The Crown silver mines in Devon: capital, labour and landscape in the late medieval period

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ABSTRACT: In the late 13th century the English Crown introduced direct management of silver mining in Devon and maintained it for over 50 years. At Bere Ferrers in the Tamar Valley the Crown, and later its lessees, used capital-intensive methods and innovative technology. Large numbers of miners, many of them immigrants, were employed but not housed by the Crown. The impact of silver mining and its infrastructure on the landscape is examined, including the establishment of the borough settlement of Bere Alston as a response to the demand for housing and food supply. The documentary and archaeological evidence for this unique sector of the early mining industry is variable but taken together as part of an integrated study they provide us with a valuable insight into the organisation and methods used at that period.

Introduction

The deployment of large numbers of men in the prosecution of the King's works was not without precedent but the permanence associated with the working of the King's silver mines in Devon has no parallel in the late medieval economy. For over 50 years, from 1292 to 1349, the mines were worked by the English Crown under direct management. They provided work for up to 400 miners, many of whom were immigrants, some pressed into service. Although the mines were subsequently leased to entrepreneurial interests, the capital intensive methods of working instituted by Crown officers continued, culminating in the application of innovative pumping technology in an attempt to sustain deep working.

Whilst the Crown appears to have been doing no more than engage with the common practice amongst large estates in the 13th century, that brought demesne resources in hand rather than letting them to outside interests to maximise on profits in an inflationary economy, it also initiated change which would have a long term impact. By introducing a prerogative on precious metals, along with copper, and maintaining direct management of the silver mines over a long period, and by breaking with the custom which regulated other forms of mineral exploitation, it was to open up the mining industry for large scale expansion. Despite its close control of silver mining there were aspects of the industry in which the Crown played no role. The settlement pattern which might be associated with the mines has, until now, been an unrecorded aspect in the landscape of mining.

Over a period of nearly two years, May 2006 to March 2008, an exercise in interdisciplinary co-operation was carried out in the Department of Archaeology at the University of Exeter to examine the mining of silver in Devon in the latter part of the medieval period. In the project, funded by the Leverhulme Trust, two archaeologists (Stephen Rippon, who directed the project, and Chris Smart) worked with an economic historian (Peter Claughton) to assess the impact of mvining on the historic landscape, focusing particularly on the parish of Bere Ferrers and its environs in the Tamar Valley to the north of Plymouth. For this work the project had the benefit of a range of resources including a large body of documentary evidence for the operation of the mines, held in the National Archives at Kew, primarily amongst the Exchequer Accounts (TNA: PRO E101).

The Calstock Parish Archive also holds transcripts and translations of documents relating to the manor of Calstock and some relating to the activities of the royal mines whilst they were based there in the early 14th century. These transcripts provide an insight into the work of the mines for those without the resources to access the original documents in the National Archives and a useful listing is provided by Mayer (1990, 92). A number of historic maps were also available, covering the late 17th century through to the early 20th century and including a detailed estate map of Bere Ferrers dated 1737 amongst the Mount Edgcumbe papers in the Cornwall Record Office (CRO, ME2424). These resources were complemented by a detailed archaeological survey of the mines and their infrastructure including the limited use of geophysical techniques.

With the notable exception of the pan-European COST (Co-Operation in the field of Scientific and Technical research) A27 Action, Landmarks: Understanding preindustrial structures in rural and mining landscapes, there has been relatively little co-operation of this nature despite the significant overlap in interests amongst economic and mining historians and medieval archaeology. Landscape archaeology has addressed some aspects of mining particularly where it was an integral part of the rural landscape (*eg* Newman 2006). Such detailed studies are, however, a relative rarity with many authors avoiding a close study of medieval activity and its impact on well-known mining landscapes through lack of available evidence or expertise (Fleming 1998). Mining historians have also, on the whole, steered clear of the medieval period preferring better-documented later periods, consigning the evidence for earlier mining to an unexplored preface to their work. It is against this background that the project sought to explore the relationship between silver mining in Devon and the surrounding landscape, and with other sectors of mining in the medieval period.

It is generally accepted that at the close of the medieval period the vast majority of manufactured and primary output in England came from small producers integrated into rural society. Some historians have in the past excluded mining from such a model, holding a view coloured by post-medieval developments in certain sectors like copper and coal production that its demand on capital and techniques was beyond the reach of the small producer (*eg* Clarkson 1985, 9). Burt and others have, however, argued convincingly for its inclusion (Hatcher and Bailey 2001, 134–37; Burt 1998 and 1995; Hatcher 1993, 11; Gill 1990). They see the archetypal mine at the close of the medieval period as small scale, supporting increased production through a multiplicity of similar small operations. It created no great demand on either capital or technology and its workforce was integrated into its landscape, moving easily between agriculture and mining in tune with demands on production. There was, nevertheless, one sector of non-ferrous metal mining which did develop on a large capital-intensive 'industrial' scale from the 13th century and that was silver mining, the subject of this study.

By the late 13th century maintaining the circulation of a large amount of silver was essential to the English economy. In the mid 12th century the volume of currency in England had been given a significant boost by production from the north Pennines but the amount of silver produced from those mines is a matter for debate. Blanchard (1996 and 2001; with comment in Allen 2003) has suggested figures as high as 24 tonnes in one year, whereas geologists with an interest in the area are inclined towards a low silver yield (Dunham *et al* 2001). An alternative interpretation of the statistical evidence is provided by Claughton (2003b) but recent work by Crafter (2008) has highlighted conflicting numismatic evidence. It is however clear that beyond the end of the 12th century England was relying almost entirely on silver drawn into the economy as a result of increased exports, particularly wool, textiles and tin. Continental silver production was expanding, led by increased output from central European mines from around 1160 onwards. As payments for exports to the continent drew on this vast resource the volume of coin circulating in England increased rapidly. Between £500,000 and £600,000 was in circulation by 1280, possibly rising to over £1,000,000 by the early part of the 14th century before falling to half that value by the middle of the century as the English economy was drained through Edward III's martial activities in northern France (Allen 2001). It was against this background that, from the mid-13th century, the English Crown sought out and worked new sources of silver.

When, in the 1260s, an ore deposit allegedly containing copper, gold and silver was reported to have been discovered at 'la Hole' in Devon the Crown was quick to exercise a prerogative over the metals *ad dignitatem regalium nostrorum* (*Cal Close R Hen III*, 12, 187). The location of 'la Hole', perhaps the most common place-name element in Devon, is unclear but it was possibly to the east of Molland where a cluster of place-names using that element are associated with copper deposits. Although the working of the ore found was unsuccessful, prospecting in Devon appears to have continued

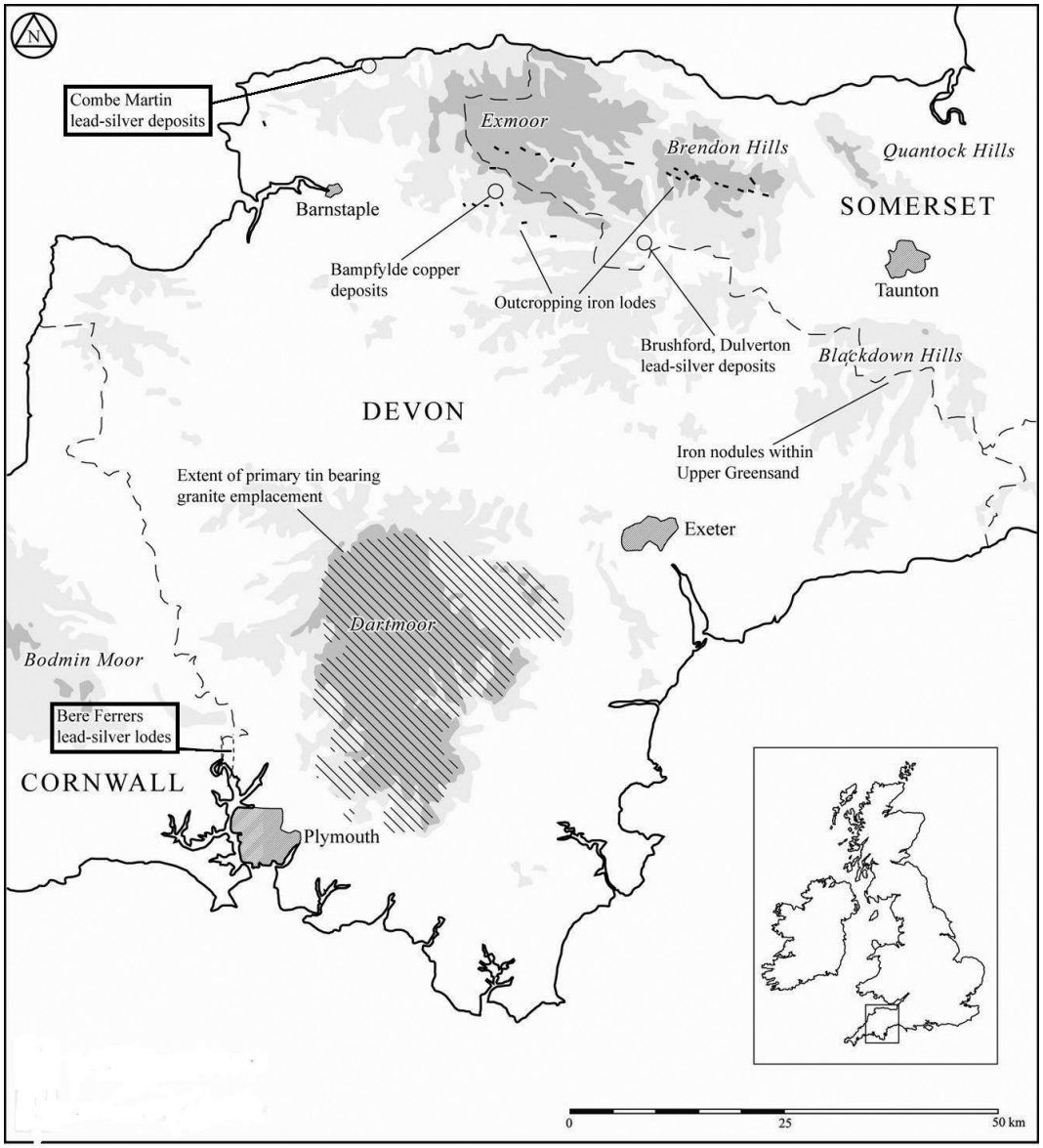

Figure 1: Mineral resources in Devon during the late medieval period with the principal silver-bearing deposits highlighted.

with groups of central European miners being brought in to the country for that purpose (*Cal Pat R Hen III*, 5, 304; *Cal Close R Hen III*, 7, 349 and 406–07; *Cal Liberate R*, 5, 246, and 6, 1252). There is no record of any production as a result of that prospecting but the simultaneous opening of silver mines at either extremity of the county in 1292, at Combe Martin on the north coast, and at Bere Ferrers in the Tamar Valley in the south-west, does suggest prior knowledge of their potential (Fig 1). The mines at Combe Martin were abandoned by the Crown within four years but those at Bere Ferrers were worked by the Crown, with only brief diversions from their direct management until the advent of the Black Death. After 1350 the mines there, and at Combe Martin, were generally leased collectively to entrepreneurial interests, with the Bere Ferrers mines being abandoned by the mid-16th century.

A significant amount of detailed documentation survives for the operation of the mines by the Crown, using a directly employed labour force, although much less survives for the subsequent, and longer, period during which the mines were leased. The documents are, however, largely financial accounts which provide considerable detail for those activities where the workforce was paid a daily wage; activities such as smelting the silver-bearing lead ore and refining the lead to extract silver. Only occasionally were miners paid wages. The unproductive 'deadwork' required to drain and provide access to the silver-bearing ore deposits was accounted for as piecework. Miners were paid for a specified task or by the distance they had cut in a particular shaft or level which provides some detail. Those miners engaged in working the silver-bearing deposits were paid by the 'load' of ore produced ready for smelting. Their payment appears as a lump sum in the annual accounts, and this provides us with no information on the numbers involved, where

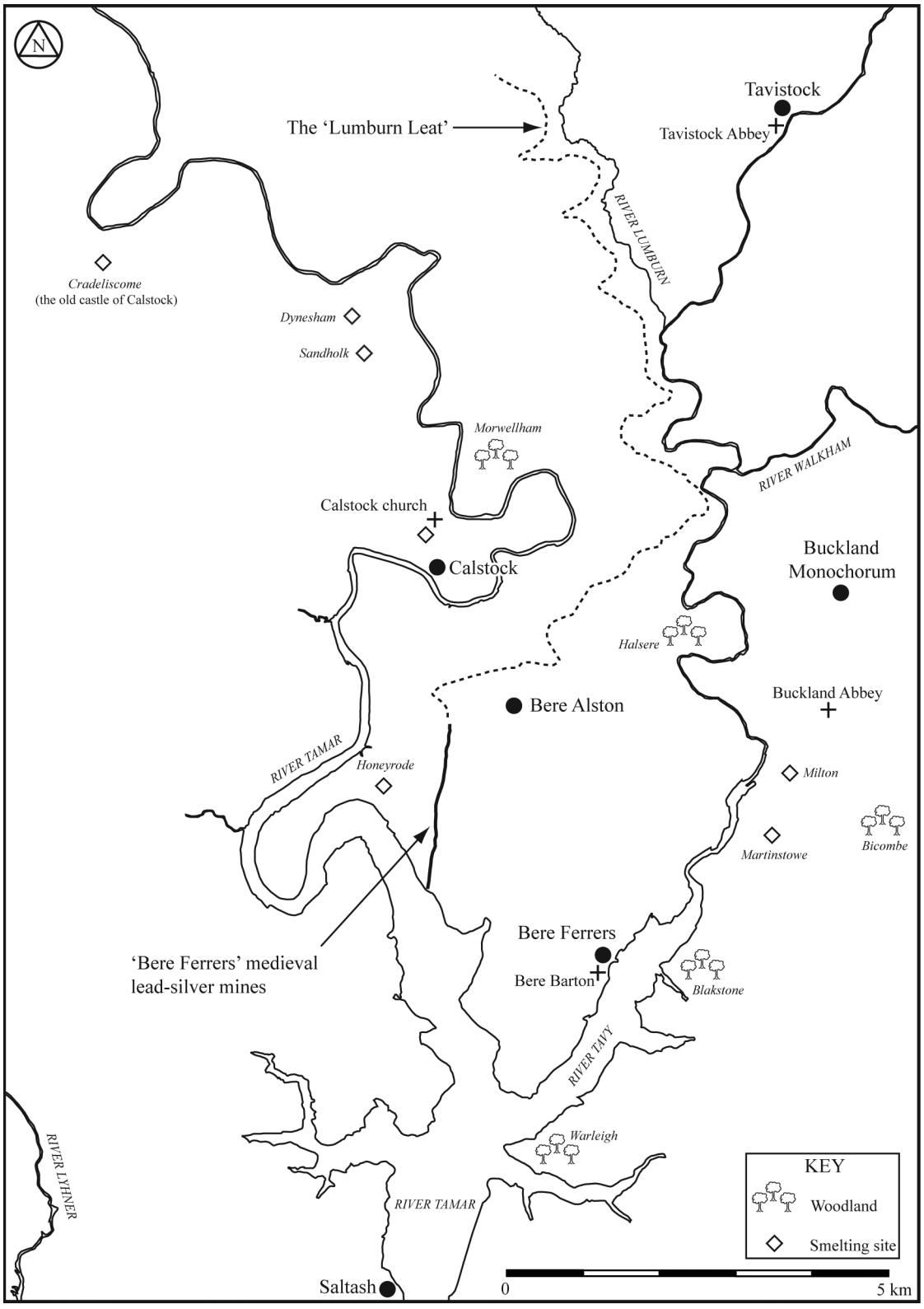

Figure 2: Location of the mines in relation to the associated infrastructure

they worked, or on the methods they used to mine and prepare the ore. Limited information on the location of the workings is available from the accounts and from other sources in the records of the Crown. Some can be particularly informative, if difficult to relate spatially to the named mines or the surviving field evidence. There is a palimpsest of earthworks much of which dates from late 18th and 19th centuries when the mines were reworked in depth with the aid of the steam-powered pumps. The documents are also virtually silent on important aspects relating to the mining community, notably the provision of housing and food for a largely immigrant mining population.

Organisational and technical innovation

The early success of the mines was dramatic, with production rising rapidly to over 23,000 ounces in 1297. This made them attractive to Edward I as a means of clearing his excessive debts and in April 1299 his bankers, the Frescobaldi, took the mines on lease. Their tenure lasted less than a year, during which time they worked the mines without regard for future production before giving them up on the grounds that they could not make a profit under the terms of the lease. The mines were brought back under direct management and it took four years, and an expenditure of over £1,000, to bring them back into production. The amount of work to be carried out over a five year period was planned and negotiated in advance with four groups of miners, with an agreement between them and the Crown officers specifying the total cost, £1026, and the work to be done (TNA: PRO, E101/260/19 and E101/260/22). This early use of capital-intensive methods to drain and develop the workings brought results, as Thomas de Sweyneseye, the keeper of the mines, reported to the Exchequer in about 1304:

> 'We are drawing ore from day to day in great quantity and it is increasing so much from one day to the next ... that it will now easily defeat by its quantity all the available workers in the area [at a time when the mine was already employing 200 or more miners]. We will see more ore this summer and the following winter than the mine produced in its two best years since it was first discovered ... because whereas until now we were unable to do anything in the winter because of the water except by drawing it out with leather buckets which was very expensive, now we can do as much in the winter as in the summer because the water will have its course out of the mine by adits cut to the deepest point of the workings'
> (TNA: PRO, SC1/48/61, with a transcript in Tanquerey 1916, 72–6).

Drainage of the workings at Bere Ferrers was to be a perennial problem. Tinners, from the tin workings on and around the granite uplands of Devon and Cornwall, were initially employed to dig the aqueducts required to allow the free drainage of water away from the workings. They were, however, familiar with draining relatively shallow alluvial tin deposits whereas the demands of working the near vertical silver-bearing fault fissure deposits meant that hard-rock techniques were required to take the aqueducts underground as adits along the strike of the deposit. Consequently the leading miners on development work in the early 14th century can be identified with immigrants from lead mining fields such as the Derbyshire Peak District. Where the Bere Ferrers mines differed from those in Derbyshire, and the other established lead mining fields, was the restricted nature of the deposit. Despite prospecting work carried out across Devon and Cornwall, the deposits worked effectively in the late medieval were confined to Bere Ferrers and Combe Martin, and that at Bere Ferrers was restricted to a section of one mineralised north-south cross-course. The mines form a near continuous linear feature running from Lockridge Hill, 1km WSW of Bere Alston, for 2km south to the River Tamar near Cleave (Fig 2). Maintaining production meant that they had to be worked ever deeper.

The effective use of drainage adits meant that the cost of manual water haulage could be reduced significantly. At first the cost of manual haulage was met by the miners undertaking ore extraction, although the Crown supplied the buckets and ropes required. In the five weeks to 13 August 1306, 87 new water bags were made, at 1d each, and 31 old bags were repaired, at ½d each; a total of 12 cow hides were then purchased at a cost of 42s 1d to make and repair further bags. In 1309 the wages of 13 of the water hauliers were paid by the Crown for five months whilst an adit at the Fursehill Mine was extended to drain the active workings and thereafter it appears to have met the bulk of the labour costs (TNA: PRO, E101/260/30 and E101/261/12). By the 1320s consideration was being given to maintaining working by draining one section of the deposit at Fursehill using a deeper, cross-cutting, adit driven from one of the shallow valleys which cross the lode to run westwards towards the River Tamar. The proposed adit would entail driving through barren rock for 90 metres to cut the lode and the work was expected to cost £50 (TNA: PRO, E101/262/13). It would have taken at least one and a half years to complete, based on drivage rates in the 16th century quoted in Buckley (1992, 27). Although no documents confirming the construction of this adit have been identified, it is marked on an estate map dating from 1737, prior to the late 18th century re-working, and field survey has identified related earthworks (CRO, ME2424).

After 1350 and the Crown's withdrawal from direct management of the mines, the lessees had a continuing commitment to the capital costs of drainage. This was becoming particularly onerous by the mid 15th century, with intense activity at Bere Ferrers driven by the shortage of bullion in northern Europe. Although a deeper drainage adit, the 'adit of Tonnewell', had been driven under the southern part of the mines prior to 1452 the cost of manual haulage of water was reputed to have reached prohibitively high levels (*Cal Pat R Hen VI*, 5, 571; TNA: PRO, E101/265/18). In 1460 the cost of

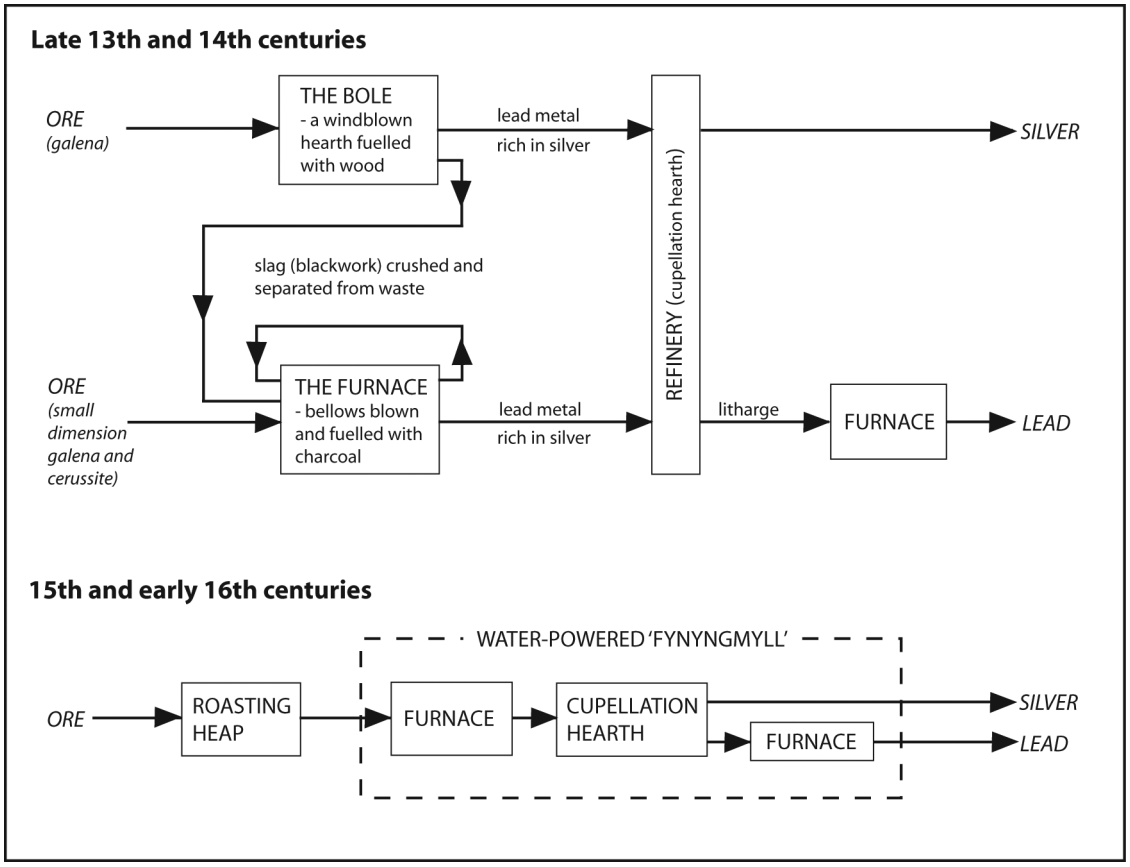

Figure 3: Lead-silver smelting and refining techniques in Devon during the late medieval period.

drainage was put at £120 over an 18 week period but should be treated with caution as the original indenture has not survived and we are relying on a transcript dated 1608 (WRO, 366/1). By 1470 plans were in place for the introduction of mechanised pumping to the northern part of the mines as the cost/time penalties of driving further deep adits would have made that option impractical in a climate of high real wages. A 16km leat system was constructed from near Millhill, to the west of Tavistock, into the mines to supply water for a wheel driving suction-lift pumps and lifting water from up to 20 fathoms (36m) below adit (*Cal Pat R Edw IV- Edw V- Ric III*, 213; TNA: PRO, E101/266/25). The bed of that leat, including a series of cuttings and tunnels on the steep upper slopes of the River Tavy, has been traced, and verified using a differential Global Positioning System (dGPS), to within 250m of the mines.

Capital expenditure is also in evidence on a similar scale for the provision of smelting and refining facilities for the mines at Bere Ferrers. In the 1290s and the early years of the 14th century there was experimentation in the design of bellows-blown furnaces to supplement the wind-blown 'bole' hearths and allow the treatment of all the ore mined. By the 15th century the use of the bole had been discontinued and all smelting was carried out, with the refining, in the water-powered 'fynyngmyll' (Fig 3). It was the practice to re-work smelting residues to recover all the lead and silver, and hearths were dismantled to be rebuilt in new locations, to the extent that smelting appears to have had little impact on the historic landscape. The sites are either named or can be computed from data in the documents but there is no visible evidence in the landscape, no disruption of the field boundaries, no surviving structures, earthworks or residues which might be linked to the processes. Field-walking has failed to find any tangible evidence after 600 years of agricultural improvement. Geophysical techniques were applied to a well documented site adjacent to the parish church at Calstock, on the Cornish bank of the River Tamar, and revealed at least two possible smelting hearths but the evaluation of one of those hearths produced rather equivocal evidence. For a preliminary report on the application of the geophysical survey and the evidence for smelting see Claughton and Smart (2008). A full report on the evaluation of the fort and the furnace, with the subsequent rescue excavation carried out on those parts of the fort lying within the Calstock New Burial Ground, is pending.

Wood, as fuel, for construction and as supporting timber, was an important input into any mining/smelting operation, yet the Crown made no permanent provision for its supply, relying instead on local sources of supply.

Only for a period of less than 20 years did it allocate supply from woodland under Crown control. In 1301 the keeper of the mines was granted access to woodland in the manor of Calstock on the Cornish bank of the Tamar, at which point the majority of the smelting activity and the silver refinery, along with the administrative centre for the mines, were moved to Calstock (*Cal Close R Edw I*, 4, 433; TNA: PRO, E101/260/19 f2). Even then the mine still had to acquire some timber from other sources such as Blaxton and Warleigh close to the confluence of the Tavy and Tamar rivers. It was not until after 1316 that smelting and refining returned to the Devon bank to drawn on woodland on the estates of Buckland Abbey in the Tavy Valley for the bulk of their supply, as they had before 1301.

The mines and smelting operations were voracious consumers of wood. In the short but highly productive first phase of operations, from 1292 to 1300, it was claimed that some 300 acres of the abbot's woodland had been 'devasted', a disproportionate amount of which was during the Frescobaldi's brief tenure (Kaeuper 1974, 61). The abbot sought redress and received assurances from the Crown that it would not be repeated, and it was at that juncture that the woods at Calstock were made available to the mines. Firm evidence, documentary or archaeological, for woodland management in support of industrial activity in the medieval period is limited. The general view is that sustained production would have required some form of coppicing or pollarding cycle (Campbell and Bartley 2006, 152; Rackham 1993, 63), and recent work by Wheeler (2007) has provided archaeological evidence to support that view for sustained smelting activity at Rievaulx and Bilsdale in North Yorkshire. At Bere Ferrers the Crown employed overseers to manage the woodland it was using, men such as Hugo de Anythel, keeper of the wood at 'Warle' (Warleigh) in 1313–17, but the long term management was the responsibility of the land-holder (TNA: PRO, E101/251/15 and E101/261/21). The ability to sustain production from the mines at Bere Ferrers without returning to the Crown woodland at Calstock, albeit at lower levels than those attained in the late 13th and early 14th centuries, does suggest that there was effective management. All of the woodland identified as being used by the Crown and its lessees prior to the 16th century survives as such today.

The cultural impact of mining

When the mines in Devon were opened up under the direct management of Crown officers in 1292 it is evident that the principal skills required, those of a hard-rock miner rather than a worker skilled in the working of alluvial tin deposits, were not available locally. Although it was possible to draw on local resources for the ancillary workforce, miners and smelters had to be brought in from other mining fields. Derbyshire and north-east Wales appear to have provided the bulk of those employed and it was sometimes necessary to press them into service (*Cal Close R Edw I*, 3, 504; TNA: PRO, E101/260/17). Many of these immigrant miners had worked within an industry regulated according to custom. They would have practised dual occupation, taking opportunities in the agricultural calendar to diversify into mining, although there is evidence to suggest that some in north-east Wales were already favouring mining as their prime occupation in the late 13th century. A number of the miners selected in Wales had surnames which linked them to settlements in the Derbyshire Peak and a significant proportion of those selected were not found in Wales in December, including all the Derbyshire men. This suggests that those miners were leaving the mining field during that part of the year when mining was restricted but, during the summer months, they would be far from home and unable to contribute to agricultural activity. Similarly a small group of miners with Welsh names, for example Matthew, Ken(wrik) and Thomas de Mohald or Mohant, expected to be found in Wales were working at 'the pit of the High Peak', probably in that part of the Peak adjoining the Cheshire boundary, some 75km away. All this is indicative of a mobile workforce primarily engaged in mining, as might be expected at the peak of medieval population growth when land was at a premium and the demand for lead was at a high level due to Edward's castle building programme (TNA: PRO, E101/260/17).

In the 1280s large numbers of men, builders and labourers, were deployed to north Wales as part of that programme, the sheer scale of which is illustrated in *The History of the King's Works* (Brown *et al* 1963, particularly fig 25). Their employment, however, was always on a temporary basis and, once the works were completed, they would be expected to return to their home county. The Crown silver mines in Devon, however, provided more permanent employment. By 1297/8 the mines were employing at least 400 men:

> 'That there be now one hundred and fifty miners of the Peak and one hundred and fifty miners of the country, chosen from the best, on the one part and on the other, for the miners in Birlaunde amount to many more than occasion appears to require. But if it were wished that other mines as of Coumartin and of Cornewaille should be worked that there should be more miners had according as should be fit, and for this purpose,

> when one shall be less obstructed by those miners. And that there be in avidodz [aqueducts], one hundred tinners of the country' (BL *Add* 24770, f 202–7).

Numbers were not maintained at that level beyond the turn of the century and by 1304, when production resumed, there were around 200 miners employed who would be expected to work all year round (TNA: PRO, SC1/48/61). The options for dual occupation were severely limited under direct management with no option to return home for the harvest.

All of the miners working in the Devon silver mines were Crown employees and they were expected to work as directed by the officers of the mine. The difficulty of supervision at the workplace meant that there was an element of self regulation with payment being related to produce, which allowed for co-operation in small groups. Such groups, employed on non-productive work, are identified in the accounts by the name of an individual miner and 'his associates' without defining their relationship. The opportunity presented for a family group to raise incomes beyond that of a single wage earner is illustrated by the employment of daughters and wives on ancillary tasks associated with smelting and further processing of the residues. Whilst the employment of family members in the extraction and processing of ores, as with the identity of all the miners working in that sector, is not documented we might expect those who were available and capable to have also been engaged in maximising family income.

For those workers recruited or pressed into service in the last few years of the 13th century there is no evidence that they were in a position to bring their families with them to Devon. By the first decade of the 14th century there is, however, evidence for the presence of family members, either immigrants or the result of local marriages. Matilda, daughter of Richard Bate who was employed as a smelter on the 'boles' between 1304 and 1317, was of sufficient age to be employed on the washing of smelting residues by 1304 (TNA: PRO, E101/260/27, particularly the entry for 24 October, E101/260/30, and E101/261/21). During 1306 the name Agnes Oppehulle, washing smelting residues, disappears from the wage roll and is replaced by Agnes Sludde, and a Richard Sludde was 'admitted to wages' as the smith at Calstock on 8 June 1310 (TNA: PRO, E101/261/12). Sludde cannot be identified as a local name and Richard might be a miner, initially employed on extractive or other piecework before taking up work as a smith, who probably married a local girl. She then continued to work on the mine, probably until prevented from doing so by childbirth. The evidence is scant with only a handful of women being named in the wage rolls, and it is fragmented, but there is enough to suggest that family income could be supplemented by the employment of more than one of its members at the mines. Langdon and Masschaele (2006) have suggested that the availability of additional income could provide the incentive for early marriage, and the potential for accelerated population growth, but also contributed to low real wage rates. It could indeed account for the apparent low wage rates noted by Salzman (1950, 73) for the 1320s and 1330s.

There would, of course, also have been an incentive for immigrant miners to marry locally and thus establish a link to the opportunity for some form of dual occupation in agriculture, even if that was confined to limited access to a small-holding. At least one family, Smalleye, whose origin might be identified with immigrant smelters brought in from Derbyshire in the early 14th century (probably originating from Smalley near Ripley), does appear on the list of conventionary tenants in the Duchy of Cornwall's manor of Calstock in 1347 and 1356 (CPA, transcripts of Duchy of Cornwall 472; TNA: PRO, E306/2/1). The name Peche or Peak reoccurs at Bere Ferrers throughout the 14th and 15th centuries, sometimes linked to landholding, suggesting a continued link with immigrants from Derbyshire (*Cal Pat R Hen VI*, 5, 571 and Exeter, MS3522). In the short term, however, many of the immigrant miners appear to have been quick to return to their place of origin (*eg Cal Close R Edw III*, 11, 37).

The Crown made no provision for housing or feeding the workforce on the mines during the period of direct management although there is evidence to suggest that its lessees did subsequently attempt to address the problem of housing immigrant miners. It is evident from the documentary evidence that many of those workers engaged in ancillary tasks around the Bere Ferrers mines were of local origin, bearing names that linked them to a scattering of holdings across that and adjoining parishes. Those duties included transporting ore, Gilbert de Clyue [Cleave]; and fuel, Alice de ffeylegh [Filley] who was paid for four days carriage of fuel to the furnace by her horse; for use of a horse, William de Gouetoun [Gawton]; for breaking 'blackwork' [smelting residues] Robert ffille [Filley]; or for cutting wood, Richard de Slymford [Slimeford, in Calstock] (TNA: PRO, E101/260/22, entries for 2 February, 20 April and 13 July, E101/260/30, E101/261/2 and E101/261/25). These could be termed 'secondary' activities which could be fulfilled by a local, unspecialised workforce. There are also recognisable

tradesmen: a carpenter (John de Lyche [Leeches]), a chandler (candle maker: John Lecche [Leeches]), and a boat-builder (William de Clomholke or Clomhulke [Clamoak]) (TNA: PRO, E101/260/22, E101/260/30 and E101/261/25). Unfortunately payment for ore production merely appears as a total in the Exchequer Accounts without naming the miners, although some contracts for development work did give names, as when William atte Birch and 'his men' were paid for 'deadwork' in 1343/44 (TNA: PRO, E101/260/22, entries for 10, 17, 24 August and 7 September, E101/263/5, and E 101/263/2).

It would appear, therefore, that although some of the local agricultural community gained employment from at least the beginning of the 14th century, it was not until later in that century that we see miners linked to local settlement names like Birch. Later evidence, such as the late 15th century list of tenements entered on the last leaf of a copy of Quinil's summary held in the Exeter Cathedral archives, does suggest that some of the larger settlements in the parish of Bere Ferrers were to be found close to the mines although factors beyond the presence of the mines, such as topography and land use, may also have a bearing on the size of some settlements. The largest, by far, was the borough settlement of Bere Alston, one kilometre to the north-east (Exeter, MS3522). For discussion on this document see Henry (2001) and Orme (2002) and for analysis of the evidence on the distribution and relative size of the settlements see Claughton (2003a, Appx 12).

The landscape evidence

Although Bere Alston is not identified by name until the 1330s it was a creation of the late 13th century, shortly after the mines were open up by the Crown (Gover *et al* 1932, 223). Analysis of the relationship between the borough settlement of Bere Alston and the surrounding field system supports the limited documentary evidence which suggests that it was established by the lord of the manor, Reginald de Ferrers, with the grant of a market to act as a service centre for the mines (*Cal Charter R*, 2, 463). Although de Ferrers had no call on the produce of the Crown mines he was in a position to profit from the demands on housing and food supply. The cost of acquiring a tenement and the status as a burgess would, however, probably be too much for an immigrant miner, particularly one who considered himself a temporary resident in the manor, when he would be expected to erect a suitable dwelling on the plot. It was nevertheless open to burgesses to sub-let accommodation to miners and, in common with most boroughs, not all the residents of Bere Alston would be burgage tenants.

In the second half of the 14th century the lessees of the king's mines were certainly looking to place workers in properties close to the mines, and an instruction to the Sheriff of Devon dated June 5th 1360, for example, states:

> 'Order … whenever required by Henry de Brusele and Richard de Colle masters of the kings's mines in that county … to (among other things) cause houses wherein they and the workmen may be suitably lodged to be demised and delivered to them for a competent farm. … upon complaint … that they are of times hindered …' (*Cal Close R Edw III*, 11, 37).

Whilst any of the farms and hamlets close to the mine workings could have expanded to include a few miners' dwellings there is no archaeological or documentary evidence for severely shrunken or indeed wholly deserted settlements. There are no field-names that suggest the sites of former habitations, and the available aerial photographic evidence does not show any evidence for shrunken or deserted settlements in the form of cropmarks or earthworks. The houses required for miners in 1360 could equally, however, have been found amongst those in the borough of Bere Alston.

Unfortunately we do not have medieval maps for Bere Ferrers and the surrounding area and so we must rely upon later sources on which to base an analysis of the historic landscape. The start point was modern Ordnance Survey mapping and the 19th century six inch to the mile maps, available under educational licence in digital form through Edina Digimap, and placed in a computer-based GIS (Geographical Information System). These six inch to the mile maps were used in a 'historic landscape characterisation' in which the land-use and morphology of the 19th century countryside was assessed, and each parcel of land attributed to one of a series of different 'historic landscape types', such as woodland, small irregularly shaped fields derived from woodland assarting, and blocks of long narrow curving fields derived from the enclosure by agreement of former open field. In the last two examples, the historical process that led to the creation of these landscape types is known through analogy with other landscapes, and in the case of Bere Ferrers a comparison of the 19th century sources with an earlier map of the manor of Bere Ferrers, drawn up in 1737, reveals the process that led to the creation of another distinctive historic landscape type: field systems characterised by relatively large, straight-sided, polygonal fields. In the 19th century, areas of such field boundary patterns were to be found on some of the higher ground to the north and east of Bere Alston which

Figure 4: An extract from the estate map of 1737 (CRO ME2424) showing the borough of Bere Alston sitting uncomfortably within the fossilised boundaries of an earlier field system centred on Frog Street.

in 1737 had been unenclosed common land, such as 'Beeralston Down'. This distinctive type of landscape was created through post medieval enclosure of common open pasture.

For the parish of Bere Ferrers more detailed analysis was carried out on the tithe map of 1845 (DRO). This map was transcribed into the GIS using the Ordnance Survey six inch to the mile maps as a base, with each parcel of land drawn as an individual 'polygon' (*ie* parcel of land) linked to a data-base which included information copied from the tithe apportionment: the owner of the field, the tenement to which it belonged, the occupier, value, land-use, and field-name. It is important to map all three of landownership, tenements, and occupiers as in places large areas of land were owned by the same individual but sub-divided into a series of discrete tenements. In places these tenements were themselves sub-divided between different tenants, while elsewhere the same tenant might hold several tenements. These various categories of tithe data can be used to add further depth to the historic landscape characterisation, for example by looking at patterns of land ownership and occupancy. The interpretation of areas of long, narrow, curving fields around Bere Alston, for example, that on morphological grounds are suggestive of former open fields, is supported by their having a very fragmented pattern of land occupancy (suggesting that following the enclosure by agreement of these former open fields tenements received the scattered strips of land that they had held immediately before enclosure). In contrast, most of the farmsteads outside Bere Alston village were surrounded by compact blocks of fields in single ownership, a pattern characteristic of closes held in severalty.

The surviving remnants of the open field system at Bere Alston are focused on the holdings, around Frogstreet, a short distance to the north west of the borough. The 1737 estate map (Fig 4) shows that there is a direct tenurial link between these holdings and the consolidated strips, with a small group of individuals holding nearly the entire former open field. The regular pattern of burgage plots oriented along the straight streets of the borough sits very awkwardly with the open field's sinuous morphology,

with the south-west oriented road apparently cutting their axis. Therefore it is suggested that the settlement was laid out, with narrow burgage plots, over part of an existing open field but aligned with a route towards the mines rather than to the pre-existing boundaries.

It must be asked, however, what impact the creation of the borough had on the existing settlement at this location, and its associated open field system. At Tavistock, only 10km north-east of Bere Alston, the consolidation of strip-based open fields into land held in severalty (undivided tenure) was well-advanced by the first quarter of the 14th century. As evidence for this, Finberg provides a number of documentary references to the purchase and amalgamation of strips, and the associated process of enclosure with hedge-banks (Finberg 1969, 50–52). No such documents are known that relate to the open field around Bere Alston so we cannot give a precise date to its consolidation and enclosure. It cannot be ruled out that the open field had been consolidated and was held in severalty before 1292, but this process may have been a response to an increase in population caused by the opening of the Crown mines and the establishment of the borough. An increase in the demand for food caused by an expanding population may have driven, or at least favoured, the presence of enclosed land held in severalty on which intensive arable production was more viable. The granting of a market would, along with the increased local demand for food, have provided local farmers with a regular point of sale but also a captive market for their produce. Herring (2006, 59) suggests that Cornwall's tin industry would have provided a strong local market for agricultural produce and so stimulated agricultural intensification and the consolidation of communal field systems. The opening of the silver mines at Bere Ferrers, and the creation of a market and borough had a significant impact on the appearance of the settlement at Bere Alston. It would also have provided an impetus for the intensification of agricultural production within the parish, which may subsequently have led to a departure from communal agriculture.

The late 19th-century settlement pattern of Bere Ferrers parish, as depicted on the Ordnance Survey First Edition six inch to the mile mapping, contains a large number of dispersed farms. The greatest density of farmsteads is in the western half of the parish where the medieval and post-medieval silver mines were operational, but did the opening of the mines instigate their creation? There is nothing unusual about the number of dispersed farms in the parish of Bere Ferrers; single farms and small hamlets are an extremely common element of both Devon and Cornwall's historic settlement pattern (Roberts and Wrathmell 2000, 57; Beresford 1964). The estate map of 1737 shows that a number of the farms in the parish of Bere Ferrers were originally composed of multiple tenements: at that time the settlements at Helston, Ashen, Pound (now deserted), Braunder, Whitsam, Hewton, Lower Birch Farm, Clamoak, Leigh and Collytown were resident to more than one land-holder. It is possible that even those places shown as single settlements on the 1737 map may once have been multiple holdings: they were simply consolidated at an earlier date. Again, this process of settlement evolution is not unique to this area, and examples are known from across Devon and Cornwall (Henderson and Weddell 1994, 131; Fox 1991, 164).

A borough foundation like that Bere Alston was not an unusual event in Devon as the county had a total of 74 boroughs, the greatest number of any county in England, almost half of which were founded in the late 13th or 14th century (Beresford and Finberg 1973, 41–43). What is significant is that it was established close to the mines rather than being linked to the existing manorial centre adjoining the parish church in the village of Bere Ferrers, on the River Tavy. The fields that surround Bere Ferrers village are predominantly large, of rectangular to sub-rectangular shape, and show none of the characteristics of former strip-based open field cultivation that is seen around Bere Alston. The pattern of landownership and occupancy in 1737 and 1845, a series of compact blocks of fields in the same hands, is also suggestive of closes held in severalty (CRO, ME2424; DRO, Tithe Award, Bere Ferrers). To the east of the village there were two mills, a 'salt' or tide mill and a more conventional 'fresh' mill, both well placed to deal with grain imported by river (CRO, ME2423). An area of altogether different character occupies the land south of Bere Ferrers, where an area of large, straight-sided, polygonal fields covers the southern tip of the peninsula. The morphology of these fields is suggestive of post-medieval enclosure and can be linked with presence, before 1549, of 'Bere Park' which can be interpreted as a medieval deer park (Stuart 1991, 66–7). The landscape around Bere Ferrers village is therefore of a very different character to that associated with the mines.

The medieval mines, from Lockridge Hill south to Cleave Wood, and associated infrastructure such as the 15th century leat, cut across an existing field system upon which the borough settlement was superimposed. The antiquity of these field systems in the west of Bere Ferrers parish is difficult to establish, though the small

open field system around Bere Alston appears to pre-date the foundation of the borough at the turn of the 13th century. To the south-west, the field systems, both in terms of their physical boundaries and patterns of land occupancy, appear to be cut by the line of mine workings dating to 1292 and later. This confirms the logical assumption that mining and the associated borough settlement were superimposed upon a pre-existing agricultural landscape which, by analogy with other parts of Devon and East Cornwall might be dated to the well before the mid-13th century (Herring 2006, 50; Fox 1991).

Conclusions

Despite the predictions of the keeper of the mines in about 1305 (above) the silver mines at Bere Ferrers did not subsequently produce the level of revenue seen from tin working, but still made a valuable contribution to the English mints in the late 13th and early 14th centuries, and again in the mid 15th century. Continental European silver, particularly that from the mines of central Europe, continued to be the dominant contributor to the currency in England.

The opening up of the Devon silver mines under the direct management of the Crown did, however, mark a significant change in English mining. Not only was their operation divorced from the custom which regulated mining elsewhere but the produce was the Crown's to hold in full. The church continued to take its tithe but the holder of the land on which the silver-bearing ores were found had no call on their produce. In 1582 the Crown's right to control silver and copper bearing ores was successfully tested in 'The Case of Mines' and it was not until the end of the 17th century that they were returned to the land-holder (Claughton 2007). The new mineral lords could then work those mines on a large scale without the impediment of customary regulation.

At Bere Ferrers there was the potential for conflict between the lord of the manor and the Crown. Even though Reginald de Ferrers' petition for compensation went unheeded in the late 13th century, no such conflict appears to have materialised until the more unsettled years of the mid-15th century (TNA: PRO, SC8/111/5544 and SC8/322/E550; Pettus 1670, 17, quoting Remembrances of the Exchequer, 36 Hen VI., Easter Term Rot 20). But, although it was not a direct conflict with the Crown, one incident has recently come to light. When the keeper of the mine failed to apprehend a miner accused of killing a man, de Ferrers took things into his own hands and his men attacked the miners, damaging much of the mine (McNeill 1934, 328–9). In the late 13th century only one realistic option was available to de Ferrers, to satisfy those demands of the new mining community not provided for by the Crown. The establishment of a borough settlement with a regular market was a tested method of exploiting new opportunities provided by changed economic circumstances. Most would be a modification of an existing settlement whereas the borough of Bere Alston was established in the 1290s on what was probably a new site. The borough was superimposed on part of an established open field system some distance from the existing manorial centre but close to the mines. Bere Alston was to grow as the service centre for the mines to become the largest settlement in the area, surviving the decline in mining post 1500 to re-emerge as the focus for mining settlement in the 19th century.

Bere Alston remains a prominent feature in the landscape, a lasting legacy of the royal silver mines. Its expansion as a modern commuter satellite for Plymouth continues to fossilise the ancient field system in which the core of the late medieval borough sits most uncomfortably. The mines to the west and south-west are today frequently linked to it by name, as the 'Bere Alston mines'. The origins are, of course, quite different. The mines were 'of Birland, or Bere Ferrers', but Bere Alston is very much a product of those mines and should perhaps be regarded as Britain's first dedicated mining town.

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TNA: PRO: The National Archives: Public Record Office, Kew
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