

TWENTY THOUSAND MINERS CAN'T BE WRONG!

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Abstract: The 1641 miners' petition is analysed and used to examine the size, location and structure of the workforce of the lead industry in Derbyshire. The conclusions drawn from this and other sources challenge the proto-industrial model recently advanced for the British non-ferrous mining industries by Roger Burt.

THE PETITION

In or around 1641* the Derbyshire lead miners petitioned the House of Commons to remove the imposition (extra customs duties) of 20s a fother on exported lead which the crown had imposed in 1636. The petitioners claimed to represent twenty thousand people whose livelihood depended upon the Derbyshire lead industry. The details of the petition, if accurate, provide evidence of the location, structure and size of the industry during a period of rapid expansion (PRO E 101/280/18).

The statistics derived from the petition are presented in Table 1. Missing totals have been estimated and are given in square brackets. The petitioners differentiated between the free miners, who owned or held shares in the meers on which they worked, and the 'hirelings' (wage-earning workmen) and 'cavers' (gatherers from the waste tips). The latter were also called 'poor miners' and frequently lived rough on the mines. It must be remembered that the figures include the miners' and other workers' wives, children and servants whether they worked on the mines (as many did) or not.

The first problem is to determine the accuracy of the information. Mass petitions are notoriously prone to inflation and rounded totals always invite suspicion (Slack 1991 pp.113-5). The petitioners' purpose was to persuade Parliament that the new customs duties recently imposed by Charles I had curtailed the industry's expansion and threatened the livelihood of its workers. They complained that in James I's reign, when the duty had been raised from 8s to 28s a fother, the price of lead had stood at £14 a fother; since then it had fallen to £10 a fother whilst the duty had been raised to 48s. As the supply of English lead seems to have been running ahead of demand on the continental markets, the new imposition could not be passed on to the consumers without further reducing demand. Instead it had been passed onto the miners in the form of lower ore prices and reduced wages. Thus it was undoubtedly in the interests of the petitioners to magnify the social and economic consequences of a slump in lead production by inflating the number of workers dependent on the industry.

There are other factors, however, which suggest that the numbers claimed in the petition are by no means the gross exaggeration that might be supposed. It is most unlikely that the petition was compiled by the miners themselves. By 1640 the industry was controlled by local lead merchants who had taken over both the smelting sector and the lead trade in the first decades of the century. The complaint at the beginning of the petition was signed (with his mark) by Lionel Tinley "on behalf of them all". Tinley was a wealthy mine owner. With his partners he employed 300 workmen and their

families on Cromford Moor Groves. He died in 1653 when resident at Holmesfield and his will reveals that he was primarily a lead merchant as well as an investor in mines and in Hardyhead and Mawrey soughs (Lawrence 1928). Merchants like Tinley and the barmasters, with whom they were frequently associated, were in the best position to estimate employment throughout the industry and to initiate and organise petitions.

Within the petition there is a clear contrast between the apparently precise statistics relating to the mining families and the rounded estimates of ancillary workers. The number of miners at work in the industry could be gathered fairly accurately from the barmasters and their deputies who kept records of all the ore sales in their liberties in order to calculate the lot and cope duties. Miners worked in groups of two or more adult males underground and were supported by wives and children on the surface (Kiernan 1989 p11-12). The average family size in Derbyshire in this period has been calculated at between four and five (Riden 1978), but many hirelings and cavers must have been single men which would have reduced the average considerably. At a rough estimate where there were 3800 households (individual families) recorded in the petition and, therefore, about 1900 separate mining groups

At this time the industry was producing at least 7600 fothers of lead a year (PRO E 190/317/14; 318/7; 318/12). The annual output of the mines was, therefore, about 91,200 loads of ore which was worth about £68,400. Thus the average annual output of each mining group was 48 loads a year which was worth £36. A century earlier 213 mining groups had produced only 2900 loads of ore a year and had averaged only 13.6 loads of ore per group (Kiernan 1989 p17-29). Mining was far more difficult in 1640 than it had been in 1540, as mines were deeper and beset with drainage problems. So an average output of one load of ore (about 5 cwt) per mining group per working week is by no means unrealistic.

Thus the number of miners and their families suggested by the petition is well within the bounds of probability.

The number of workers who serviced the industry is more difficult to calculate, hence the rounded estimates in the petition. At first sight the proportion of ancillary workers (38.6%) appears high, but for many of them, especially the carriers, the lead industry may have offered only part-time or seasonal employment. After the deduction of their families, there were between 200 and 250 smelters. Each mill employed four workers (France 1947 p84), so the petition suggests a total of 50-60 active mills. A recent survey has shown that there were over 50 smelting mills operating in this period, more than at any other time in the industry's history (Crossley and Kiernan: unpublished). Mills were capable of producing 300 fothers a year, but seldom worked much above half capacity. Between 1700 and 1705 the Earl of Rutland's

* Slack (1989) gives 1642-3 for the petition. Jill Dias has suggested "c.1640". A letter in the Cowper MSS suggests that parliament revoked the imposition in 1641. The petition itself is undated.

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Table 1

Employment in the Derbyshire lead mines c.1640
Source: PRO E 101/280/18

A) MINERS

Townships (Refer to Map 1)	free miners	hirelings & cavers	%	total
HIGH PEAK				
1. Town of Ashford	[420]*	[140]*	[25]*	560
2) Gt & Little Longstone	[560]*	[186]*	[25]*	746
3) Sheldon	[240]*	[80]*	[25]*	320
4) Wardlow & W. Mires	[235]*	[78]*	[25]*	313
5) Tideswell & pt of Litton	502	251	33	753
6) Gt and Little Hucklow & Grindlow	275	240	47	515
7) Peak Forest	257	40	13	297
8) Castleton & Hope	339	85	20	424
9) Bradwell	301	99	25	400
10) Flagg, Chelmorton, Taddington, Brushfield & Priestcliffe	246	67	21	313
11) Monyash g Hartington	260	40	13	300
12) Bakewell and Over Haddon	426	203	32	629
13) [? Nether Haddon]	242	40	14	282
14) Middleton by Youlgreave, Elton, Winstor & "Burchall" [? Birchover]	598	94	14	692
15) Stoney Middleton, Eyam, Foolow, Froggatt & Grindleford Bridge	693	254	27	947
16) Calver, Curbar, Baslow & Bubnell	220	40	15	260
17) Hassop & Rowland	125	45	26	170
[High Peak totals]	[5939]	[1982]	[25]	[7921]

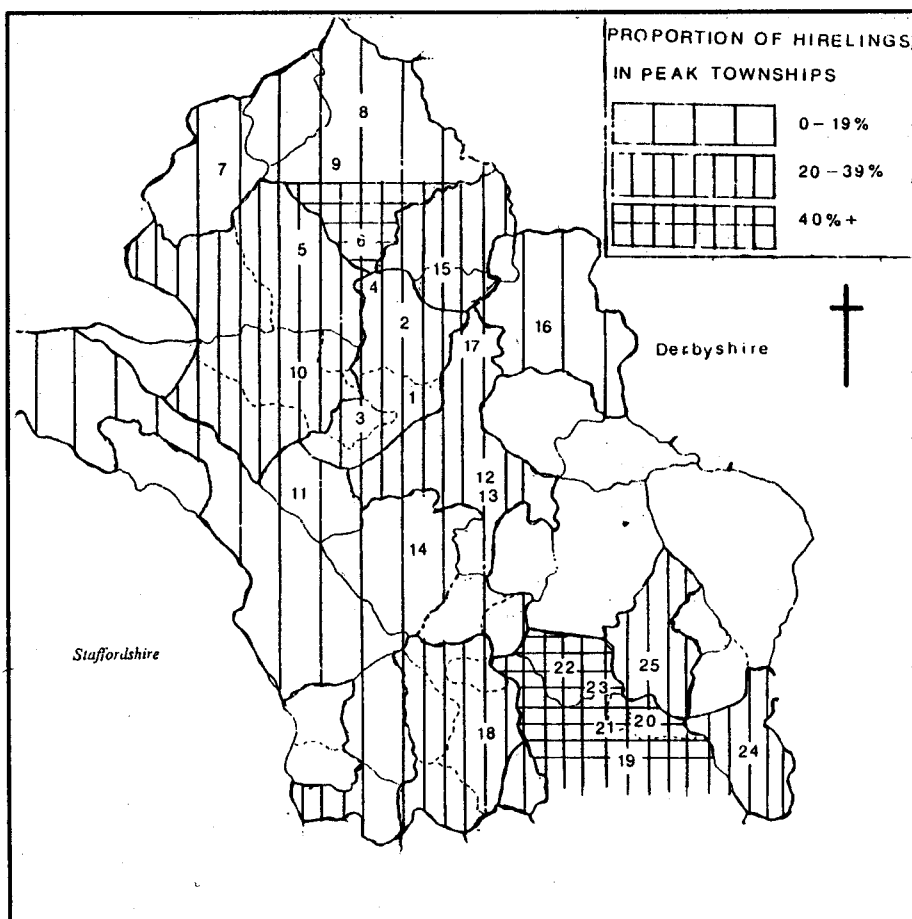
* estimate based on average for mining region
blank in mss - estimated totals

LOW PEAK

18) Brassington, Parwich, Siggin, Carsington & Tissington	332	142	30	474
19) Wirksworth, Middleton by Wirksworth, Cromford, Ible and [? Riber]	1131	82	7	1213
20) Cromford Moor	0	300	100	300
21) Dovegang "when it is in work"	0	1000	100	1000
22) Over & Lower Bonsall	280	98	26	378
23) Ball Lee [Eye], Bonsall	0	200	100	200
24) Crich "& other odd villages thereabouts"	132	65	33	197
25) Matlock, Snitterton & Wensley, Thornswood Biggin	[400]#	[1971]#	[33]#	[597]#
[Low Peak totals]	[2275]	[2084]	[48]	[4359]
[Orefield totals;	[8214]	[4066]	[33]	[12280]

B) ANCILLARY WORKERS

Smelters	1000
Jiggers of ore to the smelting mills	2020
Carriers of lead from the mills	2000
Woodcutters who make coals for the mills	500
Corve makers	150
Woodcutters for grove timber	600
Carriers of corves and grove timbers	1000
Candle makers	200
Rope makers	100
Smiths and nailers	150
[total of ancillaries]	[7720]
[combined totals]	[20,000]



Map 1.
Hirelings and cavers c.1640

mills at Great and Little Rowsley produced an average of only 152 fothers a year per mill (Belvoir Castle, Lead Mining Mss). Thus the number of smelters suggested by the petition is, at most, only a slight exaggeration.

The smelting mills used white coal (dried wood) and charcoal as fuel and both had to be cut, processed and carried to the mills. The petition states that 500 people owed their living to the woodcutter's trade, but the usual ratio of workers to families may not apply, as woodmen were often solitary folk. In 1620 Gervase Eyre employed three woodcutters to supply his smelting mill at Holmesfield (PRO PROB 11/135 f.50). Thus 50 mills would have employed 150 and a further 50 or so carriers would have been needed where, as at Wirksworth, local supplies were negligible. It is quite possible that 150-200 woodcutters and carriers supported a further 300-350 dependants

The number of ore and lead carriers involved in the industry is more difficult to ascertain. Few smelting mills were sited close to the mines and ore was usually carried by packhorses. Ore was supplied to the mills by many separate customers and was, therefore, usually carried in relatively small amounts, stocks being built up at the mills over several weeks or months (SRO BAG 358/1-29). Consequently long files of packhorses led by one man (the jagger), which were common on long-distance routes, must have been rare in Derbyshire. Therefore a large number of carriers were needed to maintain supplies to the mills and 400-500, as is suggested in the petition after the deduction of families, gives an average of only 8-10 carriers per mill.

The petition suggests that a similar number of carriers were needed to transport the smelted lead from the mills. Lead was carried in specially adapted four-wheeled vehicles called 'lead wains' which were drawn by draughts (teams) of oxen. Given the poor state of the roads, the weight of lead carried in each wain was seldom more than one fother (21.5-22.5 cwt). At this time most lead was carried to the inland port of Bawtry, a distance of at least twenty miles from the majority of the mills. Lead could not be carried throughout the year, as the combination of poor roads and bad weather frequently prevented the use of wheeled transport in the winter and early spring. The 400-500 carriers suggested by the petition would have had to make between 15 and 19 round trips each per year to transport 7600 fothers from the mills to Bawtry. Allowing for the slow pace of oxen and the seasonal nature of the traffic, neither the projected number of journeys nor the suggested total of carriers seem excessive.

In one vital respect the petition underestimates the numbers involved in the industry. The trade beyond Bawtry is ignored and yet Derbyshire lead had to pass through many more hands before it reached its consumers. Lead had to be unloaded and often weighed at Bawtry by porters, loaded on to shallow-draught keels for shipment down the River Idle to Stockwith, transhipped at Stockwith and again transhipped and weighed at Hull or London for sale or export. A fleet of about 40 coasters specialised in the lead trade, carrying cargoes of 40-80 tons of lead from the Humber to London and making two or three trips a year (PRO E 190). The porters and sailors engaged in this trade would certainly have compensated for any exaggerations of the numbers included in the petition.

LOCATION

The petition provides evidence of the size of the mining population in the various townships of the Peak in the mid-seventeenth century. The number of miners (and their dependants) offers a rough guide to the level of mining

activity. It should be noted that the township divisions of the petition do not fully correspond to the contemporary or later boundaries of the mining liberties.

The heaviest concentration of mining still centred on the Wirksworth/Cromford area which had dominated production since at least the beginning of the sixteenth century (Kiernan 1989 p.29). Although the Low Peak was much smaller in area than the High Peak, just over 35% of the miners lived and worked there. The petition reveals, however, that most of the expansion in mining had taken place in the High Peak, where mining had virtually ceased between 1540 and 1570. Almost half the miners now worked north of the River Wye, 20% of them in the liberties of Tideswell, Great and Little Longstone and Eyam. The industry's most dramatic expansion had taken place in Eyam and Stoney Middleton. In 1614 Anthony Wilson of Eyam had informed the Court of the Duchy of Lancaster that fifty years earlier there had been only six groves working in Stoney Middleton; Thomas Longden of Haslebadge claimed that there had been but two (PRO DL4/64/12). By the early seventeenth century Stoney Middleton had expanded into a major mining centre. Between 1603 and 1616 it was reported that one mine alone, Stole or Stoolle Grove, had produced ore worth £2000 (about 2500 loads) (PRO DL4/69/19). About half the smelting mills operating at this time were located in or to the east of the High Peak (Crossley and Kiernan: unpublished). By 1640 mining was far more widely dispersed than it had been fifty years earlier and was no longer dominated by the town of Wirksworth.

STRUCTURE

The petition reveals the extent to which the rapid expansion of the industry after 1570 had altered its occupational structure. In particular it illustrates the increasing proportion of hirelings (wage earners) and cavers (ore scavengers) to free miners. There had always been a large number of poor miners on the Derbyshire mines and gentry smelters had owned mines and employed miners since well before 1500 (Kiernan 1989 p.26-8). The free miner, however, who owned or possessed a sizable share in his grove, had been the major producer of ore in the sixteenth century. The petition suggests that by 1640 almost a third of the workforce was made up of hirelings and cavers

In fact, whilst the division between the free miner and the wage-earner, which the compilers of the petition were clearly keen to stress, was still of some social significance, its economic basis was rapidly disappearing. Many of the so-called free miners also received wages but retained a share in the meers or the groves which they worked. As Roger Kenyon wrote in 1630;

There be seldom any Master of a Meare of ground but that the workmen viz- the Myner hath a 3rd 4th or 6th part els the worke is comonly ill done and much loytering. (PRO DL41/17/19).

A study of the probate inventories of the period suggests that the the farmer/miners, those who had a stake in both the land and the mines and who had produced the bulk of the ore supply in the sixteenth century were no longer the dominant force in the industry. The wills and inventories of the wealthier farmers, usually styled yeomen in this period, frequently contain evidence of the ownership of mines and of lead smelting and trading, but not of mining tools. William Woodiwis of Bonsall, a wealthy yeoman farmer who died in 1637, left groves in his will and shares in three smelting mills in his inventory which totalled over £250 (LJRO, B/C/11, 6 April 1637). Such men were clearly moving into the ranks of

the gentry and certainly would not have worked in the mines they owned. There are fewer traces, however, of the miner/farmers. Husbandmen seem either to have given up mining altogether, or abandoned farming to work full-time underground, retaining shares in the mines, but increasingly reliant on wages. Whilst it is not possible, as yet, to publish a complete analysis of the structure of the industry in the seventeenth century, Table 2 gives some indication of the polarisation of the free miners. All of the surviving wills and inventories of the large parish of Bakewell have been examined up to 1660. Table 2 records the inventory totals (debts are ignored) of all who were styled 'miner' or possessed 'grove tools' between 1630 and 1650. It suggests that a gap was opening between the poor miners - but by no means the poorest who did not qualify for an inventory - whose goods amounted to under £10 and the remaining free miners who were worth £20 or more (LJRO, B/C/11).

TABLE 2

Probate inventory totals of miners in Bakewell parish, 1630-1650

£				
0-4.9	5-9.9	10-14.9	15-19.9	20+
9	8	3	4	9

The main cause of the change in the labour structure of the industry was the depletion of the ore supply above the water table. Mining was becoming an increasingly expensive occupation as mines became deeper and the problems of drainage more acute. Few free miners had the necessary capital to pay for the construction of mines which, according to Roger Kenyon, had been sunk as deep as 720 feet by this time (PRO DL41/17/19). Whilst a miner was timbering levels or sinking shafts for ventilation, he was not extracting ore and therefore had no income. Nor could the free miners afford the services of such drainage engineers as Wheatcroft, Wass and Bartholomew, who were installing pumps in this period (Fisher 1950; Kerry 1899 p.41). The construction of soughs which was just beginning, was even more expensive and required massive long-term investment (Rieuwerts 1987 p. xxi). Thus mining ventures now demanded investment capital beyond the resources of most free miners. The main source of that capital was the growing band of lead merchants who had emerged as the dominant force in the industry after 1590. By the 1640s they had both the means and the need to invest in mining in order to sustain their trade. Investment inevitably led to ownership of the mines and control of the miners. The wills of almost all the lead merchants of this period contain lists of their mines or shares in mining ventures (Kiernan, forthcoming).

Thus the proportion of free miners to hirelings and cavers, which the petition suggests was around 2:1, does not represent the true labour structure of the industry. In reality the number of truly independent miners was small and the industry was increasingly dominated by merchants from the towns of Chesterfield and Sheffield in the north and Wirksworth and Matlock in the south. A surplus of labour, which resulted from the mass migration of unemployed poor to the orefield after 1570, kept wages and ore prices low so that the workforce became known as one of the poorest in the country.

The new wage-earning workforce was not spread evenly through the orefield, as is shown in Map 1. Generally the

High Peak attracted fewer than the Low, but even within the former there were marked variations as the petition shows. The workforce of Great and Little Hucklow comprised 47% hirelings and cavers while at neighbouring Tideswell it was only 33% and in Peak Forest only 13%. It is difficult to account for these variations, although those liberties which had extensive ancient workings would have attracted more cavers to sieve for smitham ore on their waste tips. The pattern of occupation can be seen in Map 1. There were two centres of intensive employment, the established mining area between Matlock and Wirksworth and the newly redeveloped field around Great and Little Hucklow. The latter probably included Wardlow to the north and Great Longstone to the south, but the petition does not separate the free and wage-earning miners in these townships. The mines in these areas relied mainly on wage labour which made up over 40% of the workforce. The mining areas immediately adjacent to these centres maintained a balance between the free miners and the hirelings with the latter in a minority. On the fringe of the orefield mining remained small-scale and linked to the traditional farmer/miner way of life.

The attraction of the new workers to the Low Peak can be explained more easily. The petition records three large mining enterprises which either were or had been operating in Wirksworth Wapentake. Cromford Moor Groves was in the possession of Lionel Tinley and his partners; Ball Lee (Ball Eye) at Bonsall was maintained by a Mr Walker (possibly George Walker of Riber, d.1655) and Anthony Coates (possibly of Wirksworth); the famous Dovegang mines were possessed by Sir Robert Heath and Sir Cornelius Vermuyden. Thus the first two were owned by local lead merchants and the third was rented from the crown by the Attorney General of the Duchy of Lancaster and a Dutch drainage engineer (Fisher 1952; Kirkham 1953).

Such large scale enterprises were relatively new in Derbyshire, but had been common in other English and continental mining fields, notably in the Mendips. An earlier, albeit smaller, venture is recorded at Steeple House near Wirksworth where c.1583 William Blackwall employed his servants and tenants to work the mines (PRO DL4/72/31). Many of the miners employed in these operations lived rough with their families in camps. As the petitioners stated, they were "poore hirelinges and cavers that live on the mynes". Employment could be irregular, depending on the development of the mines and fluctuations in the demand for ore. At Dovegang it was, as the petition mentions, spasmodic because of the recurrent drainage problems.

Little is known of the mass of poor miners who inhabited the camps or lived rough in the other liberties. They possessed too little wealth to require probate inventories to be made of their goods when they died and they have made little or no impact on the historical record. Daniel Defoe's familiar story of the cave-dwelling mining family of Brassington Moor does not suggest that this was a common mode of existence, but his description of the low incomes of the mine workers can be corroborated (Defoe 1724-6 p161-2). In 1630 Roger Kenyon of Whalley in Lancashire reported his recent visit to Derbyshire to the Chancellor of the Duchy of Lancaster:

"In my Journey into Darbshire I tooke some notice of their manner of grove workeinge. their usuall wages they give, which is farr lesse than wee can have workemen for here; the reason I take to bee for that all the poorer sort of people there are almoste from their cradles bredd up about the Mynes and have noe other vocacions or traides to followe" (France 1947 p-95).

The free miners of the previous centuries frequently combined mining with farming. They were able to balance

the requirements of the farming calendar with the bole smelters' seasonal demand for ore and were not solely reliant on the mines for their livelihood. The poor miners, however, who predominated in the seventeenth century, were totally dependent on their mining incomes, as Kenyon relates. There is little evidence of farming or by-employment in the few surviving probate inventories of miners' goods. Some, like Humphrey Lee of Bakewell, left behind little but their grove tools, valued at a meagre two shillings (LJRO, B/C/11, 27 July 1638). Many must have ended their days like Ralph Merryman of Taddington whose appraisers reported in his inventory of 1642 that he "died seized only of his working apparel" which was valued at £1 (LJRO B/C/11).

The ancillary workers who served the industry seem to have been considerably better placed. In 1630 the smelter and his three assistants received 5s for each fother they smelted so they would usually gross between 15s and 25s a week to share between them (PRO, DL41/17/19). Many also smelted on their own account and were able to achieve a comfortable standard of living for as long as they survived the hazards of their trade. The small army of carriers that serviced the industry were frequently drawn from the ranks of the local farmers who lived on the route from the mills to the markets of Bawtry and Derby. The lead trade could prove extremely lucrative and a few were able to progress sufficiently to be classed as lead merchants. Paul Fletcher began as a carrier, prospered as a lead merchant and in 1635 was able to purchase Walton Hall near Chesterfield (Lawrence 1910 p.71). The large number of ancillary workers claimed in the petition suggests that many were either part-time or seasonally employed in the industry and this is confirmed by their surviving probate inventories. Those who provided essential services were able to retain their independence.

CONCLUSION

The petition of 1641 offers acceptable evidence of the number of people who depended upon the Derbyshire lead industry for all, or a significant part, of their livelihood. Statistics derived from the petition can be used to assess both the size, location and occupational structure of the industry. This 'snapshot' of the industry in 1641, when combined with other evidence drawn from probate records, directly challenges the conclusions reached by Roger Burt in a recent article. Burt argues that:

... the received view of early modern revolution in the non-ferrous metal industries is in error: that the period saw no major changes in British mining or ore dressing techniques and very few of significance in non-ferrous smelting practices; that mining remained small in scale and that no large scale, capital intensive operations were sustained; that the labour force retained a high degree of independence, continued to share fully in the risks and profits of the industry, supplemented family income from a wide range of other activities, and in no sense became a fully proletarianized industrial workforce. (Burt 1991 p267).

In the century after 1570 there were major changes in the Derbyshire lead industry; a revolution in smelting in the 1570s, when ore hearths replaced boles, initiated a century of rapid growth which had considerable knock-on effects. Expanding production resulted in the depletion of the above-water ore supply; this in turn led firstly to a drastic deepening of the mines and eventually to the introduction of drainage techniques which were far beyond the financial resources of small independent mining groups. Whilst small-scale mining continued in such areas as Brassington on the fringes of the ore field (Slack 1989), medium and large-scale operations took over the bulk of production in the

heart of the mining region. The mining enterprises at Cromford Moor, Ball Eye or Dovegang cannot be dismissed as 'small-scale'. The drainage schemes, which were essential for mining to continue, necessitated widespread long-term investment. The independent miners did not disappear - they were keen to emphasise their social superiority over the mere hirelings - but their significance in terms of ore production declined as many either stepped up into the ranks of the mining employers or down into the mass of full-time wage-earners. The richest mines were taken over by wealthy merchants and local gentry. Their workforce largely comprised landless migrants or their descendants who had no other employment and were utterly dependent on mining wages. The poverty of the miners, many of whom lived rough on the mines with their families, was notorious. It contrasted sharply with the rapidly expanding fortunes of the established merchants against whom the miners harboured considerable ill-feelings.

The Panglossian proto-industrial model, as elucidated by Burt, collapses completely under the weight of the drudgery and grinding poverty that was the lot of most Derbyshire leadminers and their families in the seventeenth century.

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