number of people involved in lead mining during the period. Findmypast.co.uk provides a search function on the occupation recorded for each individual in UK censuses 1851-1901 (excepting 1871, where occupation has unfortunately not been transcribed). The relevant registration districts were identified from Fig 12 below.



Fig 12. Map of Northern Pennine Registration Districts 1851.⁵⁴

The format of the search needed to be carefully worded and, after some experimentation, it was decided that a search for ‘*lead*’, where ‘*’ is a wildcard,

would be effective in identifying those involved in the industry. This successfully identifies not just ‘lead miner’ but, for example, ‘lead ore smelter’ and ‘farmer and lead miner’. It would, however, pick up ‘lead miner’s wife’ but not ‘miner’. This of some consequence, as observation shows that some census enumerators adopted the practice of prefixing the husband/father’s occupation to wives and children, although most did not. This has been corrected where it occurs by manual adjustment.

Occasionally individuals also recorded just ‘miner’ when completing their census schedule (although the instructions on the reverse requested the mineral mined to be recorded). These cases have not been included in the computerised counts but have been included in the manually-extracted samples where it appears likely from the context that they are lead miners.

This type of search also picks up the word ‘leader’ in an occupation, although this usage is fortunately rare and the counts have not been adjusted for any occurrences.

Fig 13 shows the results, in approximate north-south order based on Fig 12. Nenthead, Arkengarthdale and Greenhow Hill are in the registration districts of Alston, Reeth and (largely) Pateley Bridge respectively.

Registration District	1861	1881	1901
Hexham	1915	891	303
Haltwhistle	19	14	2
Weardale	1973	985	365
Alston	1524	887	308
Penrith	91	63	93
East Ward	222	56	14
Durham	77	9	37*
Teesdale	1257	816	217
Auckland	11	32	43*
Reeth	1622	791	56
Askrigg	88	n/a	n/a
Aysgarth	n/a	39	1
Leyburn	263	134	4
Skipton	508	180	33
Pateley Bridge	269	180	51
TOTAL	9839	5077	1447

(* predominantly "leader")

Fig 13: Numbers of individuals with occupations containing ‘lead’ recorded in the census returns covering the Northern Pennines 1861-1901.

This confirms that the censuses correctly identify the main lead mining districts identified in Fig 1. It also demonstrates the significant decline in employment in the industry, by 1901 to less than 15% of its 1861 levels. It also shows that the decline was more complete in the region south of Teesdale (to 5% of its 1861 level) than in Teesdale and northwards (only to 18%).

It is also possible for 1861 to obtain the numbers employed in lead mining and lead processing for each district directly from the official reports published on the census, although only for males aged 20 and over⁵⁵. These numbers underestimate the total

numbers employed in the industry, although can be ratioed up to allow for under-20s employment using county-level statistics. Fig 14 shows the results.

Registration District	1861
Hexham	1505
Haltwhistle	13
Weardale	1866
Alston	1253
Penrith	89
East Ward	209
Durham	45
Teesdale	1181
Auckland	7
Reeth	998
Askrigg	69
Aysgarth	n/a
Leyburn	231
Skipton	460
Pateley Bridge	272
TOTAL	8199

Fig 14. 1861 census; numbers of individuals employed in lead mining and lead manufacturing in the Northern Pennines

Fig 14 provides reasonable confirmation for the 1861 figures in Fig 13. The most significant difference is for Reeth, where visual examination shows that several of the census enumerators did indeed classify wives and daughters as “lead miner’s wife/daughter”. A feasible ‘overcount’ level of 33% would account for much of the difference in the two approaches.

As mentioned in the introduction, three areas were then selected for detailed study:

- Nenthead, largely to consider whether the management approach of the London Lead Company had any limiting influence on migration
- Arkengarthdale, as a representative of the wider Swaledale region and because of the presence there of Kipling family members
- Greenhow Hill, largely for being diametrically opposite from Nenthead in the North Pennine region

We can look at the census returns for the parishes of Alston, Arkengarthdale and Pateley Bridge, in which lived the majority of miners and ore processors working in the Nenthead, Arkengarthdale and Greenhow Hill ore fields respectively. A search as described above on Findmypast.co.uk for occupation of “*lead*” was used. As Findmypast.co.uk does not support an occupation search for 1871, a visual search of the enumerators’ records was used instead. We can compare the results with the total parish population (Fig 15).

	Alston		Pateley Bridge		Arkengarthdale	
	Lead Industry	Total Population	Lead Industry	Total Population	Lead Industry	Total Population
1851	1486	7363	275	7577	321	1283
1861	1524	7719	269	9490	534	1147
1871	n/a	7017	n/a	8686	n/a	1018
1881	877	6217	180	7759	308	1000
1891	361	5201	63	8040	167	761
1901	308	5049	51	7744	31	427
% change 1861-1901	-80%	-35%	-81%	-18%	-94%	-63%

*The apparent increase in ‘*lead*’ results for Arkengarthdale between 1851 and 1861 despite a reduction in the total population reflects the abnormal recording method adopted for family members described earlier.*

Fig 15: Total population of selected lead mining parishes and the numbers with an occupation containing ‘lead’, 1851-1901

Very different rates of decline in the total population of the parish are observed. Lead miners only ever represented a small proportion of total Pateley Bridge residents, it being largely a lower dales agricultural town parish, whereas Arkengarthdale was a remote, moorland parish, with only a limited ability to support agriculture. Alston was supported not only by its being a market town but also by diversification into other mining and non-mining industry.⁵⁶

Population change 1851-1901

The overall trends in net internal and external migration throughout the periods of the study can be seen from Fig 16, providing supporting evidence that all three lead mining areas selected experience low or negative population growth over the period. Strong positive growth can be seen in potential receiving areas such as the Durham coalfields and around Newcastle and Middlesbrough. There was less dramatic but still significant growth in the woollen districts around Bradford. Baldersdale is in a district of positive but low growth.

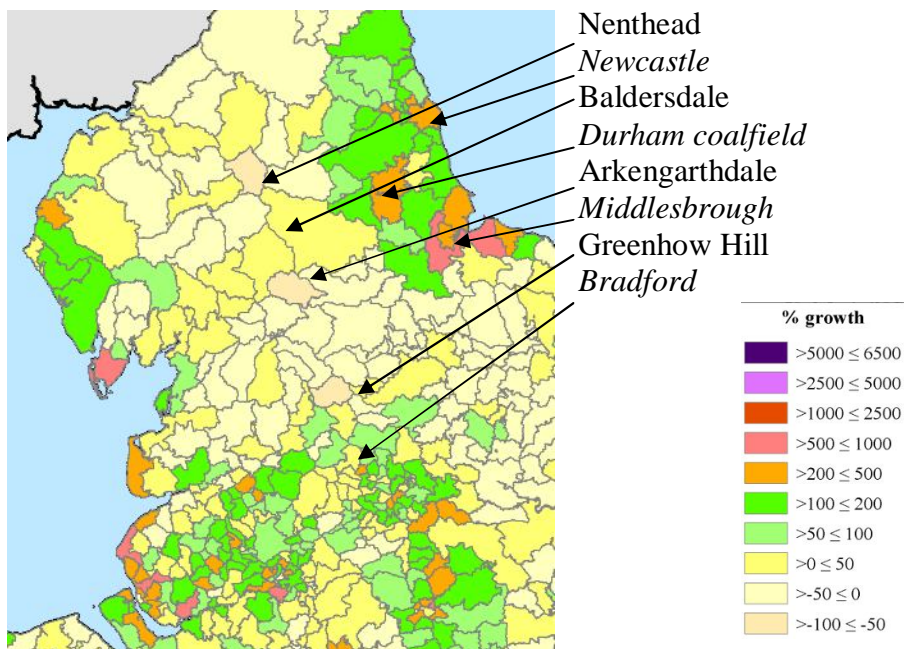


Fig16: Percentage growth in population in Northern England registration sub-districts between 1851 and 1901⁵⁷

Similarly, Fig 17 illustrates the fairly comprehensive depopulation of the south-west peninsula in the same fifty years and the lack of nearby centres of population growth.

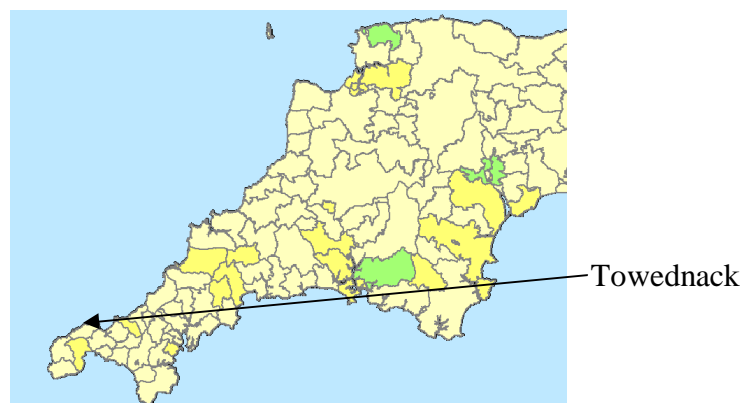


Fig17: Percentage growth in population in Cornwall and Devon registration sub-districts between 1851 and 1901⁵⁷

Design of main statistical study

Whilst a dissertation in social geography or economic history might focus on results at the level of the individual, this dissertation is in the field of genealogy, where the family as a whole is to the fore. Analysis and conclusions will therefore also examine the fate of families as a whole rather than just of their members as individuals. The primary method to be adopted will therefore be to select and follow through the period of the study a statistically significant number of households from the target and control areas.

Trials showed that deaths and loss of visibility of individuals in any initial sample made it difficult to follow an initial cohort through the whole period and to have an adequate population to draw conclusions about the later periods. Accordingly, it was decided to limit the period of study to thirty years. The starting point was chosen to be 1871, so that the first decade coincided with the peak absolute number of job losses seen in Fig 4.

This approach will enable the frequency and nature of any multi-stage migration to be analysed. Also, the appendices in which the findings are recorded can be made available on-line to current and future family historians, who may find their intended work made easier as a result.

As well as identifying the destinations of those leaving the study areas, the approach will also examine changes in occupation, both for those leaving and those remaining in the study areas.

To limit the extent of the research to feasible levels, only the fate of those alive in 1871 will be considered. Although the inclusion of those born subsequently, particularly to the head of the 1871 household, would increase the useful information, it is not considered that this additional work could be accomplished in the time available.

Statistical significance

The statistical validity of any conclusions drawn from this study depends upon the relative size of the sample relative to the population. Fig 18 shows for both likelihood range (i.e. the range either side of the sample statistic in which there is a 90% chance the population statistic actually lies).⁵⁸

	Households	Mining Households	Sample	90% likelihood range	Individuals	Mining occupation	Sample	90% likelihood range*
Nenthead	282	193	53	9.7%	1291	310	265	4.2%
Arkengarthdale	238	156	51	9.5%	1018	243	252	4.1%
Greenhow Hill	107	85	51	7.3%	528	118	225	3.7%
Baldersdale	87	n/a	48	8.0%	436	n/a	264	3.2%
Towednack	179	117	47	9.3%	848	192	263	3.7%

* Individual in mining households estimated as Individuals*(Mining Households/Households)

Fig 18: Statistics of the samples analysed with associated 90% likelihood ranges

So, for example, if the analysis showed that 25% of sample Nenthead households migrated as a unit, there would be a 90% likelihood that the actual population proportion lay between 15% and 35%. The range might be a little narrower, e.g. 18%-32%, if we expected from other knowledge an answer significantly different from 50%. Similarly, if 25% of individuals had changed occupation to coal mining, the population proportion might be 21%-29% with 90% likelihood.

Because of the larger sample size, conclusions about individuals have a narrower range than that for households, although the table understates the individual range as it does not allow for the partial lack of independence of migration of members of family groups.

For reading clarity, only the sample statistic will be reported in this study. However, the above levels of uncertainty should be borne in mind when interpreting the results.

Search Methods

The name, year of birth and county of birth of the household head was input into the main search page of Ancestry.co.uk, specifying England as a preference but allowing a global search. This usually identified the 1871 census entry as one of a range of possibilities. Selecting this often led to other years' census entries and sometimes a death entry being automatically identified by Ancestry. If there was no explicit death entry identified but a surviving spouse, described as 'widow(er)' at the census following that at which the individual was last identified, a 'death' was recorded.

If there was no census entry for 1901 (or 1911) and no evidence of death, a search was carried out on Findmypast.co.uk for either the first missing census entry or a likely death (age, registration district) in the preceding decade. No success there, either, led to 'not traced' being recorded.

Other members of the 1871 household were selected in turn on Ancestry and all automatically generated likely suggestions similarly followed up.

On occasions, Ancestry generated useful suggestions for the marriages of daughters or even the remarriage of wives. This was more likely where the family name was relatively uncommon. Daughters who had left home were searched for death and marriage on Findmypast. Potential marriages were validated where possible by examining the date and place of birth of the wife at the subsequent census. Despite these methods, it proved possible only to trace around 65% of daughters to 1901 or earlier death compared to 80% of sons.

Ancestry also identified a number of cases where others had recorded family trees on the website containing one or more household members. Wherever possible, information from these sources was independently validated.

Some subjectivity was applied in determining whether a census entry, marriage or death registration was the relevant one, especially where the name was common. Where there was reasonable doubt, 'not traced' was recorded.

4. Results

Appendix 1 contains the results of the full analysis.

4.1 Nenthead

The 1871 census reported 282 households in Nenthead with 1291 members. A total of 53 of the 193 households with at least one member employed in the lead industry have been traced as far as possible through to 1901. The initial sample was constructed by selecting the first household on each page of the census returns which contained at least one member active in the lead industry (mining, ore washing, smelting or managerial activity).

The sample was 27% of the total number of lead mining households and contained 265 people. The mean household size was 5.0, the mean age was 26 and the mean age of household heads was 47.

Individuals

By 1881, 48% of the initial sample still lived in Nenthead, 23% had moved elsewhere, 14% had died and 15% could not be traced. Of those alive, traceable and actively working, the proportion working in lead industry had fallen from 68% to 45% with the difference mainly made up by coal mining and other heavy industry. The commonest migration destination was County Durham, followed closely by Northumberland.

The data exhibits several expected trends. As time passes, children mature and enter employment, sons in particular often following their father's trade. Some working daughters, on the other hand, become commercially inactive following marriage. Overall, this has resulted in a net reduction in the inactive proportion of the population (wives, children, retired or invalid), from over 50% in 1871 to under 25% in 1891 and 1901.

Between 23% and 37% of the initial sample migrated during the decade, depending on whether none or all of the 'untraced' are assumed to have migrated. The net migration rate calculated by Baines for Cumberland as a whole for the decade is 9%-12%, implying that Nenthead experienced a far higher population loss than the county as a whole, even allowing for the net-off of inwards migration in Baines' figures.⁵⁹

The observed annual death rate was around 2% for the decade; the precise number again depending on how many of the untraced individuals had died. The rate of mortality is typical of the period nationally; the registrar-general's report for 1881 describes the annual rate of death in England and Wales falling from 22.7 per thousand to 18.9 per thousand over the preceding decade, citing Public Health Acts of 1872 and 1875 as the primary beneficial factor⁶⁰.

Other trends noticeable from these data include:

- Daughters entering domestic service not locally but away from Nenthead

- Relatively little recourse to agriculture or other local employment as a fall-back once mining opportunities reduced
- Limited migration other than literally downstream to Alston itself, to Tyneside and to the Durham coal fields.
- There is very limited evidence of overseas migration (2 members of one family went to Canada, one going on to the USA). Of course, the untraced may well contain a significant proportion of overseas migrations.

Fig 19 shows the results of the full data analysis over the 30 year period:

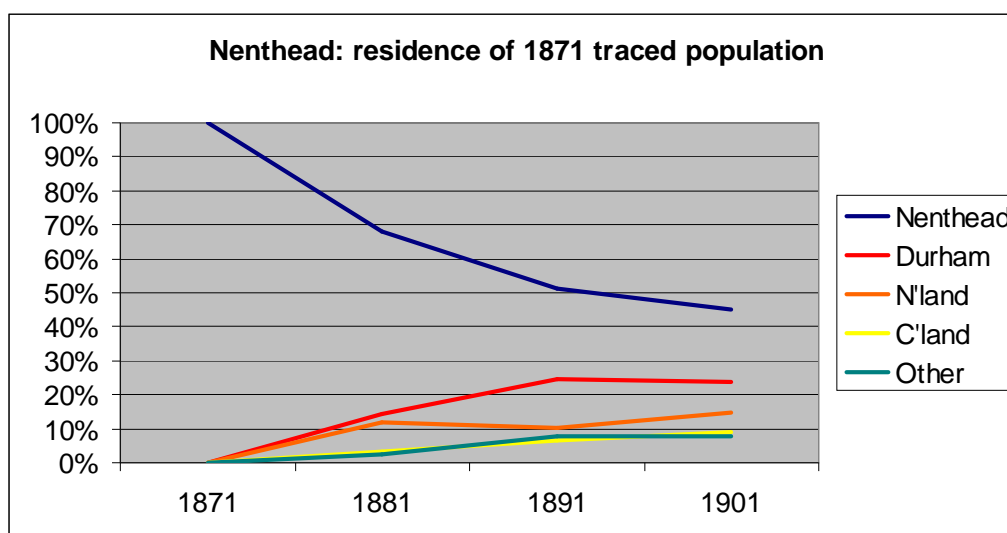


Fig 19: Nenthead; residence of traced sample population 1871-1901

It can be seen that the main destination of migrants was east to Durham and Northumberland, with fewer moving elsewhere in Cumberland (including other parts of Alston parish) or further afield. Around 45% of the still-traceable part of the initial sample has remained in Nenthead.

Fig 20 shows the calculated range of migration and death rates for the whole period under observation (for the later two periods only for those resident in Nenthead at the start of the period).

	1871-81	1881-91	1891-1901
Migration rate: minimum	23%	19%	7%
Migration rate: maximum	37%	31%	15%
Annual death rate	1.9%	2.0%	3.8%

Fig 20: Nenthead; observed sample migration and death rates.

The increase in death rates is a feature of the aging of the sample being studied (average age had increased from 26 to 48 between 1871 and 1901). Aging might also be affecting the assessment of the migration rate, as migration drive may well reduce both because of increasing age and because those remaining have either a lower desire or a lower need to migrate.

Fig 21 indicates the destination of the 1871-1881 migrants to other parts of the north of England. The width of the arrows is proportionate to the number migrating to that location.

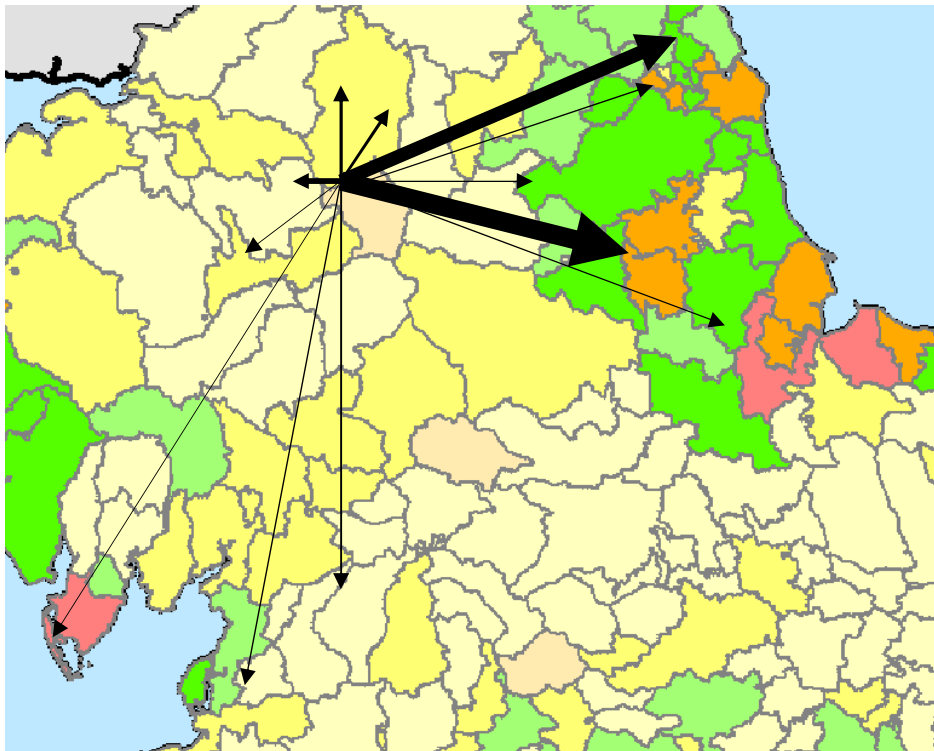


Fig 21: Nenthead, map of destinations of 1871-1881 migrants

Fig 22 shows the variation in the occupations of the traceable population over time. Daughters who were unmarried in 1871 are attributed the occupation of their husband following marriage.

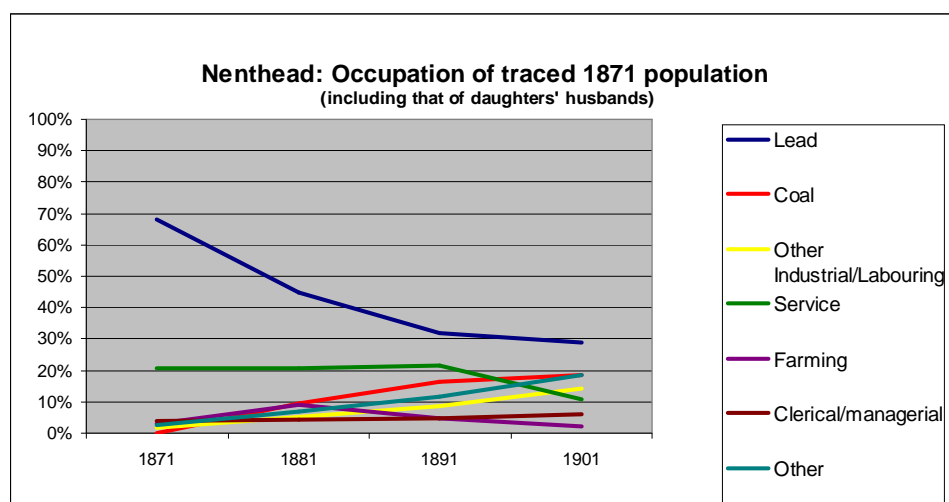


Fig 22: Nenthead; occupation of traced sample population 1871-1901

In 1871, household members not employed in the lead industry largely consist of daughters recorded as being servants. It is unclear whether the girls are in domestic service with their own or another family.

The trend away from the lead industry is very clear over the 1871-1891 period, its representation more than halving in the traceable population. The main substitute occupation is coal mining, although a variety of other occupations are also seen, including a small number in iron and steel manufacturing. There is a small transfer to agricultural employment in the first decade but this soon drops away.

The number of women leaving domestic service to marry is balanced over the first two decades by younger girls entering service. In the final decade, as the study group ages, marriage of younger women to coal and other industrial workers explains the majority of the occupational change seen.

Whole Family Results (1871-1881)

The status in 1881 of the heads of the 53 households were categorised into whether they had died, were still resident in Nenthead ('stayed'), had moved elsewhere or could not be identified ('unknown'). A similar categorisation was made of the whole household, although with the addition of the 'dispersed' category where household members were in different locations in 1881.

When categorising a household, death and non-traceability of individual members was disregarded except on the rare occasion where the whole household had died or had been lost in the decade.

HEAD	OTHER FAMILY MEMBERS					TOTAL
	Stayed	Moved	Died	Dispersed	Unknown	
Stayed	34%	0%	0%	9%	0%	43%
Moved	0%	11%	0%	8%	0%	19%
Died	15%	2%	4%	9%	2%	32%
Unknown	0%	0%	0%	0%	6%	6%
TOTAL	49%	13%	4%	26%	8%	100%

Fig 23: Nenthead: Family migration analysis

From Fig 23, it can be seen that half (26) of the households remained in Nenthead at the end of the decade and that a further 7 moved essentially intact elsewhere. A quarter of households (14) dispersed. This was noticeable more common where the head of household had either died or moved in the decade than where the head had stayed in Nenthead.

The Barron family selected for the case study below (Nenthead household #26 in Appendix 1) are a fairly typical example of a family the head of which died during the decade and the members had dispersed by its end; two sons migrating to the Newcastle area to work in the lead industry there and a daughter remaining in Nenthead. After the daughter's subsequent death, two of her children followed their uncles to Newcastle.

This case study nicely illustrates a number of important migration drivers, including 'pull' factor of the lead industry in Newcastle (where the Walker, Parker & Co works at Elswick produced sheet lead, shot and white and read lead for paints) and the family links evidenced by first the two brothers and then the nephew and niece migrating to the same area on different occasions.⁶¹

Finally, the case study illustrates the lack of opportunity in the lead industry by the end of the period; all but one member of the third generation of the family being, or being the wife of, someone employed in other trades or professions (engine fitter, joiner, postman, bricklayer, printer's clerk, tailor and music teacher). Some signs of upward social mobility may also be read into these occupations.

Case Study: The Barron Family

In 1871, the Barron family lived at Whitehall, a hamlet just outside Nenthead village.⁶² Robert Barron, aged 69, was a lead miner. His wife Elizabeth was four years younger. With them lived daughter Betsey (40), a servant, and sons George (25) and Cowper (23), both lead miners. Also in the household were grandchildren Henry (15), a lead ore washer, Elizabeth (13) and Margaret (2), the illegitimate children of Betsey.

Elizabeth senior died in 1877 and Robert died the following year.⁶³

George Barron married Esther Hall at Nenthead in February 1873 and son William was born in at Brancepeth, Durham in the first quarter of 1874.⁶⁴ Further children were registered at Alston in 1876 and 1878. By 1881, the family had moved to Wallsend, Northumberland, where George was a lead smelter. Staying with them was lodger Michael Carrick, another smelter from Alston, and visitor Margaret Hall, a younger sister of Esther.⁶⁵

By 1891, George's family has moved to nearby Byker. He was still a lead smelter but his two older sons were an apprentice joiner and a telegraph messenger. Three additional children had been born since 1881.⁶⁶

George died in 1897.⁶⁷ In 1901, widow Esther was living with younger sons George and Emmerson, who are respectively a bricklayer and a printer's clerk.⁶⁸ Older sons William and Robert had married and were respectively joiner and postman.⁶⁹

Cowper Barron married Isabella Brown in 1874 and two daughters, Elizabeth and Sarah were born to them in Nenthead in 1875 and 1879.⁷⁰ In 1881, the family is found in Byker, where Cowper was working as a lead smelter.⁷¹ The 1891 census suggests that nothing much changed in the next ten years, except for the birth of a son, Robert Cowper Barron, in 1890 and Cowper specifying his job more precisely as a furnace stoker at a lead works, work he was still doing in 1901.⁷²

Sarah married a musician, William Harper in 1898 and they were still living in Byker in 1901.⁷³ Elizabeth married tailor Alexander Duggan in the same year and in 1901 they were living in Elswick, another suburb of Newcastle.⁷⁴

Betsey Barron still lived at Whitehall in 1881 with Henry, now a lead miner, and Margaret.⁷⁵ She died in 1882.⁷⁶ Henry followed his uncles to Newcastle, where he married Margaret Natrass in 1884.⁷⁷ In 1891, they were living at Byker, Henry being a lead separator.⁷⁸ In 1901, he was still a lead worker at Byker.⁷⁹

Margaret also came to Newcastle, marrying engine fitter Stephen Best there in 1890.⁸⁰ They lived at Byker in 1891 and Elswick in 1901.⁸¹ Betsey's daughter Elizabeth proved untraceable after 1871.

A good example of the communication between former lead miners overseas and their family back in the UK is the Graeme correspondence (1851-1887) which consists of the UK to USA side of exchange between various members of the Graham family of Weardale, not far from Nenthead. The content is mainly family news but also provides insight into the state of the mining industry, as in extract below for 1887 which notes that two daughters have married coal miners and moved away (original spelling retained).

*"Jane has 3 sons 2 going to school and a baby. She also has a second husband. Margaret has four boys all going to school. She lost her little girl about 3 months ago with the measles. She lives at a place called Shildon about 16 miles from here. Jane lives at Hedden on the Wale a little Colierly place on the borders of Scotland about 40 miles from here. Both their husbands work in the coal pit.... With kind love to you ale believe me your affectate neice and Cousin Isabella Stobbs PS Mother oftens says she would like so much to see Uncle once more. If it could be we would ale gladly welcome any of you if only you would pay us a visit"*⁸²

Most of the memorials in the parish churchyards of the sample areas reveal nothing of those who migrated. However at Nenthead, we read of Sarah, wife of Thomas Swindle, who died in North Orillia, Canada, in 1885 (see Fig 24).

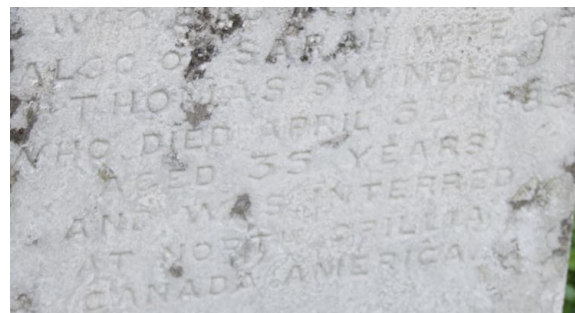


Fig 24: Monumental inscription in Nenthead churchyard: Sarah Swindle (nee Lattimer)

Sarah was the daughter of John Lattimer who was a draper and grocer in the village. Thomas Swindle was a lead ore smelter, although by 1881 he and Sarah were farming elsewhere in Alston parish. They travelled to Toronto on the *Sarmatian* in April 1882 and they would appear to have established a farm in Orillia, about 100km north of Toronto.⁸³ This is a good example of two-stage migration; first from Nenthead and the lead industry to elsewhere in the parish, with a change in occupation to farming, then overseas but continuing farming.

4.2 Arkengarthdale

The 1871 census reported 238 households in Arkengarthdale with 1018 members. A total of 51 of the 156 households had at least one member explicitly employed in the lead industry have been traced as far as possible through to 1901. The initial sample was constructed by selecting the first household on each page of the census returns which contained at least one member in the industry.

The sample was 33% of the total number of lead mining households and contained 252 people. The mean household size was 4.9, the mean age was 23 and the mean age of household heads was 45.

Individuals

By 1881, 64% of the initial sample still lived in the dale, 15% had moved elsewhere, 13% had died and 8% could not be traced.

Of those alive, traceable, and actively working, the proportion in the lead industry had fallen from 86% to 53%, although this reflected mainly the entry into employment of children, especially girls entering farm service. The number employed in the lead industry actually only reduced from 73 to 66, as those dying or leaving the industry were largely offset by those joining the industry. The inactive proportion of the population (wives, children, retired or invalid) reduced from 66% in 1871 to under 20% in 1891 and 1901.

Between 15% and 23% of the initial sample migrated during the decade, depending on whether none or all of the 'untraced' are assumed to have migrated. 8% of this migration was within Yorkshire. Removing this, the observed external migration rate is still somewhat in excess of that calculated by Baines for Yorkshire for the decade of around 6%⁸⁴.

The observed annual death rate was around 1.5% for the decade; the precise number again depending on how many of the untraced individuals had died.

Fig 25 shows the results of the full data analysis over the 30 year period:

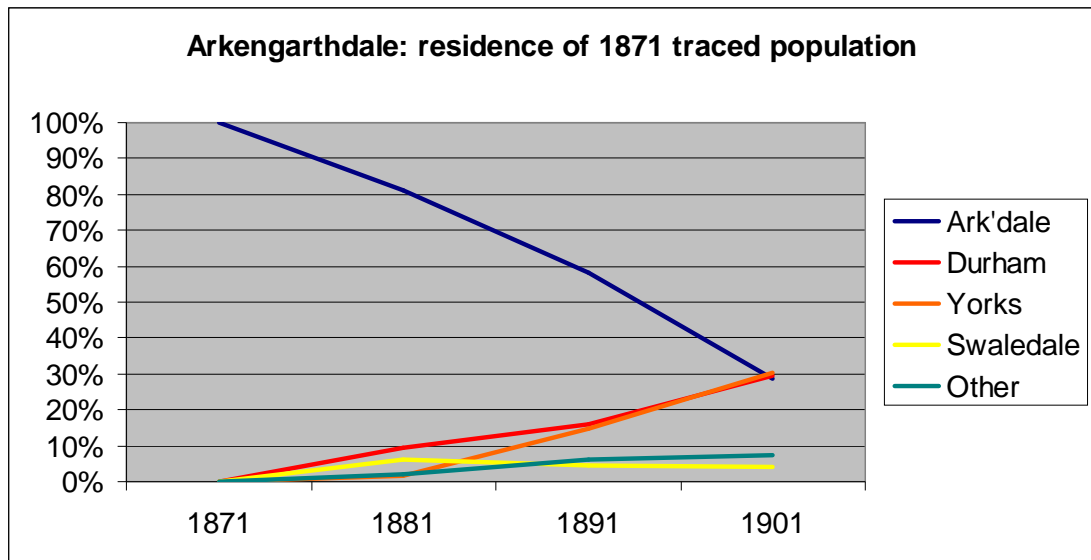


Fig 25: Arkengarthdale; residence of traced sample population 1871-1901

It can be seen that the main destination of migrants was to Durham and to other parts of Yorkshire, with fewer moving elsewhere in Swaledale (not surprising, given the even harsher impact of the decline in lead mining there) or further afield. There was only one identified example of migration overseas, the two Alderson brothers (household #31) who emigrated to Leadville, Colorado. Around 30% of the still-traceable part of the initial sample has remained in the dale throughout the 30-year period.

Fig 26 shows the calculated range of migration and death rates for the whole period under observation (for the later two periods only for those resident in the dale at the start of the period).

	1871-81	1881-91	1891-1901
Migration rate: minimum	15%	25%	32%
Migration rate: maximum	23%	35%	37%
Annual death rate	1.5%	2.0%	3.0%

Fig 26: Arkengarthdale; observed sample migration and death rates

Average age had increased from 23 to 47 by 1901.

Fig 27 shows the destination of the 1871-1881 migrants to other parts of the north of England. The widths of the arrows are proportionate to the number migration to that location

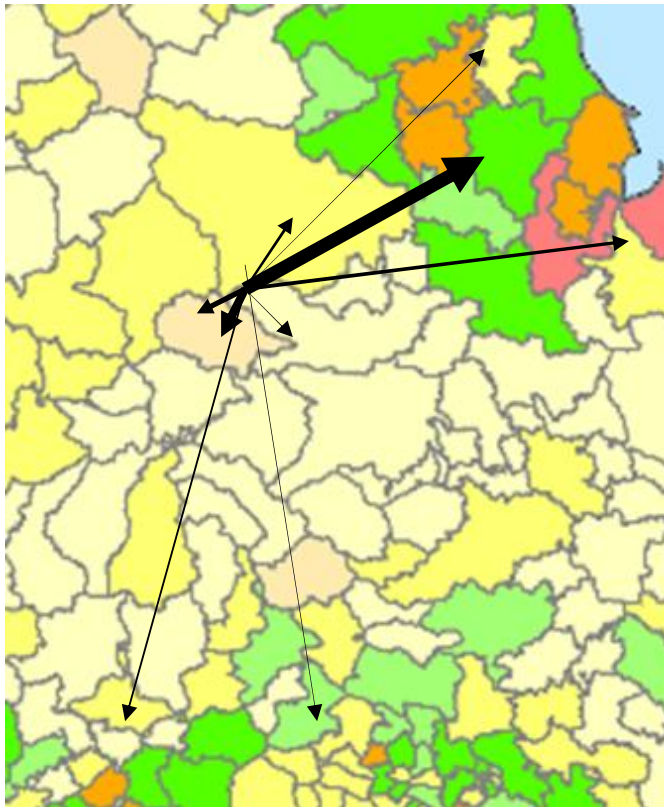


Fig 27: Arkengarthdale, map of destinations of 1871-1881 migrants

Fig 28 shows the variation in the occupations of the traceable population over time. Daughters who were unmarried in 1871 are attributed the occupation of their husband following marriage.

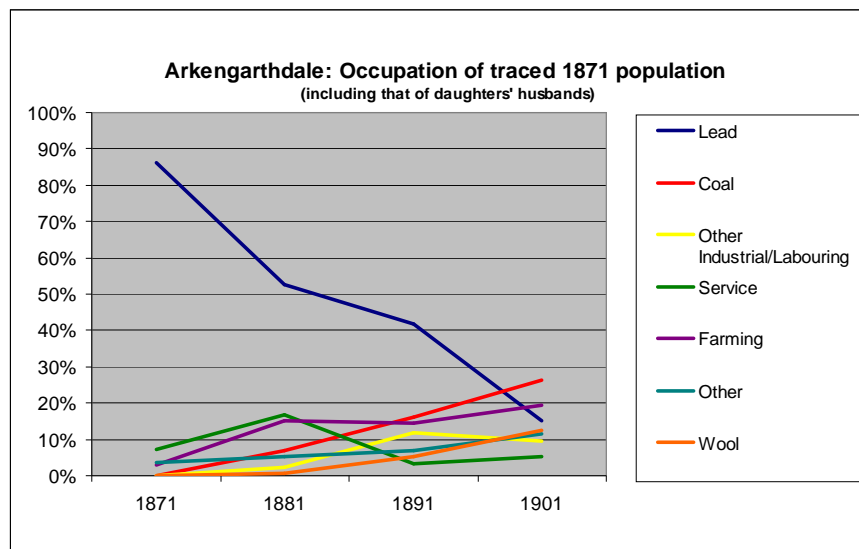


Fig 28: Arkengarthdale; occupation of traced sample population 1871-1901

Initially, movement is into service (daughters) and agriculture (sons and former lead miners). The steady trend away from the lead industry is clear throughout the period, its representation falling to only 15% in the traceable population by 1901. The later substitute occupations include coal mining, mainly in County Durham, and the woollen industry, mainly in Yorkshire, particularly Haworth.

Whole Family Results (1871-1881)

At the household level we find that, deaths and untraced members apart, 32 of the 51 families were still to be found in Arkengarthdale in 1881, 5 had migrated as a unit and 14 had dispersed. Fig 29 shows the correlation between the fate of the 1871 household head and that of the family as a whole.

HEAD	OTHER FAMILY MEMBERS					TOTAL
	Stayed	Moved	Died	Dispersed	Unknown	
Stayed	43%	0%	0%	14%	0%	57%
Moved	2%	4%	0%	4%	0%	10%
Died	16%	6%	0%	10%	0%	31%
Unknown	2%	0%	0%	0%	0%	2%
TOTAL	63%	10%	0%	27%	0%	100%

Fig 29: Arkengarthdale: Family migration analysis

Unlike Nenthead, dispersion was equally likely after a head had moved or died.

Case Study – The Kiplings of Arkengarthdale

Appendix 2 contains a detailed study of the Kipling family of Arkengarthdale from 1851 to 1901. What follows is a summary. Bibliography and references can be found in Appendix 2

In 1851, three lead mining brothers William, James and Thomas Kipling lived in the dale with their families. William, the eldest, had four sons, all of whom were also lead miners. The children of the other brothers were not yet of working age.

By 1871, William and James had died, both of mining-related diseases, and Thomas had moved with his family to Darlington to work in the ironworks there. Two of William's sons remained in the dale mining lead, along with two of James' sons. James' third son was a shepherd in the dale.

William's eldest son, John, had moved to the Durham coalfields in the 1850s, where both he and his wife died of tuberculosis. Their children returned to the dale (the younger ones to the Reeth workhouse until they were old enough to find work). By 1871, John's sons had all left the dale once again. William's fourth son had emigrated to Australia, where he worked as a carpenter.

By 1881, only one Kipling remained mining lead (and that only part time alongside farming), the others having become farmers or in one case, moved to the Durham coalfield.

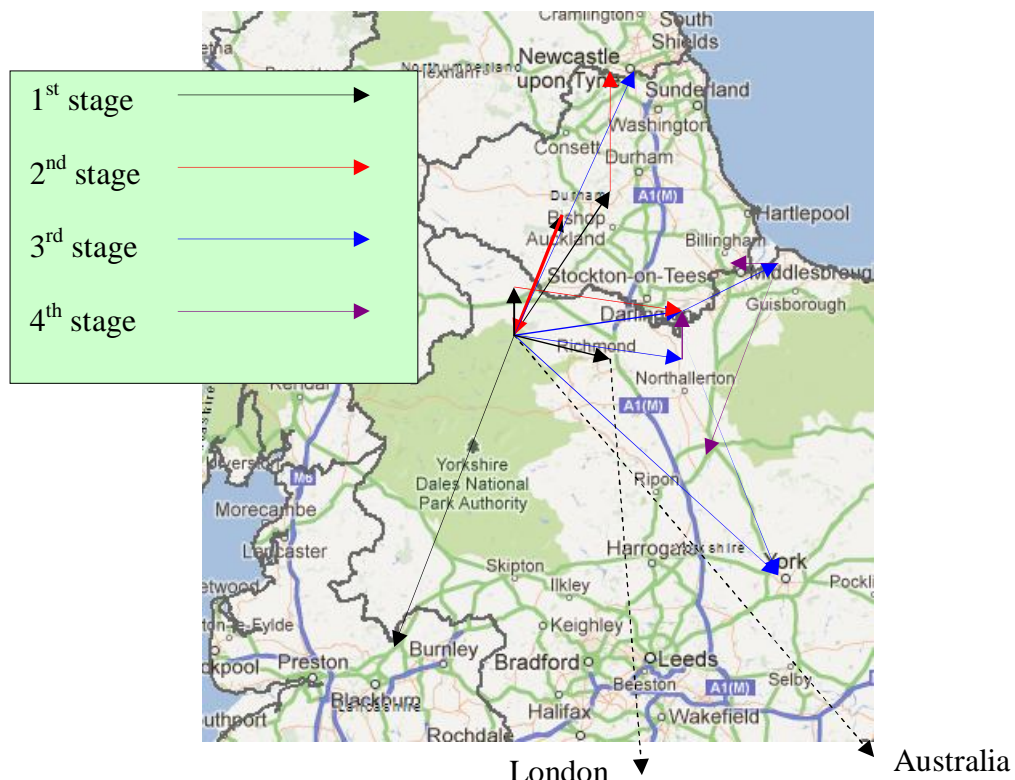


Fig 30: Kipling family stage migrations (1851-1901)

Corroborating evidence from the work of Marion Hearfield

Hearfield traces, with a high degree of success, the whole of the population of the dale between the 1881 and 1891 censuses. Her results for Arkengarthdale are shown in Fig 31 ('moved' and 'new couple' refer to individuals who remained in Arkengarthdale or Swaledale and 'gone' to individuals who cannot be traced). Arkengarthdale rates of migration were similar to those of the dale as a whole.

Arkengarthdale population movement

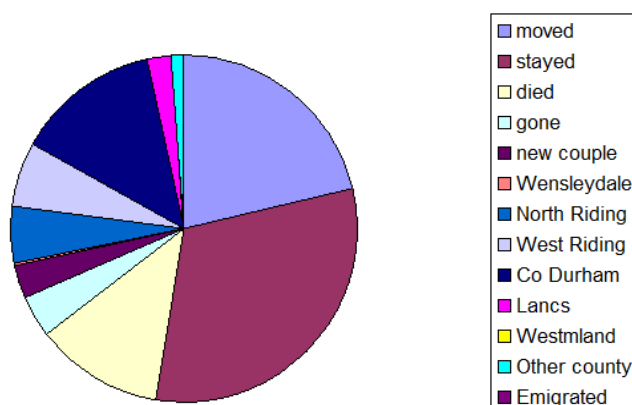


Fig 31: Location of 1881 census population of Arkengarthdale in 1891

It can be seen that Durham and Yorkshire are the main migration destinations, with very limited migration identified elsewhere, supporting the findings of the present study.

She repeats the analysis for Swaledale, excluding Arkengarthdale (Fig 32, showing the destinations of identified migrants only).

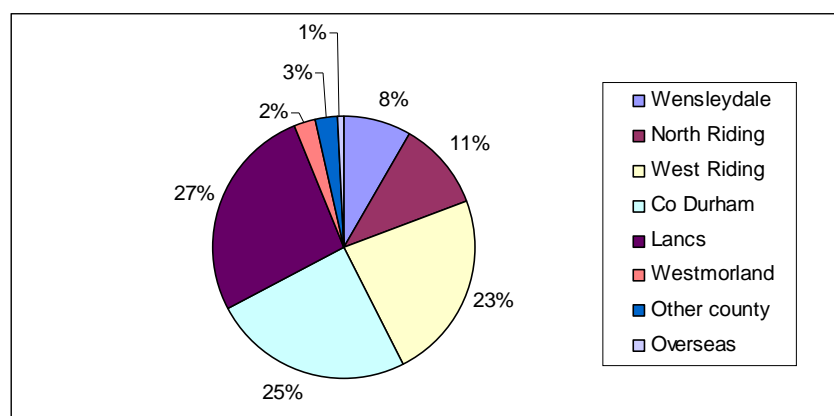


Fig 32: Destination of Swaledale 1881-1891 migrants

Fig 33 presents the same information for Arkengarthdale.

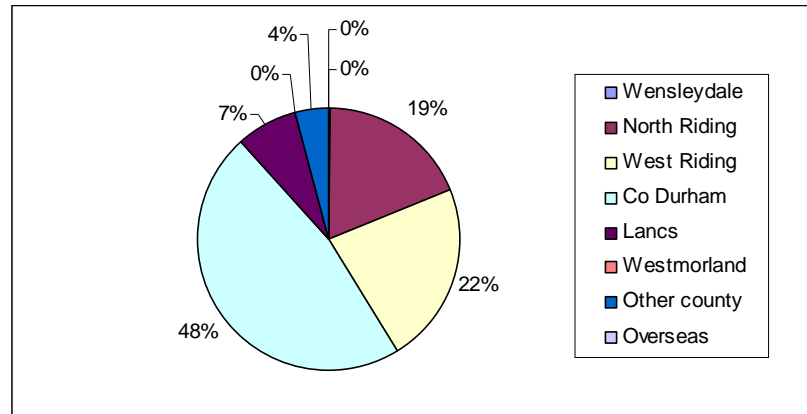


Fig 33: Destination of Arkengarthdale 1881-1891 migrants

The most noticeable differences between the destinations of Arkengarthdale and the balance of Swaledale migrants is the absence in the former of any migration to Wensleydale (the dale immediately south of Swaledale) and the much lower proportion of migrants to Lancashire, suggesting the influence of information or support provided by prior migrant family or friends only elsewhere in Swaledale.

Hearfield has also examined the 1891 population of Swaledale lead mining families who left the dale and tracked them to the 1901 census. Her findings are summarised in Fig 34.

	1891 Population		1901 Occupations				Notes
	Individuals	Lead Miners	Lead Miner	Coal Miner	Textiles	Other	
County Durham	101	52	0	34	0	18	7 sons also became coal miners. Includes 14 complete families
Haworth	53	10	0	1	9	8	27 children became mill workers. Includes 8 complete families
Pateley Bridge	59	19	19	0	0	0	7 out of 8 sons also became lead miners
Lancashire	25	9	0	1	0	8	7 children became mill workers. Mainly two large families.
Other	38	n/a	n/a	n/a	n/a	n/a	37 Yorkshire, 1 Northumberland
Untraced/Died	115	n/a	n/a	n/a	n/a	n/a	At least 5 families were completely untraceable
TOTAL	390						

Fig 34: Swaledale 1891 lead mining families; location and occupation of migrants in 1901

Of the 390 migrants, 261 (67%) were from Arkengarthdale, illustrating the later decline of the mining industry there than in the rest of the dale identified by Hallas, who records that the township of Melbecks lost nearly half its population between 1881 and 1891 whereas Arkengarthdale lost 44% when the mines failed between 1891 and 1901.⁸⁵

Also, only one of the 261 went to Lancashire, the other 25 coming from the other districts of Swaledale.

Figure 35 illustrates the hard times and difficult choices facing Arkengarthdale miners at this time, also mentioning both return migration from the Durham coalfields and the health difficulties faced by some miners.

THE MINING INDUSTRY OF THE DALES.
A case which gave some proof of the deterioration of the lead mining industry of Arkengarthdale and Swaledale was heard before Mr. Gilpin-Brown, Mr. O. Cradock, and Mr. M. D'Arcy Wyvill, at the Richmond County Petty Sessions on Saturday, when John Slack, a miner, was summoned at the instance of Supt. Gregory to show reason why he should not under the Reformatory School Act contribute towards the support of his daughter, who was in a Sunderland institution. In reply to the Bench the man called attention to the great falling off in the mining wages, and said he did not think he could earn more than 8s. per week. The prices of lead were so low, that, whereas they used to have £3 per bing, they now had only 36s. As to the wages a man could earn, much depended on their fortune in meeting with lead ore. He had been in Arkengarthdale three weeks, and he attributed his illness to the sudden change from the Durham coal pits to the cold lead mines. He had a cow and a calf, but he would not have had them but for the kindness of a friend; the bit of land he had was in a very poor state, and he took it in the hope of improving it in the course of a few years. The Bench did not think that at present he would be able to contribute anything towards his daughter; in the event of improved times, however, they hoped he would do so. This the man readily consented to do, and he was discharged.

Fig 35: Item in York Herald - Saturday 19 July 1884⁸⁶

The *Yorkshire Gazette* had reported two years earlier that an Elizabeth Ann Slack of Arkengarthdale, aged 13, had been sent to reformatory school for three years for stealing clothes from a trunk left outside Richmond station.⁸⁷ This may have been the girl mentioned in the 1884 piece but it has not been possible conclusively to demonstrate this.

The low price of lead also caused problems for mine owners. The records of the liquidation of the Hurst Lead Mines in Swaledale are preserved at the Swaledale Museum. A letter from the official receiver in 1890 highlights the problems faced.⁸⁸

The present average expenditure is about £240 per month, of which £100 is the cost of coal, cartage of coal, engine-men's wages, and expenses of pumping machinery. Of the rest, about £100 is expended in getting and dressing ore, and about £40 in driving the new level, prospecting in other parts of the mine, and in keeping the waterways in repair. The whole of the ore obtained is at present worth about £170 per month. Hence, but for the cost of pumping, a fair profit would be returnable. The workings at the Cat Shaft are not of a sufficiently extensive character to profitably employ a large number of men so as to distribute the cost of pumping over a large output of ore. Labour in the neighbourhood is also scanty and commands a fair price.

Fig 36 : Extract from a letter of the official receiver of the Hurst Lead Mines, Swaledale

It is particularly interesting to see the receiver's comment on the labour situation. This supports Hallas's findings, mentioned previously, that the majority of miners in Swaledale itself had already left and the final decline in Arkengarthdale had not yet commenced (the long-time owner of the latter, George Gilpin-Brown, only died in late 1889 and the lease to the Arkengarthdale Mining Company ended in 1892).⁸⁹



Fig 37: Remains of the old lead smelting mill, Arkengarthdale, 2013.

4.3 Greenhow Hill

The 1871 census reported 123 households on Greenhow Hill with 528 members. A total of 51 of the 85 households with at least one member employed in the lead industry have been traced as far as possible through to 1901. The initial sample was constructed by selecting the first two households on each page of the relevant part of the Bewerley census returns, and all the households in the relevant part of the Appletreewick and Thornthwaite returns, which contained at least one member active in the lead industry.

The sample was 60% of the total number of lead mining households and contained 225 people. The mean household size was 4.4, the mean age was 25 and the mean age of household heads was 48.

Individuals

By 1881, 51% of the initial sample still lived on the hill, 30% had moved elsewhere, 11% had died and 8% could not be traced. Of those alive, traceable, and actively working, the proportion in the lead industry had fallen from 74% to 47%. The number employed in the lead industry actually only reduced from 62 to 56, the larger percentage change arising from the entry into non-mining work of previously inactive children, especially girls into service. Almost all migration was to elsewhere in Pateley Bridge parish or to other parts of the West Riding. The inactive proportion of the population (wives, children, retired or invalid) reduced from 63% in 1871 to 35% in 1881.

Between 30% and 38% of the initial sample migrated during the decade, depending on whether none or all of the 'untraced' are assumed to have migrated. As almost all of this was within Yorkshire, a comparison with Baines is not applicable. Rather, here is evidence that first-stage migration in non-border districts is within county.

The observed annual death rate was around 1.5% for the decade; the precise number again depending on how many of the untraced individuals had died.

Fig 38 shows the results of the full data analysis over the 30 year period:

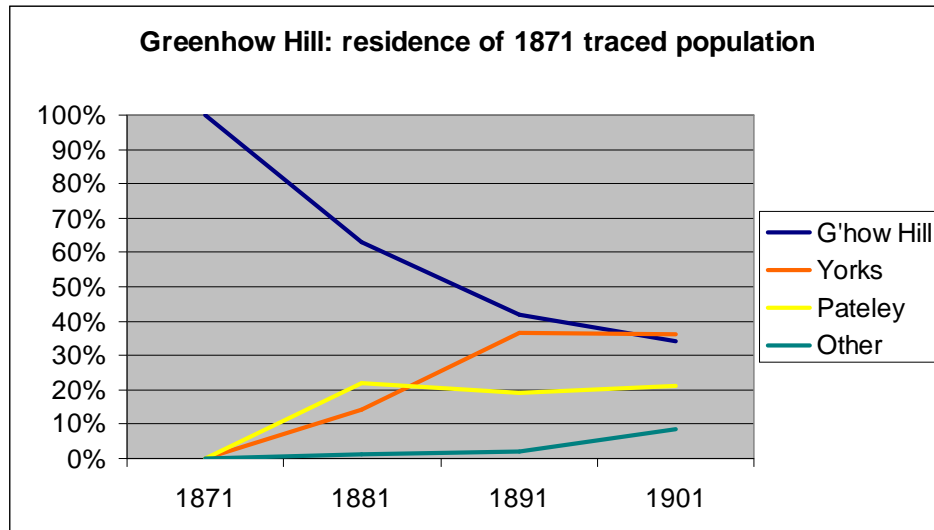


Fig 38: Greenhow Hill; residence of traced sample population 1871-1901

After 1881, migration was mainly to other parts of Yorkshire (mainly the West Riding) with no evidence of attraction towards the more distant Durham coal mines.

There is some evidence of staged and return migration, as 15 individuals who moved to other parts of Pateley Bridge parish subsequently moved further away and a further three returned to the hill.

The chart below shows the destination of the 1871-81 migrants to other parts of the north of England.

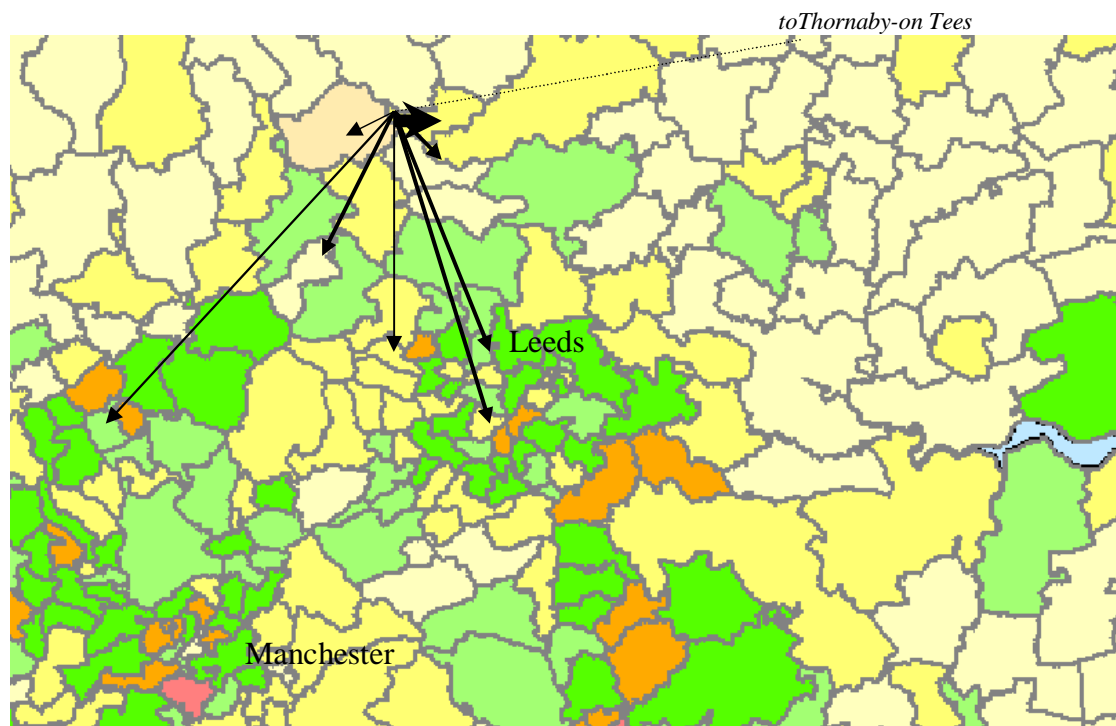


Fig 39, Greenhow Hill map of destinations of 1871-1881 migrants

An analysis of the 1901 census found 187 individuals reporting Greenhow Hill as their birthplace but not resident there.⁹⁰ Of these, around 20% lived nearby, 60% elsewhere in the West Riding (including 15% in Bradford and Leeds), 15% are in Lancashire textile district and only 5% in Durham or elsewhere. This is broadly consistent with the findings reported above.

Fig 40 shows the calculated range of migration and death rates for the whole period under observation.

	1871-81	1881-91	1891-1901
Migration rate: minimum	30%	23%	9%
Migration rate: maximum	38%	33%	16%
Annual death rate	1.5%	2.6%	3.1%

Fig 40: Greenhow Hill; observed sample migration and death rates

The picture below (Fig 41) was taken around 1890 and shows Greenhow Hill lead miners. Fortunately, their names are all given and ten men from the sample still shown as lead miners in the 1891 census can be identified in the picture.



Fig 41: Some Greenhow Hill lead miners around 1890⁹¹

The large bearded miner at bottom centre of the picture is Joseph ('Joss') Pounder, about whom a number of tales are told, including of his bare-knuckle fight on Greenhow Hill with a renowned fighter and horse-dealer known as Gypsy Jack.⁹² The census returns show that he alternated between farming and lead mining and Brough (1920) quotes him "Ah's happy, now the mines are agait ageean".⁹³ As described, he appears to be of a type not particularly amenable to migration, whatever the attractions.

Case Study 1 - Typical

A typical example is that of the family of Benjamin and Meriah Eidson (Appendix 1, Greenhow Household #25). In 1871, he was a 42 year old lead miner on Greenhow Hill with children Albert (11), Eunice (9), Beatrice (6) and Isabella (3).⁹⁴

Ten years later the family had moved to Glasshouses, a village in the Nidd valley just downstream of Pateley Bridge town.⁹⁵ Benjamin was still a lead miner, son Albert was a quarryman and all three daughters worked at a flax mill.



Fig 42: Glasshouses Flax Mill (date under clock 1862)

At some time during the next decade, the family moved to Barnoldswick, a town on the border with Lancashire. The first record they left there was of the birth of an illegitimate son to Beatrice in 1884.⁹⁶

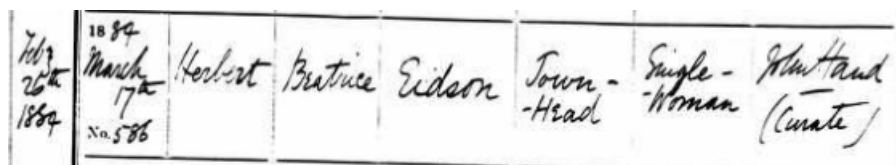


Fig 43: Herbert Eidson's baptismal entry

Eunice also had an illegitimate son, George Harold, baptised there in 1887, the same year that Albert married Isabella Bracewell and Beatrice married John Horner.⁹⁷

The 1891 census shows Benjamin and Albert both being quarry workers and the girls cotton weavers.⁹⁸ Isabella married Robert Cryer in 1891.⁹⁹

The 1901 census reveals some third stage migration, with Beatrice living across the Lancashire border in Colne and Eunice, who married John Harwood in 1892, having

moved further into Lancashire to Burnley¹⁰⁰. Both they and their husbands were cotton mill workers.

This case study illustrates one of the attractions of mill-working, in that it was usually possible for both husband and wife to earn a wage if appropriate child-care arrangements could be made. In the Eidsons' case, these appear to have been fulfilled by Meriah (until her death in 1897), the 1891 census showing three grandchildren residing with her and Benjamin.¹⁰¹

Fig 44 shows the variation in the occupations of the traceable population over time.

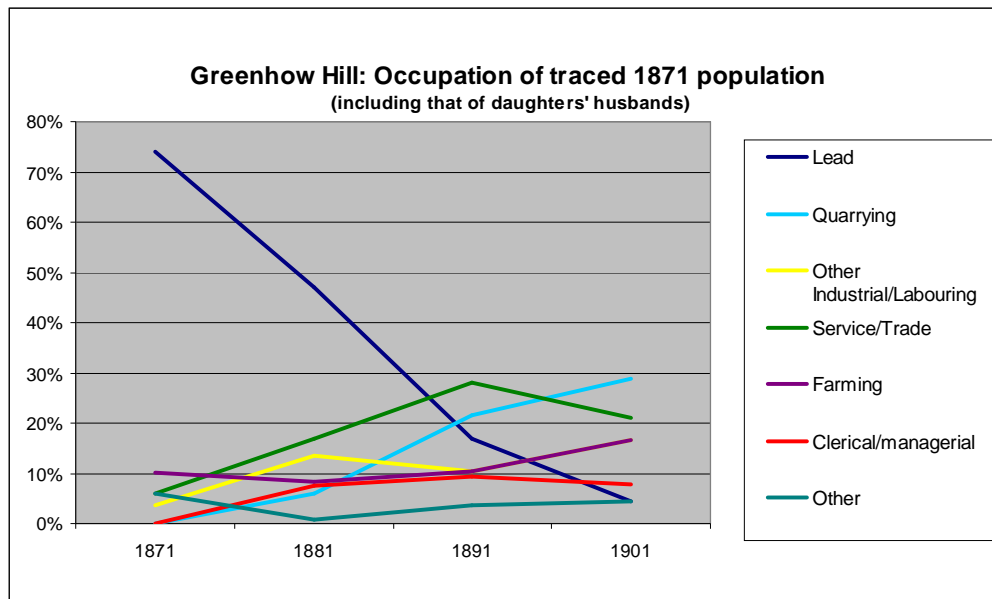


Fig 44: Greenhow Hill; occupation of traced sample population 1871-1901

The almost complete movement away from lead mining is notable (5% remaining compared with 15% in Arkengarthdale and 45% at Nenthead). Quarrying is the most significant alternative, followed closely by service and trade (blacksmith, joiner, tailor, innkeeper, etc). The surprisingly high level of 'clerical' employment is explained largely by case study 2 below.

Case Study 2 - Atypical

An unusual family was that of Thomas Green (household #45).¹⁰² This was not only because he and his wife Jane had eleven children living with them in 1871 with ages ranging from 25 to 3, but because all six of their sons made careers as insurance agents, mainly in Yorkshire.¹⁰³ Two of the sons had been lead miners like their father in 1871 and one a lead roller. A cousin, William Green (household #46), also became an insurance agent.¹⁰⁴

Quarrying took place on Greenhow Hill itself at the limestone quarries of Coldstones and Duck Street.¹⁰⁵ The former was operated by the Newbould Brothers, former lead miners (household #10), supplying amongst others Harrogate town council.

**THE ROAD SURVEYOR'S REPORT AND THE
SUPPLY OF STONES.**

The Road Surveyor presented his report of the work done upon the roads and footpaths during the month, which showed that 948 tons of Pateley stone, 153 tons of Dacre stone, and 36 tons of granite had been brought into the borough. The Highways Sub-Committee had made arrangements for a better supply of stone from Coldstones Quarry. It was resolved that £15 be paid to Messrs. Newbould Brothers on account for the special quarrying work.

Fig 45 Item in York Herald - Saturday 18 June 1892¹⁰⁶

There were also quarries elsewhere in the Pateley Bridge district and it at these that many ended up. The demand for stone for buildings, roads and agriculture (limestone) was growing, and the railhead at Pateley Bridge, opened in 1862, made the transport of stone more economical. Scotgate Ash Quarry was the largest quarry in Nidderdale and in 1871 a 'self acting inclined railway' was built to bring stone down from the quarry to the railway at Pateley Bridge, 600 feet below.¹⁰⁷ The timing was fortunate and allowed more former miners to remain in the local area than would other wise be the case (55% of the living traceable in 1901 compared with 50% at Nenthead, where lead mining continued, and 32% for Arkengarthdale).

Others transferred their skills to quarries in more distant parts of the West Riding, including to the quarries near Bradford and Barnoldswick (q.v. case study 1).

Apart from the case study, few of the sample moved into the West Riding textile industry. This is perhaps surprising given the proximity - and that the Roantree family in Rudyard Kipling's *On Greenhow Hill* were leaving the Hill and "goin' to Bradford, to Jesse's brother David, as worked i' a mill".

Whole Family Results (1871-1881)

At the household level we find that, deaths and untraced members apart, 42% of families were still to be found on Greenhow Hill in 1881, 18% had migrated as a unit and 36% had dispersed (1 household was untraceable and all members of another had died). Fig 46 shows the correlation between the fate of the 1871 household head and that of the family as a whole.

HEAD	OTHER FAMILY MEMBERS					TOTAL
	Stayed	Moved	Died	Dispersed	Unknown	
Stayed	30%	2%	0%	26%	0%	58%
Moved	0%	12%	0%	0%	0%	12%
Died	12%	4%	2%	10%	0%	28%
Unknown	0%	0%	0%	0%	2%	2%
TOTAL	42%	18%	2%	36%	2%	100%

Fig 46: Greenhow Hill: Family migration analysis

Family dispersions appear not to have been triggered by the head moving but are uniformly likely whether the head has died or still lived on the hill.

4.4 Baldersdale

The 1871 census reported 87 households in Baldersdale with 436 members, a mean household size of 5.0. Almost all of the heads of household were small or medium-sized farmers.

48 of the households have been traced as far as possible through to 1901. The initial sample was constructed by selecting the first two households on each of the 21 pages of the relevant parts of the Cotherstone and Hunderthwaite census returns and adding a further 6 from randomly selected pages. The sample was 55% of the total number of households and contained 264 people. The average age of the sample individuals was 28 and the average age of heads of household was 51, somewhat older than in the mining regions.

By 1881, 50% of the initial population still resided in Baldersdale, 28% had moved elsewhere, 12% had died and 10% could not be traced. Of those alive and traceable, the majority still worked locally and in agriculture. The commonest migration destinations were either down the dale to other parts of the large parish of Romaldkirk, especially the nearest village of Cotherstone, or over the top of the dale to the agricultural parishes of Westmorland on the western side of the Pennines. There is no evidence of any overseas migration.

Fig 47 shows that over the whole period, Durham was the most common migration destination, followed by other parts of Yorkshire.

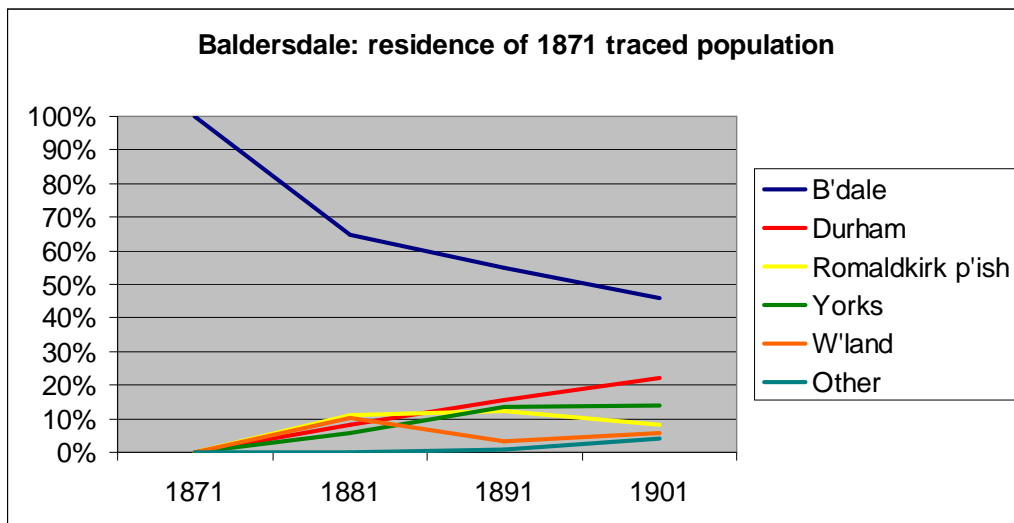


Fig 47: Baldersdale; residence of traced sample population 1871-1901

Between 14% and 25% of the initial sample left Yorkshire during the decade. The net migration rate calculated by Baines for Yorkshire as a whole for the decade is around 6%. This might be seen as implying that Baldersdale experienced a higher rate than the county as a whole, which might be expected as it is a 'border' region, although this assumes that inward migration, offset in Baines' calculation, did not make up the whole of the difference.

The observed death rate was 1.6% for the decade; the precise number again depending on how many of the untraced individual had died. The rate of mortality is a little less than that for the period nationally (1.9% - 2.3%).

The data exhibits the main expected trends. As time passes, children mature and enter employment, sons usually working on the family farm or taking on the running of a nearby farm and daughters also work on the farm before marrying farmers or their sons. The census categorisations of 'farmer's son' and 'farmer's daughter' implies working on the farm, so these (in fact all children over the age of 14) have been classed as agricultural labourers in this study.

Overall, this has resulted in a net reduction in the inactive proportion of the population (wives, children, retired or invalid), from 54% in 1871 to 30% in 1881 and 18% in 1901 – although describing a Baldersdale farmer's wife as inactive is somewhat of a misnomer!

Of particular note was the number of farm servants within households (30 out of 264). More than half could not be traced even to 1881 and only one of the 14 who could be traced that far had remained in Baldersdale. Kipling (2011) found in another part of the North Riding that employees of this type were also subject to a high turnover rate¹⁰⁸. A significant number of the female servants had been born in Durham and the males in Westmorland and it is reasonable to assume that a proportion of them at least returned home to marry.

Fig 48 shows the results of the full data analysis over the 30 year period.

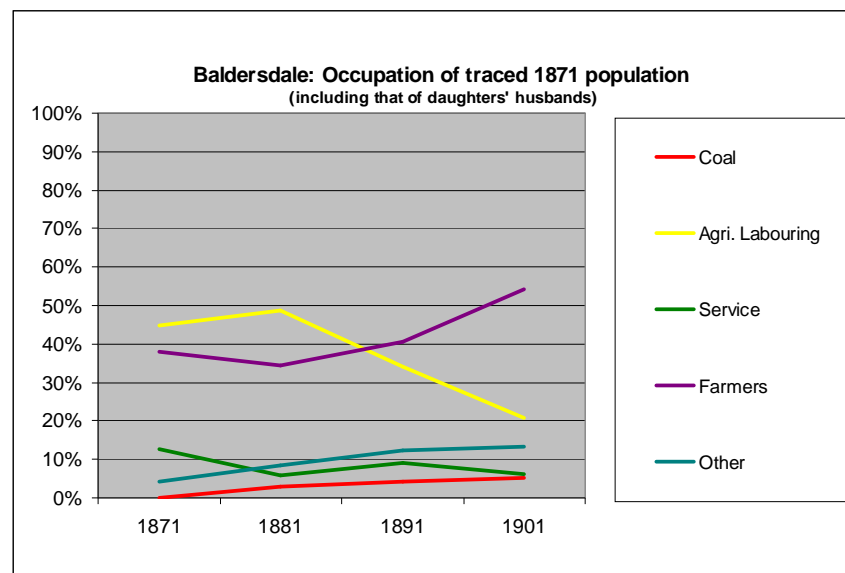


Fig 48: Baldersdale; occupation of traced sample population 1871-1901

The trend for farmers' children to take up farms of their own or to marry farmers can clearly be seen. The decline in the number in service is largely due to the high

proportion untraceable. Finally, the movement out of farming into coal mining and other trades is observable but not particularly significant.

Fig 49 shows the destination of the traceable 1871-81 migrants.

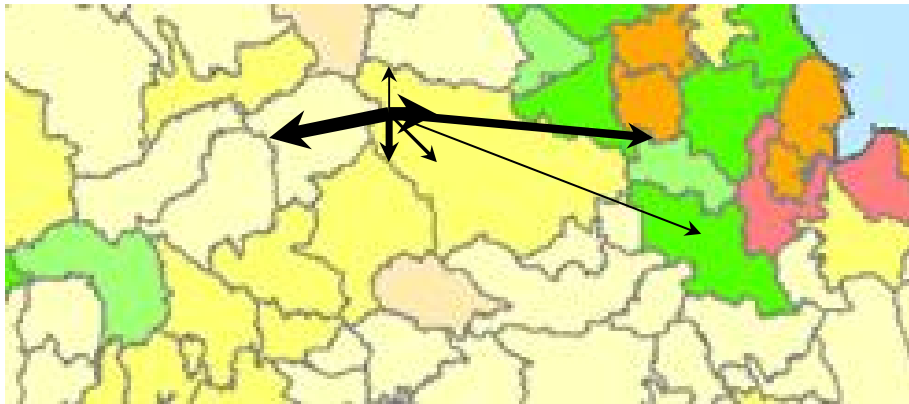


Fig 49: Baldersdale, map of destinations of 1871-1881 migrants

Compared to the same analysis of the lead mining areas, the limited scope of the migration is clear.

Fig 50 shows the calculated range of migration and death rates for the whole period under observation.

	1871-81	1881-91	1891-1901
Migration rate: minimum	28%	14%	14%
Migration rate: maximum	38%	20%	19%
Annual death rate	1.6%	2.5%	2.9%

Fig 50: Baldersdale; observed sample migration and death rates

Whole Family Results (1871-1881)

At the household level we find that, deaths and untraced members apart, 67% of families were still to be found in Baldersdale in 1881, 22% had migrated as a unit and only 11% had dispersed (the movement of farm servants was excluded from consideration). Fig 51 shows correlation between the fate of the 1871 household head and that of the family as a whole.

Dispersions appear more likely following the death of the household head. It could be speculated that this arose in some cases because farm tenancies terminated and were not taken up by other family members.

HEAD	OTHER FAMILY MEMBERS					TOTAL
	Stayed	Moved	Died	Dispersed	Unknown	
Stayed	48%	0%	0%	4%	0%	52%
Moved	0%	22%	0%	0%	0%	22%
Died	20%	0%	0%	7%	0%	26%
Unknown	0%	0%	0%	0%	0%	0%
TOTAL	67%	22%	0%	11%	0%	100%

Fig 51: Baldersdale: Family migration analysis

Case Study – Typical

In 1871, James Kipling (57) farmed 88 acres high up the southern side of the valley at Clove Lodge.¹⁰⁹ Living with him was his wife Mary, son William (19), daughter Mary (17) and father, also William, (92). (Baldersdale Family #14)

James was a tenant farmer, as can be seen from the cutting below advertising the sale of the freehold in 1877.

BALDERSDALE, YORKSHIRE.
VALUABLE CUSTOMARY FREEHOLD ESTATE.
TO BE SOLD BY AUCTION, at the
KING'S HEAD HOTEL, Barnard Castle, on WED-
NESDAY, the 19th day of DECEMBER, 1877, at 3 o'clock in
the Afternoon, (subject to such Conditions as will be then
produced, and in one or more Lot or Lots, as may then or
previously be determined upon,) by
MESSRS. TARN, AUCTIONEERS,
 All that Customary FREEHOLD FARM, called "Clove Lodge," situate in a rich Pastoral District in Baldersdale, in the Township of Cotharston, in the North Riding of the County of York, comprising a Dwelling-House, Stable, Barns, Cowhouses, and all other requisite Outbuildings and Conveniences thereto, with several Closes or Parcels of LAND, containing altogether 88a. 0r. 17p., be the same more or less; also 75½ SHEEP STINTS on Cotharston Regulated Pasture.
 The above Property is situated about 5 miles from Cotharston, where there is a Railway Station, and near Cotharston Moor, well stocked with game, and good fishing can be obtained in the river Balder.
 Some portions of the land are proposed to be taken for water supply purposes by the Stockton-on-Tees and Middlesbrough Corporations Act, 1876.
 The Property is subject to an ancient customary yearly rent of £1 1s., which (if it is sold in Lots) will be apportioned previous to the completion of the sale.
 A Fine, amounting to twenty years' ancient rent, will be payable to the Lord of the Manor of Cotharston on allocation.
 The amount of Tithe Commutation Rent Charge is £5 11s. 1d.
 The Tenant (Mr. James Kipling) will show the property, and further information may be obtained of Mr. W. H. SCARRE, land agent, Lartington; the AUCTIONEERS, Hayberries, near Romaldkirk; or at my Office, Barnard Castle, where a Plan may be seen.
 9217 JOHN D. HOLMES, Solicitor,
 Barnard Castle, 16th Nov., 1877 Barnard Castle.

Fig 52: Item in York Herald 1877¹¹⁰

James had been born at nearby Waterknott, which had been farmed for many years by his father, and he had worked at Clove Lodge since at least 1841, initially for Thomas Bousfield and then in his own account from at least 1861.¹¹¹

In 1874, daughter Mary married John Kipling (not a near relative), who farmed at nearby Merebeck.¹¹² They were still at Merebeck in 1901.¹¹³

By 1891, James and Mary had retired to a house in Cotharstone village, leaving William to farm Clove Lodge, along with wife Mary and sons James W (2) and Elizabeth J (3mo).¹¹⁴ There were two farm servants, both from Westmorland, William Metcalf and Isabella Dixon (19).

In 1901, the Kipling family were still at Clove Lodge, although the farm servants were now John Tunstall (17) of Westmorland and Mary J Kipling (22), one of William's sister Mary's daughters.¹¹⁵

Case Study – Atypical

In 1871, William Coatsworth (37) farmed 12 acres in the hamlet of Hury.¹¹⁶ With him and his wife were five sons aged 2 to 9 and step-daughter Eliza Wright. (Baldersdale Family #19).

William's father had come to Baldersdale in the mid 1840s from higher up Teesdale and was a tenant farmer at Merebeck in 1851.¹¹⁷

The 1881 census finds the whole family in Hamsterley on the edge of the Durham coalfield.¹¹⁸ William was described as an 'auctioneer' (and later as a 'hawker') and three of his sons were working as coal miners, soon to be joined by the other two. Eliza married a tailor and they later moved to Eggleston, on the north bank of the Tees opposite Romaldkirk.¹¹⁹

The sons remained in the Durham coalfield up to 1901, although not all at Hamsterley.¹²⁰

4.5 Towednack

In 1871, Towednack contained 179 households and 848 people, an average household size of 4.7.

47 'tin' households out of 117 in the 1871 census were traced as far as possible through to 1901. The initial sample was constructed by selecting the first household on each of the 39 pages of the census returns with at least one member in a clearly mining-related occupation. A second 'tin' household was selected from randomly selected pages to make up the numbers. The sample was 40% of the total number of 'tin' households and contained 263 people. The average family size in the sample is 5.6, somewhat larger than that of the parish as a whole.

The average age of the sample individuals was 23 and the average age of heads of household was 47.

Individuals

By 1881, 47% of the initial sample still resided in Towednack, 21% had moved elsewhere, 13% had died and 18% could not be traced. The commonest migration destinations were to the immediately adjacent parishes of Uny Lelant, St Ives, Gulval, Ludgvan and Zennor, which for some may have meant as little as a move a few houses away from where the previously lived.

7% were known to be overseas (Australia, New Zealand or the USA), although given the greater difficulty of tracing overseas migrants, this almost certainly understates the true number. Nevertheless, the material proportion identified as having migrated overseas using the same search methodology as for the other areas, clearly shows this to be a material difference.

The observed death rate was around 1.8% for the decade; the precise number again depending on how many of the untraced individual had died. The rate of mortality is typical of the period nationally

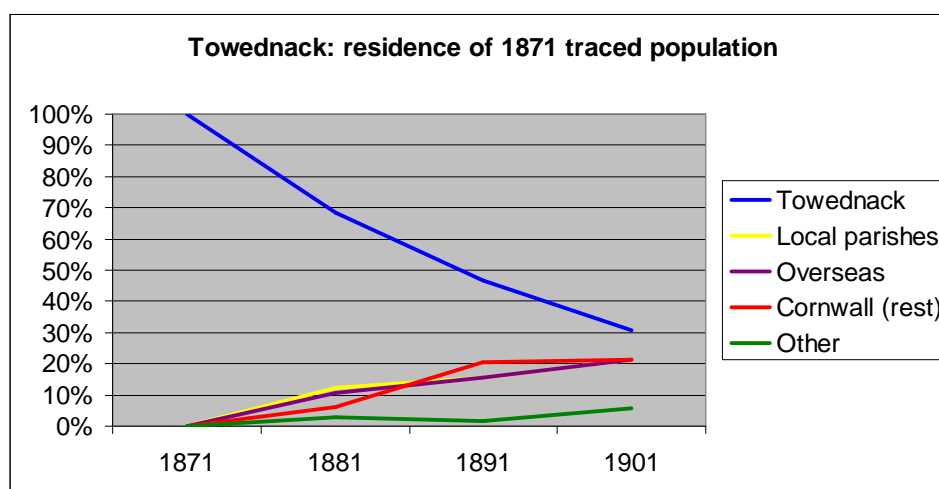


Fig 53: Towednack; residence of traced sample population 1871-1901

By 1901, of those traced this far, only 31% remained in Towednack, with 42% being elsewhere in Cornwall and 21% overseas. Relatively few had moved elsewhere in the UK.

The observed migration rates and death rates for 1871-1901 are shown in Fig 54:

	1871-81	1881-91	1891-1901
Migration rate: minimum	23%	22%	21%
Migration rate: maximum	40%	44%	42%
Annual death rate	1.8%	2.3%	2.0%

Fig 54: Towednack; observed sample migration

Considering only migration away from Cornwall, the observed gross migration rate for 1871-1881 was between 10% and 29%. The net migration rate calculated by Baines for Cornwall as a whole for the decade is 10% to other UK counties for men and 12% overseas (22% in total) and 11% to other UK counties and 7% overseas (17% in total) for women.¹²¹ The sample experience is not inconsistent with Baines, especially after allowing for a small rate of return migration in Baines' statistics.

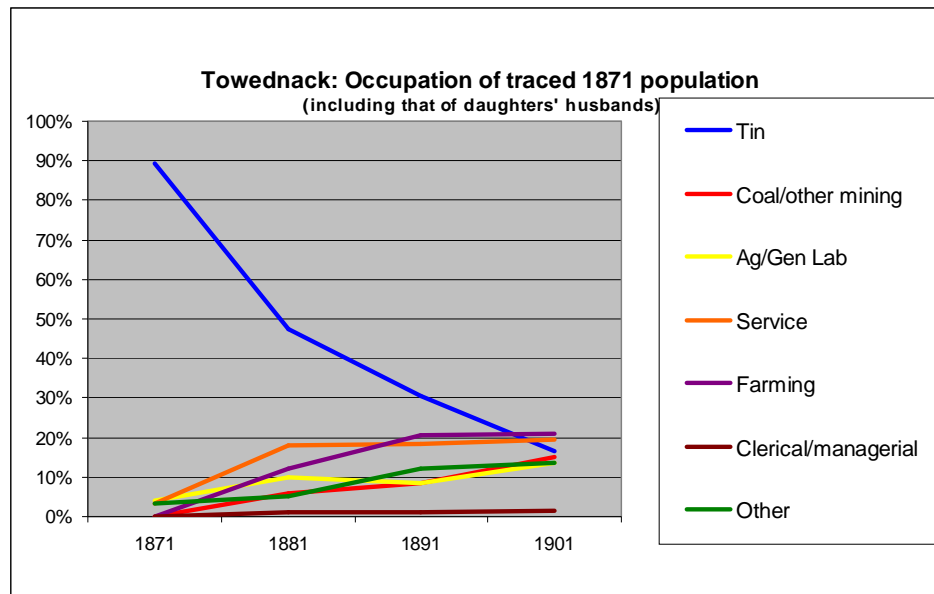


Fig 55: Towednack; occupation of traced sample population 1871-1901

89% of the sample who were in employment in 1871 was engaged in tin extraction. This had reduced to 47% by 1881 and to less than 20% by 1901. The most common alternative employments were agriculture and service (domestic or otherwise). Those overseas were generally engaged in mining.

As with the other samples, there is a net reduction in the inactive proportion of the population from 63% in 1871 to 39% in 1881 and 22% in 1901.

No evidence of migration to South America could be found, supporting Schwartz's finding that the main source of this migration was central Cornwall around Camborne and Redruth (see Fig 56).¹²²

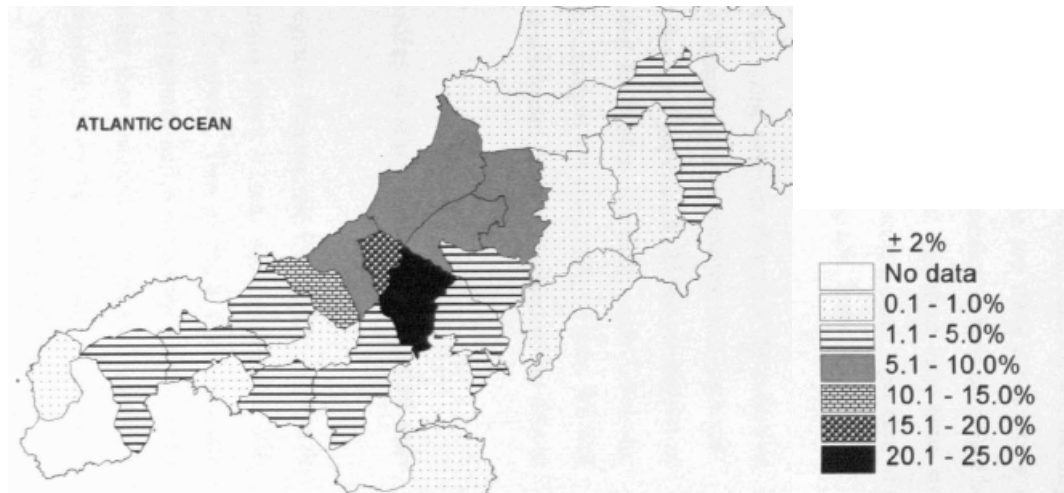


Fig 56: West Cornwall, percentage of total migrants registration sub-districts 1811-1830

Her rationale is of the co-incidence of the rather earlier decline from peak of copper mining in those areas and the establishment of personal connections (early migrants writing home favourably or returning with some wealth, recruitment sourced via local contacts, etc).

However, there is evidence of migration from Towednack to the Camborne area, suggesting some filling-in of vacancies caused by those moving overseas.

Payton shows that migration in general from Cornwall in the second half of the 19th century was directed mainly to newer mining areas Australia and the USA¹²³. This followed much previous Cornish migration to the copper fields of South Australia and the gold mines of California and Victoria earlier in the century, which established not only the reputation of Cornish miners in those countries but also informal social networks which fostered further migration.

Whole Family Results (1871-1881)

At the household level we find that, deaths and untraced members apart, 37% of families were still to be found in Towednack in 1881, 20% had migrated as a unit and 26% had dispersed. The fate of 13% was unknown and 4% had all died. Fig 57 shows the correlation between the fate of the 1871 household head and that of the family as a whole.

There is, if anything, a negative correlation between deaths of the head and dispersal.

HEAD	OTHER FAMILY MEMBERS					TOTAL
	Stayed	Moved	Died	Dispersed	Unknown	
Stayed	24%	0%	0%	17%	0%	41%
Moved	0%	13%	0%	4%	2%	20%
Died	13%	7%	4%	4%	2%	30%
Unknown	0%	0%	0%	0%	9%	9%
TOTAL	37%	20%	4%	26%	13%	100%

Fig 57: Towednack: Family migration analysis

Case Study. The Berriman family (Towednack household #29)

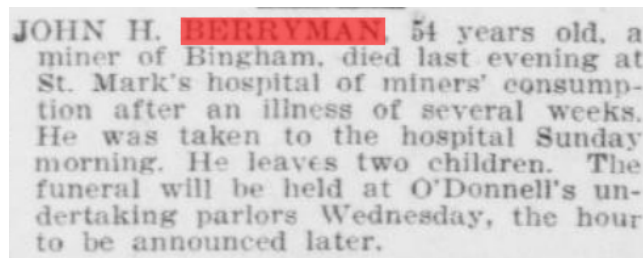
In 1871, Richard Berriman (51) was a tin miner at Georgia Croft, with wife Ann and 10 children ranging in age from 2 to 22.¹²⁴ They had moved there within the last 3 years from Madron/Zennor, as only youngest daughter Ellen had been born in Towednack.

Daughter Elizabeth (22) was a dressmaker and sons Richard (20) and John (16) were tin miners. A monumental inscription in Towednack churchyard tells some of the family's subsequent story:

*“Richard BERRIMAN 31/7/1879 aged 59 also Ann 2/7/1903 aged 76 Samuel their son Died Butte Montana USA 20/8/1888 22 also James their son died Butte Montana USA 8/8/1902 38 also John their son died in Utah USA 11/10/1909 54”*¹²⁵

By 1881, Richard was dead and the family dispersed.¹²⁶ Widow Ann was living in the neighbouring parish of Ludgvan, with sons James (17), a farm worker, Samuel (14), a brickmaker, and daughter Ellen (12).¹²⁷ Daughters Jane and Dinah had married tin mining brothers William and John Uren respectively and were still in Towednack.¹²⁸ Daughter Emily was in Ludgvan, married to mine engine driver Robert Osborn (of Towednack household #28).¹²⁹

Son John was already in the USA (according to his entry in the 1900 USA census he arrived in 1874, although he cannot be identified in the 1880 census).¹³⁰ He was a silver miner in 1900 at Bingham Canyon near Salt Lake City.



*Fig 58: Item in Salt Lake Herald-Republican 12 October 1909*¹³¹

Son James may be the James Berryman in the 1900 US census in Silver Bow County, Montana (the county containing Butte) who was a copper miner.¹³²

Son Richard probably have married Margaret Battan in 1892 and was living (‘retired miner’) in Uny Lelant in 1901.¹³³

It has not been possible to trace the remaining three children to 1881.

Case Study. The Phillips family (household #44)

The obituary below tells in detail the life of William Phillips of Bussow Hill who, with his two brothers, James and Matthew, migrated from Towednack to the USA. Houghton was a copper-mining area in Michigan close to Lake Superior.

<p style="text-align: center;">William Phillips 1848—1933</p> <p>After a very brief illness, lasting only a few weeks, the immortal soul of William Phillips winged its way to celestial morning on July 3. Mr. Phillips was one of the pioneers of Dickinson County, coming to East Vulcan almost 50 years ago, where he located on the well-known Phillips homestead, becoming a foreman for the Penn Company.</p> <p>He was a native of old Cornwall, that has given so many of her sons to Michigan, having been born at Towednack, St. Ives, Cornwall, Feb. 15, 1848. While a citizen of Great Britain he was married and had born to this first union, one son, William John, who now resides at Negaunee, who was present at his father's funeral.</p> <p>On the death of his first wife, he came to America in 1872, locating at Houghton, Mich., where he was united in marriage to Miss Mollie Fredricks of that place in 1880.</p> <p>To this second union, ten children were born, all of which survive, and with the exception of Marshall, of Nevada, were able to be present at the funeral: Chester of International Falls, Minn.; Jennie (Mrs. Myners) of Kalamazoo; Wilmont Olive (Mrs. Crawford), Muskegon; Howard, Allan, Norton and Horace of Detroit; Olive (Mrs. Ivey Mole) on the old homestead, and Professor Robert Phillips of Purdue University, Lafayette, Indiana.</p>	<p>Other relatives surviving are two sisters, Mrs. Margaret Curnow of Lead, S. D., and Mrs. Wilmot Mitchell, Cornwall, England, together with 30 grand-children and eight great-grand-children.</p> <p>The funeral was held from his late residence on Friday afternoon of last week, short services being held at the home, and the service of worship at the Vulcan Methodist church, with the Rev. J. W. Greenwood, pastor, in charge.</p> <p>The Men's Quartette, consisting of Messrs. Olson, Hammill, Piper and Thomas sang three inspiring and comforting numbers, "Crossing The Bar," "Where Jesus Lives" and "In The Garden," and the pastor spoke on the theme—"The Father Who Stands By Us."</p> <p>Interment took place in the Phillips lot, in the Norway Township cemetery.</p> <p>Relatives in attendance from a distance, in addition to the sons, daughters and families were: Seth Phillips, wife and son, of Negaunee; James Phillips (a brother) and daughter, Miss Bessie, of Eagle River; Frank (a nephew) and son and daughter of Calumet, and Mr. and Mrs. Roy Phillips of Loretto.</p> <p>Mr. Phillips was a man of the strictest integrity and honor whose word was as good as his bond, and although of a quiet and unassuming manner, was held in very high esteem by many friends. Michigan is richer and better because of the life and service of such a pioneer, and no one will forget the inspiring sight of six sturdy and splendid sons acting as pall-bearers for a father who had sacrificially stood by them through all the years.</p>
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Fig 59: Obituary of William Phillips, Norway Current, Friday, July 14, 1933¹³⁴

Their widowed mother remained behind in Towednack, farming, and Matthew died in a mining accident in California.

<p style="text-align: center;">❖ ❖ En ❖ Loving ❖ Memory ❖ of ❖ ❖</p> <p style="text-align: center;">JANE,</p> <p style="text-align: center;">Widow of Francis Phillips,</p> <p style="text-align: center;">WHO DIED AT BUSSOW HILL, TOWEDNACK,</p> <p style="text-align: center;">SEPTEMBER 11TH, 1900,</p> <p style="text-align: center;">❖ ❖ AGED ❖ 88 ❖ YEARS. ❖ ❖</p>	<p style="text-align: center;">MINER KILLED BY CAVE-IN AT A MINE NEAR CALEXICO</p> <p>SAN BERNARDINO, June 14.—Mat Phillips, an employe of one of the mining companies in the vicinity of Calexico, was killed at noon yesterday in a cave-in at the mine. The news of the accident was received in a brief telegram this morning by Coroner Pittman. None of the particulars were given. The Coroner left on train No. 5 this morning to hold the inquest. News of the accident was wired in from Daggett by Alexander McLaren, supposedly a companion of Phillips.</p>
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Fig 60: Notice of death of Jane and Matthew Phillips¹³⁵

The spread of William's large family across the USA is notable from the obituary. Most unusual is the achievement of a chair at Purdue University by one of his sons, an improvement in social status not observed elsewhere in this study.

Further monumental inscriptions in the parish churchyard refer to other parishioners who have died overseas.⁶⁹

Joseph Robert BERRIMAN 19/8/1853 48 Margery his wife 3/5/1876 78 Elizabeth his daughter 19/8/1852 24 Matthew the son died in Michigan USA 19/8/1860 27 also six other children who died in infancy stone erected by family in California USA

Banfield GILBERT 31/8/1897 aged 58 also son Issac Broad died Brokenhill Australia 16/12/1897 aged 27 also son John Banfield 18/11/1898 32 also Elizabeth Ann his wife 14/2/1900 aged 64 also Fanny Jelbert 30/11/1933 aged 80

Richard John son of Thomas and Mary JAMES 21/2/1877 23 also Thomas his father 3/11/1888 62 also Mary his mother 22/5/1914 87 also William his brother died Workington Cumberland 18/4/1888 35 and Henry HOCKING son-in-law died in South Africa 24/1/1895 38

Thomas Eddy MARTIN died in the USA March 1913 60 also Alice Ann his wife 4/9/1913 63 also Thomas Eddy their son died in the USA June 1914 36 also Mary Jane 30/3/1960 86 also Eliza 24/4/1924 46 also Elizabeth Ann 5/4/1939 66

Richard son of Richard and Mary Ann NICHOLLAS 28/6/1887 20 their grandson William Edward child of William and Francis NICHOLLAS 4/7/1883 16 months also Walter brother of Richard 5/4/1891 28 also Steven his brother who was killed in Black Hills USA 29/5/1892 33

4.6 Origins of the population

It could be conjectured that a population's propensity to migrate might depend in part on its origins; a recently arrived family being more likely to return to its origins or to move on than a family with established local roots. An examination was therefore carried out of the origins of the 1871 populations in the five study regions as recorded in the CEBs.

One feature shared in common across all five areas is the lack of immigration in the recent past. In Greenhow Hill, 97% of the population was born locally and in Towednack, only 1% was born outside the parish and its adjoining neighbours; one of the exceptions being the Bailey family ('husband abroad') having three children born in New Grenada (now Colombia and Panama).

A slightly higher 7% of the Arkengarthdale population was born outside the parish, mainly from nearby parishes in Westmorland or Durham (although the vicar came from Lincolnshire and the schoolmaster from another part of Yorkshire)

Around 10% of the population of Nenthead was born outside Alston parish, although largely in neighbouring Northumberland or Durham lead mining parishes; two children born in the USA being one of the few exceptions.

For all four mining areas, the evidence is consistent with an industry that had not been in material growth mode for several decades, with vacancies being filled by locally-born people rather than any 'pull' on immigrants.

Baldersdale was a little different, as there was evidence of rather more movement, although still largely only from a slightly expanded neighbourhood of a dozen or so parishes of Westmorland, Durham and the North Riding. In particular, there was evidence both of farm tenants (and their families) and farm servants moving quite regularly between these parishes as employment and land opportunities arose.

It can be concluded that, Baldersdale apart, the vast majority of the population in the sample areas had been established locally for at least one generation and that origin was unlikely to be a material factor in subsequent migration.

4.7 The attraction of coal and other expanding industries

Church describe show as the 19th century progressed, the earnings of coal miners, especially the skilled hewers, rose materially relative to both to the cost of living and the wages in other occupations, especially agricultural labour.¹³⁶

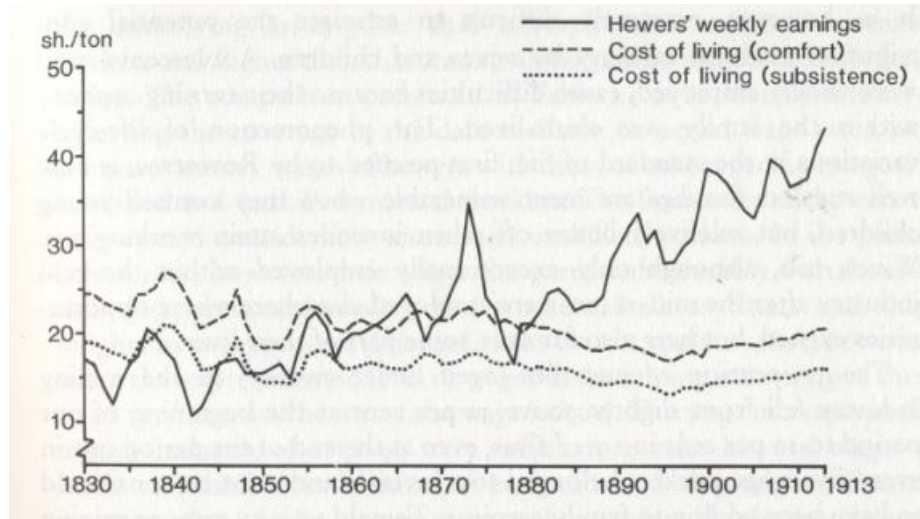


Fig 61: Estimates of coal hewers' earnings and the cost of living 1830-1913¹³⁷

	1866	1873	1883	1890	1900
Coal Hewers	26	33	24	32	39
Textile Dyers	20	22	24	24	24
Agricultural Labourers	12	13	13	13	14

Fig 62; Wage comparisons, 1866-1900; national averages¹³⁸

It is not surprising that, as mentioned in section 2 above, this led to a material net migration flow into coal mining areas, especially early in the period during the boom of 1872-3. Absolute comparisons with agricultural labouring earnings should be made cautiously, however, given possible differences in non-financial elements of remuneration and/or in living costs.

Church also compares earnings in the Teesside iron and steel industry with that of coal mining, and identifies a significant narrowing of the gap in favour of the latter between 1870 and 1900

	1870	1880	1890	1900
Coal Hewers (UK)	51	50	81	100
Teesside Iron and Steel	81	67	90	100

Fig 63: Comparison of real earnings estimates 1870-1900 (1900=100)

This would suggest that earlier in the period, larger differentials might have been sufficient to attract the more flexible lead miners into this different industry but that this effect diminished over the period. Only a small number of the sample took this course, however.

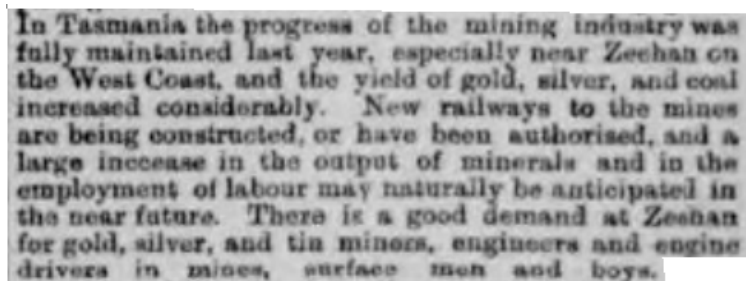
The textile industries of Yorkshire and Lancashire have also been identified as a source of attractive migratory influence, although not perhaps less so than proximity might suggest at Greenhow Hill, even though the greater ability of the whole family to be gainfully employed has already been mentioned as one attraction of moving to the textile towns.

Even more remunerative prospects beckoned overseas. It was reckoned that a gold or silver miner in Nevada could earn in 1881 nine times what he could earn mining tin or copper in Cornwall, saving over living expenses in nine months what it would take nine years to earn back home.¹³⁹ Newspaper advertisements encouraged emigration, such as the one below which appears in the Newcastle Courant in 1876, specifically targeting lead, tin and copper miners amongst others,¹⁴⁰



Fig 64: Emigration advertisement from the Newcastle Courant

Newspapers in Cornwall published regular reviews of the prospects for migrants in various areas. Fig 65 below is an extract from an 1897 report relating to tin mining opportunities in Australia.



*Fig 65: Item showing demand for metal miners in Tasmania*¹⁴¹

A search on the British Newspaper Library website did not identify similar reports in Northern newspapers.

5. Conclusions

Fig 66 combines the results from sections 4.1-4.5 and illustrates key similarities and difference between the three lead mining areas and between those areas and Baldersdale and Towednack.

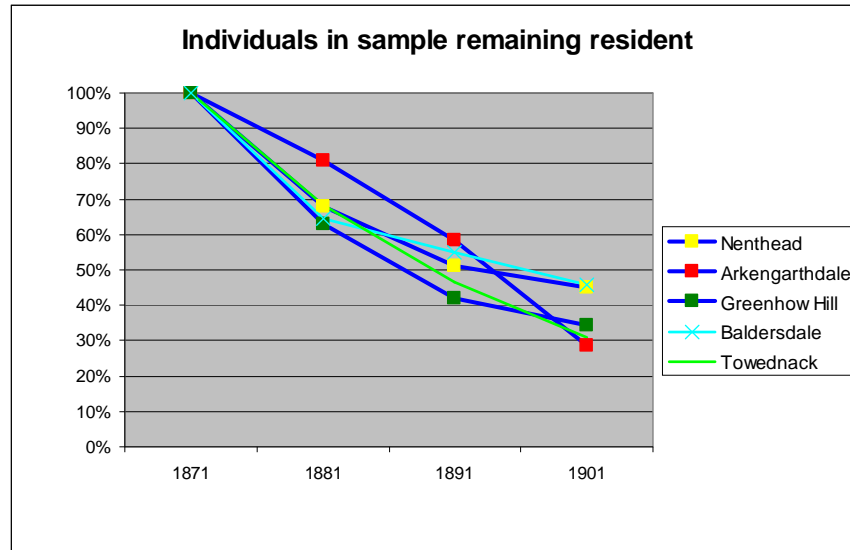


Fig 66: Comparison of observed proportions of non-migrants

At the end of the period, the proportions of individuals remaining in the sample area fall into two clusters; Nenthead and Baldersdale with around 45% remaining and Greenhow Hill, Arkengarthdale and Towednack with 30-35%.

Comparing Fig 67, we can see a possible relationship with the continued availability of traditional employment, with the Nenthead (to a degree) and Baldersdale populations having higher proportions still following their original occupation.

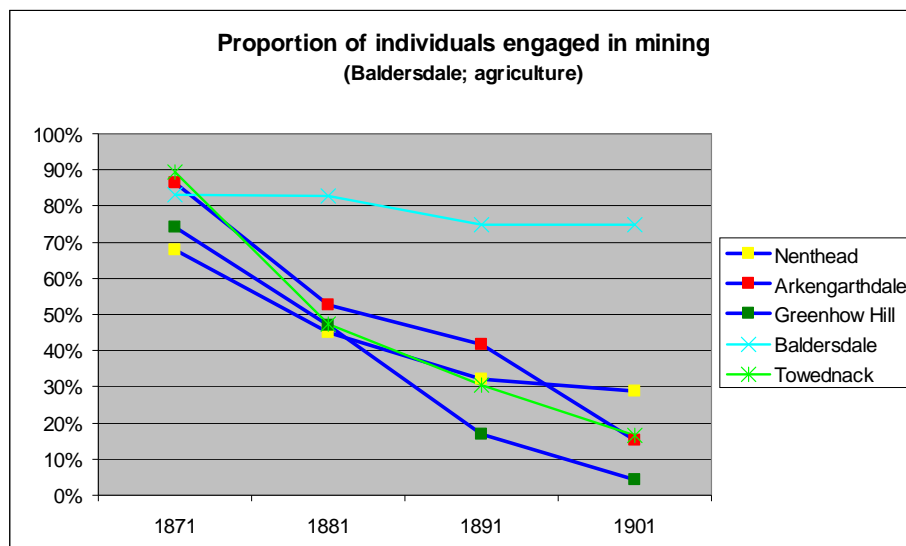


Fig 67: Comparison of observed proportions of remaining in the lead industry

Closer examination shows that all of those of the Nenthead sample who were still mining lead in 1901 had remained at Nenthead rather than having moved elsewhere. This shows there was little opportunity for migrants to find work in the industry in the other areas, all of which were in decline.

For Baldersdale, as noted earlier, there was significant migration between farms, mainly within a cluster of twenty or so local parishes, of both tenant farmers and of farm servants. Here, industrial decline is not the main driver of migration but rather a desire for betterment or change (or in some cases the consequence of failure) within farming. For Baldersdale women, marriage within the farming community of the parish cluster is the main observed driver.

The different pace of decline in lead (and tin) extraction in different areas can also be seen from both graphs, especially for Arkengarthdale where the decline was initially slower and then more rapid in 1891-1901 (echoing the findings of Hearfield, see 4.3 above, and also that of Hallas (1999)) and Greenhow Hill where the decline was most rapid in 1871-1891.¹⁴²

The main genealogical effect of the decline in the North Pennine lead mining has therefore been the break-up and migration of established local families from the affected areas. In some areas, the absence of substitute occupations has led to an increase in the rate of migration above the natural level that might be expected over decades from any small area

Where sufficient local alternative employment is not available, migratory behaviour has been in line with accepted theory. Economic betterment is sought and the difficulty of relocation is minimised; Nenthead miners move to the Durham coal-fields, Greenhow miners to elsewhere in the West Riding and Towednack miners to other parts of Cornwall or abroad.

Gomersall (2000) describes how Arkengarthdale families often left in groups, each with a cart loaded with their belongings, over the moor road (to Teesdale).¹⁴³

There is strong evidence of limited change in occupation, enabling existing skills to be used; other metal mining, coal mining or quarrying being a general preference, although agriculture as an option to remain *in situ* and the textile industry had attractions for female family members.

The location of alternative employment appears to be strongly influenced by ease of migration; those from Nenthead and Arkengarthdale being within walking or horse cart distance of the Durham coal fields and so choosing this whereas those for Greenhow Hill choose the easier option of moving within the Pateley Bridge district or to the more easily accessible southern parts of the West Riding.

Recommendations from families and friends and newspaper reports and advertisements also serve to reinforce the distinct migratory behaviours in the different areas.

The Baldersdale experience suggests that where traditional employment opportunities remained, the pull factor alone was not sufficient to attract large numbers to the coalfields, although the relevant skills and contacts would also have been largely absent.

The Towednack experience also illustrates the ‘push’ factor of a declining industry but in the absence of either local or easily accessible substitute occupations, a much more significant proportion moved overseas. Indeed, the ease of access via local ports, the positive experience of past generations and possibly price is likely to have made emigration, particularly to the USA, the preferable option to overland or coastal migration within the UK. These factors are all largely absent in the Northern Pennines.

Married daughters

Fig 68 analyses the situation in 1901 of those unmarried females in the 1871 sample population who can be traced this far.

	Married daughters 1901	Remained in area	Lead miner's wife*
Nenthead	15	40%	27%
Arkengarthdale	21	10%	5%
Greenhow Hill	27	15%	0%
Baldersdale	20	50%	65%
Towednack	14	21%	0%

* Baldersdale: Farmer's wife

Fig 68: Married Daughters in 1901

Similarities can be seen with the total result (of which these form only a small part) in Figs 66 and 67, although with few marrying miners other than Nenthead and a rather higher rate of migration from the sample areas than the total rate everywhere other than Baldersdale.

This evidence is supportive of marriage being a supplementary migration driver for younger females

Whole Families

Fig 69 summarises the family migration statistics presented in sections 4.1-4.5.

1871-1881	Stayed	Moved	Died	Dispersed	Unknown
Nenthead	49%	13%	4%	26%	8%
Arkengarthdale	63%	10%	0%	27%	0%
Greenhow Hill	42%	18%	2%	36%	2%
Baldersdale	67%	22%	0%	11%	0%
Towednack	37%	20%	4%	26%	13%

Fig 69: Whole family changes 1871-1881

It is clear that lead (and tin) mining families were more prone to dispersal than farming families in the 1871-1881 period, a consequence largely of younger family members seeking employment elsewhere. The rate of whole family migration is quite variable, being 13%-21% at Nenthead (depending on the fate of the 'unknowns') but only 10% in Arkengarthdale, reflecting the lesser decline in Arkengarthdale in this decade.

Suggestions for further investigation

The reliability of the conclusions reduces materially after the first decade due to the reduction of the 'home' population through migration, death and non-traceability. An improvement would be to introduce offsetting numbers of new families into the population in 1881 and 1891.

The statistical reliability of the study could be improved by increasing the sample size (e.g. to 75 families). Alternatively, the scope of the study could be widened to include other Northern Pennine lead mining areas or other lead mining areas in the UK such as Derbyshire, Wales or Scotland.

Acquisition of registration certificates would enable some reduction in those marked untraceable, particularly those with more common names, and would also confirm some of the assumptions made from the registration indices. However, at present this would incur considerable cost. Would it be too much to hope that English and Welsh certificates might at some time come available on-line at a lower cost as in Scotland?

Bibliography

Primary Sources

Several thousand genealogical primary sources were used in compiling Appendix 1, including census and BMD records in a number of countries, immigration and travel records and other databases utilised by the search programs of Ancestry.com or available on FindmyPast.co.uk. These have not been included in this bibliography.

Only the primary sources used in the case studies or otherwise referred to directly in the body of the paper are listed below. A separate bibliography is included in Appendix 2 for the Kipling Arkengarthdale case study.

Any photographs not referenced belong to the author's private collection.

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