

Tinworking in the Cornish landscape

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Abstract

Dartmoor's wealth of well-preserved historic tin workings has been made richer by the improvement in understanding gained from their close investigation by, among others, the Dartmoor Tinworking Research Group.

Tinworking (including early working) on the lower Cornish granite uplands and in their hinterlands had greater intensity and variety, and its impact on Cornwall physically, topographically, economically and socially was heavier and longer-lasting. Those impacts of tinning have affected so many places and have affected the meanings and values that people give them that a substantial part of Cornwall may be regarded by some as an industrial landscape, or a post-industrial one, with mining (principally for tin and copper) being the main industry involved. Of course that over-simplifies an especially complex history and region, whose landscape and identity might equally be regarded as maritime, rural, recreational, artistic and non-conformist, but which has industry, mainly extractive and mainly tin threaded through all those and many other aspects.

This paper will attempt to meld the particular with the general by considering how the study of historic landscape, a place perceived by people in the past and now by people in the present, is informed by the archaeological investigation and historical study of leats, streamworks, pits, shafts and heaps, mills, dressing floors, shelters, engine houses, tramways and blowing houses and of workers' housing, mine-owners' mansions and field systems.

Cornwall and Dartmoor share many aspects of their industrial histories: the practices and technologies that were employed by streamworkers and miners as well as the methods of historical and archaeological research that have been employed in developing our current understanding of them. This paper touches on these and on how tinworking has affected place, landscape and identity in Cornwall, and by extension or implication how it may have done likewise on Dartmoor and in west Devon.

Landscape is at the same time a physical thing and a mental construct, with people central to its creation and its perception (Fairclough 2006; Council of Europe 2000). Places and landscape are always changing, both materially and in the ways individuals and groups perceive them. Raising the profile of an aspect of a place, such as when improving understanding of the history of tinworking on Dartmoor, will change the way a place is regarded and valued. So the work of the DTRG, and the effects of its May 2016 Tavistock conference, have changed

Dartmoor, just as the work on the Bronze Age boundary patterns known as reaves systems changed it a generation ago (Fleming 1988) and reading Conan Doyle's *The Hound of the Baskervilles* did a century ago. As an understood and perceived landscape Dartmoor will never be the same again.

In Cornwall (and a part of west Devon) the nomination of ten separate areas as a UNESCO World Heritage Site that acknowledges the universal significance and value of the mining landscape of the early modern period; the age when technological advances enabled highly capitalised industrialisation has substantially affected perceptions of Cornwall (World Heritage Site Bid Partnership 2005). Some may now regard Cornwall as an industrial landscape, or a post-industrial one (Brayshay 2006; Fig. 1).

Others, however, see instead a 'quintessentially maritime region', with fishing, importing and exporting, defence, victualing and ship and boat building important (Payton et al. 2014), and the sea as 'an active moulding element' (Deacon 2014, 276).



Figure 1 Geevor mine (which closed in the late 20th century) and, in the distance, Lower Boscaswell medieval hamlet, swollen in the post-medieval period by homes for mining families. The mine is now protected by scheduling and celebrated by being within the Cornwall and West Devon Mining Landscape World Heritage Site. (Photo: Phoebe Herring)

And many more people, and especially those who visit Cornwall as various forms of tourist (around five million each year), see and treat Cornwall as primarily a place of recreation and pleasure, populating it more through various fictions than through understanding of historical or modern realities (Harvey 2006; Brace 2006). This sits uncomfortably with appreciation that Cornwall is and long has been a land of stark contrasts in terms of wealth and opportunity, with extremely wealthy people living or staying close to zones that are amongst the most deprived in Britain (Cornwall Council 2012).

Cornwall is not unusual in being complex, with overlapping uses, and inconsistent and contested narratives; most places are like this (Howard et al. 2013). But Cornwall does have a stronger than normal sense of identity, reflected most simply in the range of uses of the adjective ‘Cornish’ compared with, say Devonian or Devonish. That identity is tied to the place by narrative and custom, and by nationalism, under the now familiar flag with its white cross on a black ground ‘formerly the banner of St Perran, and the standard of Cornwall; probably with some allusion to the black ore and the white metal of tin’, first so described in 1838 (Davies Gilbert 1838, vol 3, 332). The extent of this nationalism was also recorded in the latest census, of 2011, when 73,200, or 13.8%, identified their nationality as Cornish (Cornwall Council 2013, 5). Cornishness is also symbolised by named items like the pasty, the shovel and most formally in the coat of arms, created in 1939, which includes the Cornish cough, the Cornish fisherman and of course the Cornish miner

(holding a sledgehammer). Another symbol, to some an icon, is the tall strong stone-built structure, usually with arched windows and brick detailing and with a tall tapering chimney stack, that housed the Cornish beam engine (Barton 1969; Fig. 2). These engine houses make instantly visible the industrial strand in Cornish history and in the present-day Cornish landscape, and when encountered in Ireland, Mexico or Australia, still turn corners of distant lands Cornish (Payton 2007).

Farmers and landowners might suggest that industry, the coast, tourism and post-industrial poverty all intrude only slightly upon the appreciation that Cornwall is fundamentally rural with a rural landscape. Over 80% of its surface is enclosed farmland (Herring 1998) and agriculture is the most enduring land use, with most fields having medieval-derived forms and most commons having been in place since prehistory (Herring 2006; 2008; 2013). Most farmland is now worked from fairly isolated farmsteads, though their fields have patterns that indicate origins in different, more communal, ways of arranging land and drawing food from it. Those indications, when pursued, confirm that medieval and earlier farming society in Cornwall was closely cooperative and that its commons (especially the rough grazings of Bodmin Moor and the other uplands) were administered well (Herring 2006).

The historic landscape characterisations of Cornwall and Devon emphasise how rural the land that was once the Iron Age territory of Dumnonia is; land whose character is predominantly industrial covers a tiny proportion of Cornwall (less than 2%,



Figure 2 Engine house and spoil heaps at Unity Wood, near Chasewater. (Photo: Phoebe Herring)

and that includes the extensive china-clay workings) and even less of Devon (Herring 1998; Turner 2007). But the impact of industry, visually and through the strength of its historical and communal meanings, and thus the ways that it is valued, is considerably greater. The head gear, engine house and the darkly vegetated spoil dump catch the eye and industrialise the most rural scene (Fig. 3), but this paper will illustrate how the agricultural backdrop has itself been altered by the effects of industry.

Cornish historical writing is also dominated by

industry. There are hundreds of books on mining (see for example the bibliography of the WHS Nomination document; World Heritage Site Bid Partnership 2005, 206-219), but just dozens on maritime Cornwall and only handfuls on Cornish rural history. A K Hamilton Jenkin (Fig. 4), whose bardic name was Lef Stenoryan ('Voice of the Tinnerns'), the doyen of Cornish mining historians, established in his *The Cornish Miner* (1927) an authority, tone and seriousness that few have matched, and he did that by concentrating as much in his writing on place and people as on engines



Figure 3 Two ruined 19th-century engine houses (Carn Galver Mine) in rural Zennor, where the fields and commons have prehistoric origins. (Photo: Peter Herring)



Figure 4 Cornwall has had many fine mining historians, but perhaps the greatest was Arthur Kenneth Hamilton Jenkin. He kept in mind always the link between the life of a mine and the lives of those who worked in and around it. (Portrait painted by Leonard Fuller and part of the Cornish Studies Library's collection.)

and shafts. Other influential writers include George Randall Lewis who, before Jenkin's time, gathered together documentation for and an understanding of the stannaries, the administrative bodies established in each of the main tinning areas, and their relationship with ultimate authority in the form of the Crown (Lewis 1908).

As long ago as 1935 the Cornish Engines Preservation Committee, precursor of The Trevithick Society (named from Cornwall's premier mining engineer and inventor), was established in order to save the Levant whim engine from loss. In addition to the successful protection and conservation of several important steam engines and waterwheels, The Trevithick Society has encouraged much detailed historical research and archaeological recording and interpretation. The fine granularity of research reflects the complexity of Cornwall's mining history, with each mining area, from Hingston Down west to St Just, having its own peculiarities of geology and geomorphology (see Scrivener, this volume) and its own ways of exploiting those. Each mining area thereby developed its own character and qualities. Those in the east of Cornwall, with extensive

streamworks and surface workings, and considerable use of water power, have much in common with Dartmoor.

In the last few decades of the twentieth century each Cornish mining area was subjected to close historical and archaeological study, mostly through projects undertaken by the Cornwall Archaeological Unit. These surveys were stimulated by different needs and their scale and detail also varied accordingly. For example, Kit Hill on Hingston Down, near the River Tamar, was the subject of a detailed record (in which every pit was carefully plotted) in order to guide management of a newly created country park (Herring and Thomas 1990). Bodmin Moor, formerly the Foweymore Stannary, was studied in part to obtain the understanding required to address the effects of various threats to this poorly recorded upland area, especially afforestation, reservoir construction, agricultural change and road construction (Herring et al. 2008). The survey led to the identification of candidate sites for statutory protection through Scheduling (Rose and Herring 1990). Also on Bodmin Moor, the Minions area, intensively mined in the last two centuries and now heavily visited, was subjected to more detailed study through a community programme that led to conservation works on selected significant structures (Sharpe 1989).

A third strand of the study of Bodmin Moor's medieval tinworking was in part inspired and influenced by the work on Dartmoor undertaken by the DTRG silver jubilee conference's principal organiser, Dr Tom Greeves (1981). Dr Sandy Gerrard had worked with Greeves on the important complete and closely recorded excavation of a later medieval and early post-medieval tin stamping mill at West Colliford (in St Neot parish) (Austin et al. 1988). Gerrard realised that there were significant gaps in the knowledge and understanding of the practical methods of early tin working, and tin streamworking in particular, and in the social and economic impacts of the industry on later medieval Cornwall. His doctoral research in St Neot parish involved single-handed plane-table survey and close critical observation of the complex earthworks of valley-bottom alluvial streamworks and hillside eluvial streamworks. These were done in order to establish, by analysis of the patterns of spoil tips (and thus their contiguous working areas, the tyes), the mechanics of digging through the shode and preparing dressing areas for the separation of stones containing the heavy tin ore

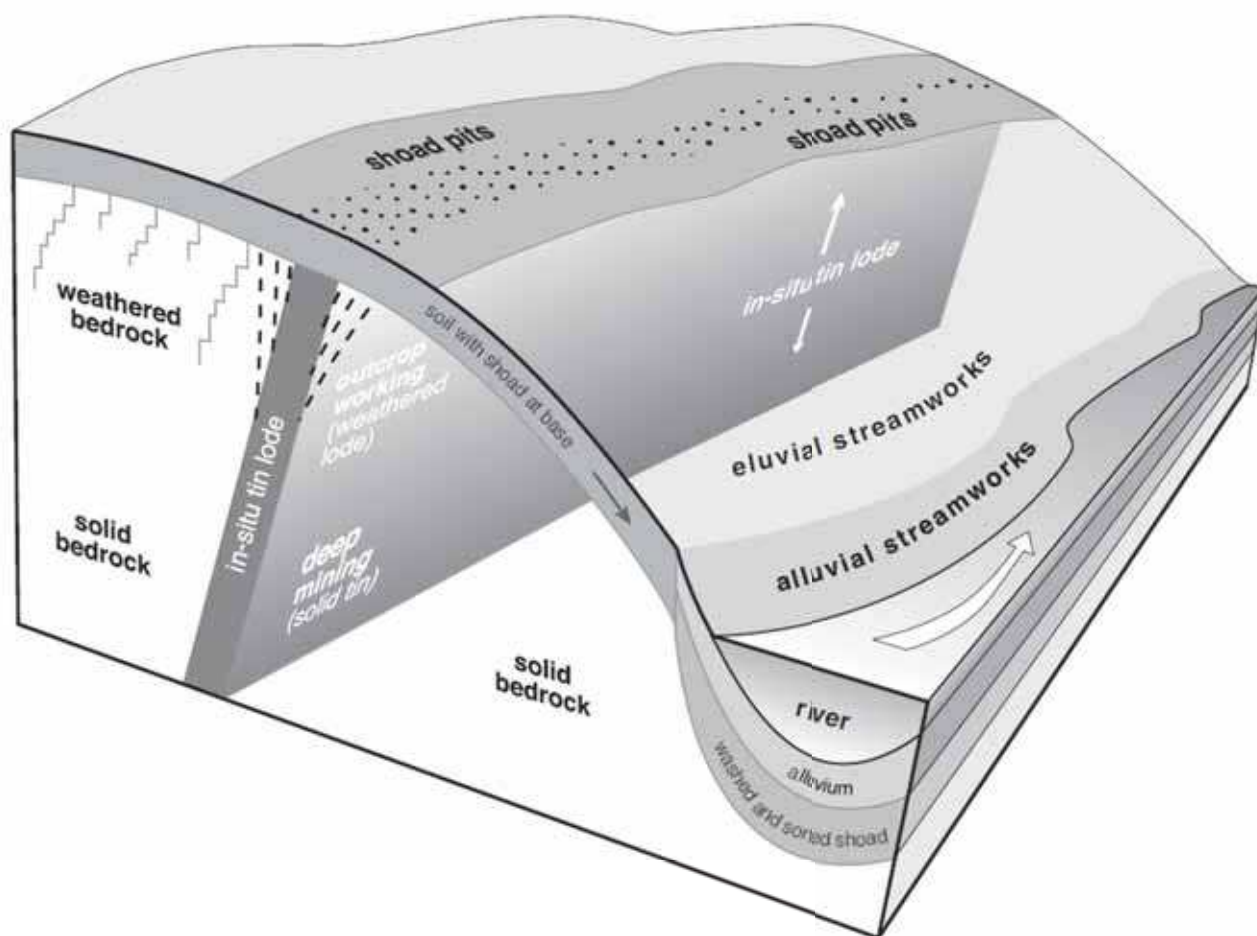


Figure 5 This model, developed by Adam Sharpe, shows how tin workers have exploited the lode by outcrop and deep mining and the shode (or shoad) weathered from the lode and moved downslope by shode pits and by eluvial and alluvial streamworks. (From Sharpe 2008, fig 25; image copyright Rosemary Robertson)

from lighter waste (Gerrard 1986; 1987; 2000; Austin et al. 1988).

Gerrard and his later co-worker Adam Sharpe prepared explanatory models of the ways that geomorphological processes had dislocated ore from the roughly vertical lodes and carried it downslope as 'shode' or 'shoad', and then how tinworkers had used ingenious hydraulic engineering to exploit it; engineering that left distinctively patterned archaeological remains (Gerrard 2000; Sharpe 2008; Fig. 5). The explanatory models that Gerrard and Sharpe developed owed much to earlier accounts from the likes of William Pryce (1778), Thomas Beare in 1586 (Buckley 1994), and an anonymous Cornish writer of 1671 (cited in Lewis 1908, 5). Some shode was sorted by alluvial action and deposited in valley floors where it was dug over in pits known as hatches or in long narrow pits, the forms and locations of which are signalled by either patterns of ramped dumps emanating from the sub-circular hatches

(and up which barrows of spoil may be expected to have been pushed) or parallel linear dumps along the sides of the trenches. A major constraint on working alluvial deposits was the continued flowing in the valley bottoms of the streams. Tinnerns diverted these into channels running parallel to one side of the natural stream-course to allow easier access to the tin-bearing ground. Alluvial streamworking was best suited to the summer months when streams were running at their lowest volume.

Conversely the winter was the better season for working the mid-slope eluvial deposits of shode, to which water had to be brought for dressing, to separate the tin-bearing stones from the waste. Long contour-following leats caught run-off rain water and drew it into banked reservoirs ready for careful diversion into the working tyes set within the cuttings dug into the linear spreads of shode (Figs 6 and 7). The tinnerns calculated how to draw the water through the dressing areas within their tyes at the optimal



Figure 6 Eluvial streamworks in the dry valley between Leskernick Hill and Bray Down on West Moor, Bodmin Moor. Reservoirs on the far side of the cutting stored water for use in the tyes, on the nearer uphill sides of the parallel dumps that lie each side of the central drain. Leats brought water to the tyes on the nearer side. Three tinner's lodges or shelters survive at the sheltered far end. See Sharpe 2008, fig 32 for a survey and interpretation of this site. Further streamworks can be seen in the distance (top right). (Photo: Peter Herring).

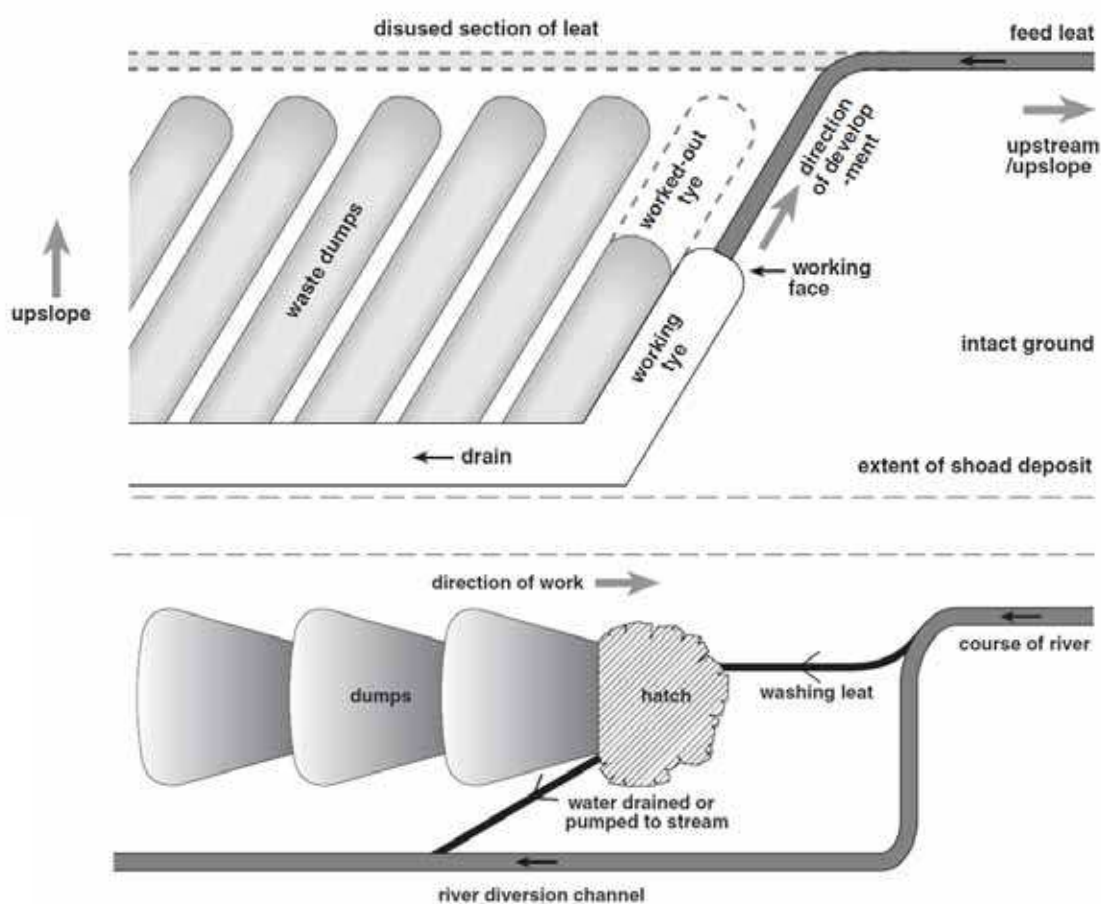


Figure 7 A reconstruction drawing based on the earthworks depicted in the above photograph (Figure 6).

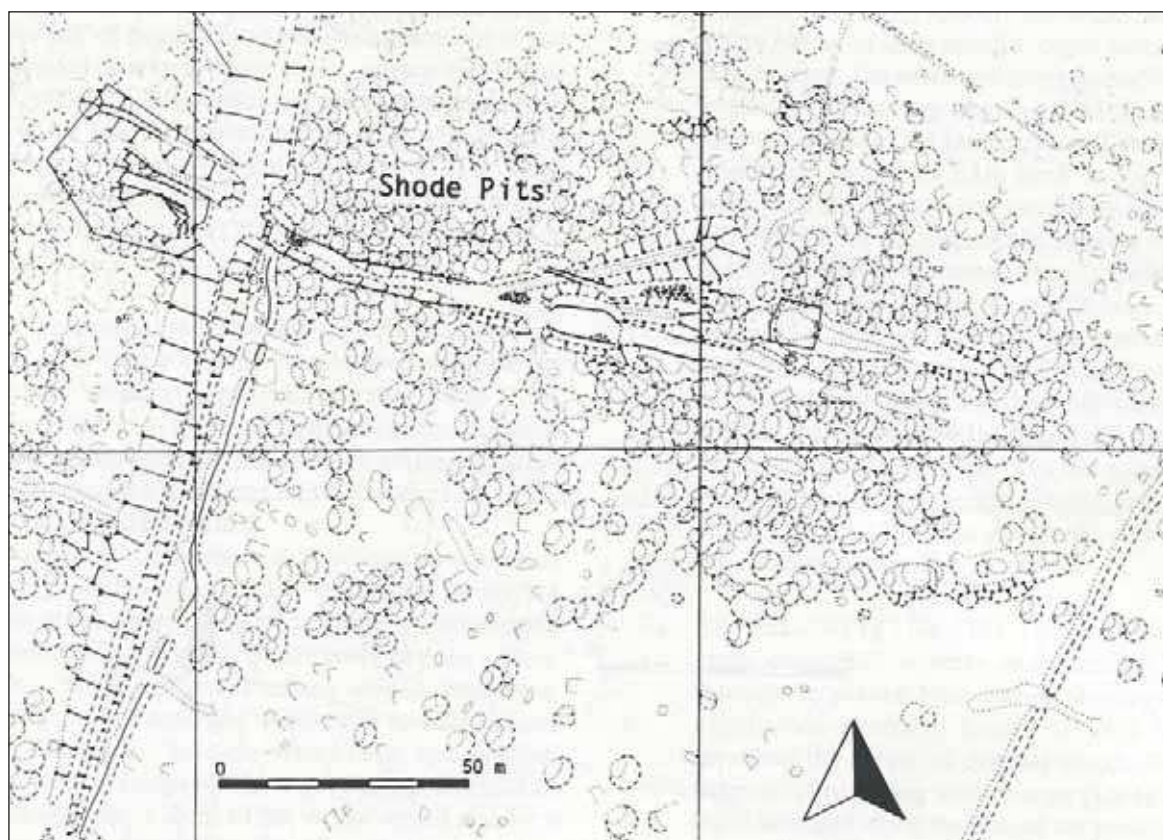


Figure 8 Measured survey of a shamble of shode pits on the high eastern side of Kit Hill. The hundreds of pits are oval with heaps on their downhill sides. Tinnery worked uphill in rough lines often throwing their spoil into pits immediately downhill to reduce the area of ground sterilised by dumps. (From Herring and Thomas 1990, fig 60.)

velocity to remove the lighter waste (the average specific gravity of quartz, feldspar and mica being 2.65, 2.53-2.60 and 2.94 respectively) while leaving the heavier tin-bearing ore (specific gravity of cassiterite varying from 6.8 to 7.1) (Gerrard 1987, 7)

Shode found on the highest parts of hills, where water could not be brought to it for dressing purposes, was dug over by small pits and the material collected taken downhill to sources of water for dressing. Complex patterns, or 'shambles', of shode pits have been recorded in several places, notably on Goon Zion Downs on the flat-topped downland west of St Neot (Gerrard 2000, fig. 33), and further east on the summit plateau of Kit Hill. These detailed surveys indicate that these apparently random scatters of pits were dug systematically, the tinnery working up hill and casting the spoil from the small sub-rectangular pits downhill into the earlier pits behind them (Herring and Thomas 1990, 106-7, fig. 60; Fig. 8).

The Bodmin Moor Survey showed that this upland area was thoroughly worked over – most valley bottoms have alluvial works and most dry side valleys have eluvial works (Sharpe 2008, fig. 39; Fig. 9). Many streamworks were re-worked several times,

each revisiting deepening the cutting to leave some as much as 15m deep (as between Leskernick and Buttern Hills on West Moor; Fig. 10). Much of the material removed from such streamworks was taken in suspension down river to be dropped where the waters slowed in the middle and tidal reaches of the Fowey, Lynher, Tamar and Camel, silting up formerly navigable channels at great cost to trading towns and leading to complaints against tinnery as early as 1357, when Abraham the Tinner was imprisoned for his role in the clogging up of Lostwithiel (Gerrard 1987, 8).

Abraham appears to have been in charge of a large enterprise involving 300 people (men, women and children) in seven named works, including four streamworks (Gerrard 2000, 40). He was not a small-scale, semi-subsistence miner, but a proto-capitalist whose principal resource would have been the skill and the muscle-power of those 300 people. Where might such people have lived and were they themselves like Abraham, full-time tinnery? Streamworking's seasonality (alluvial summer works and eluvial winter works) suggests the possibility that some or many fitted tinworking within a farming

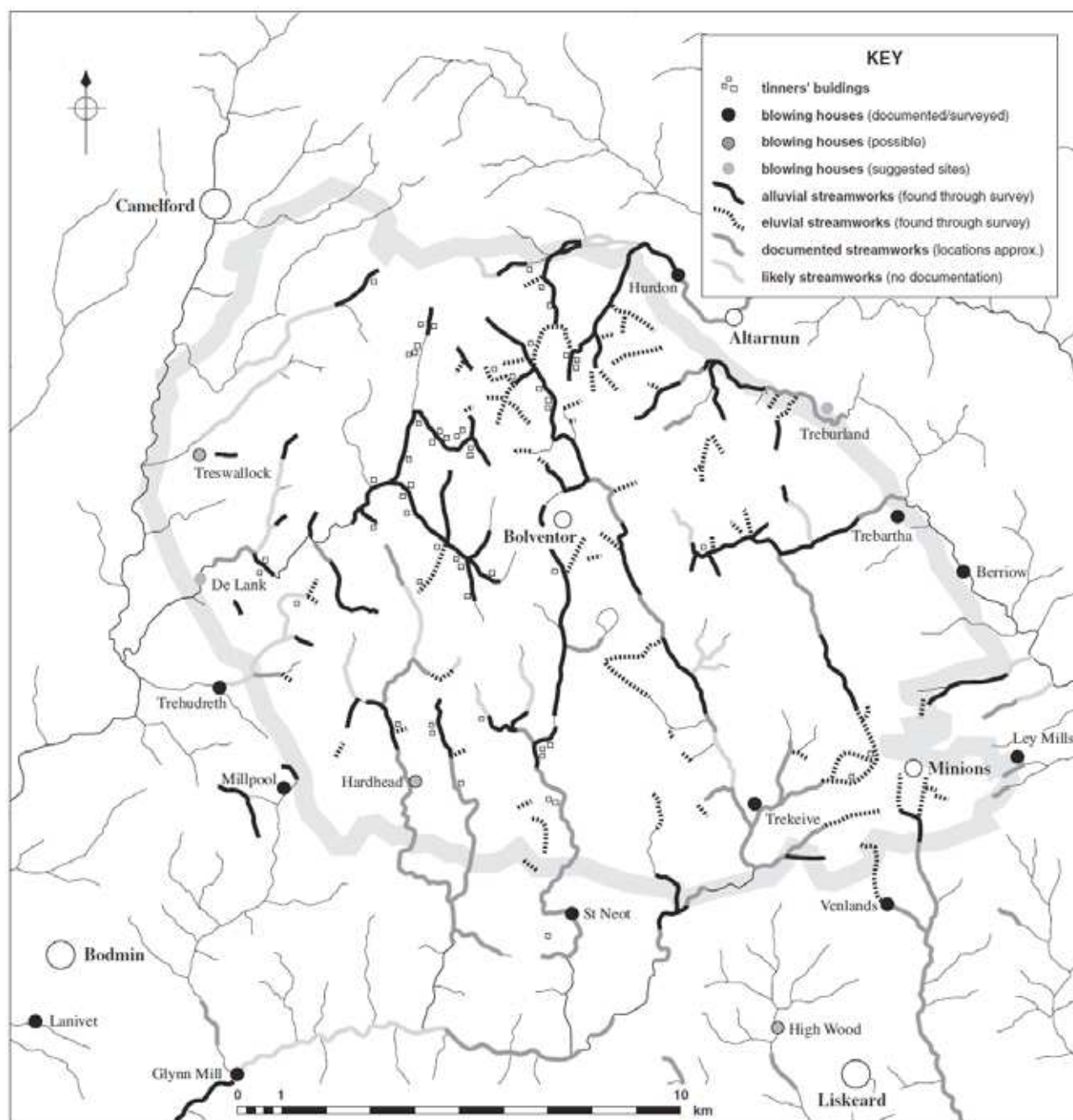


Figure 9 Bodmin Moor, or Foweymore Stannary district, showing known and likely locations and extents of alluvial and eluvial streamworks etc. Known and possible blowing houses, all near the edge of the Moor, are also shown, as are tinnery huts, or lodges, largely distant from farming hamlets. (From Sharpe 2008, fig 39; image copyright Rosemary Robertson)

calendar and formed parts of households living in the hamlets of longhouses whose remains survive in many places on Bodmin Moor (and Dartmoor). There is also archaeological evidence for the accommodation of tinnery both near and within streamworks; nearly 50 ruined buildings have been recorded on Bodmin Moor, small rectangular structures, mostly of earth or turf with single entrances in one long side and some with small stone fireplaces in end walls (Fig. 11). These appear to be equivalents of the ‘lodges... made up with turves covered with straw’ in which

dinner was taken, described in 1586 by Thomas Beare the bailiff of Blackmore (the Stannary of central Cornwall) (Buckley 1994, 57). Most lodges recorded on Bodmin Moor are in the more remote central areas distant from permanently occupied farming settlements (Sharpe 2008, fig. 39; Fig. 9), strengthening the argument that other tinnery walked to work from their permanent homes, probably within farming settlements.

West Colliford stamping mill, the one whose excavation set Sandy Gerrard on to his tinning



Figure 10 People indicate the scale of the probably later medieval eluvial streamworks between Buttern and Leskernick Hills, most of the material dug being washed down to the lower Fowey where it silted up ports like Lostwithiel. (Photo: Peter Herring)



Figure 11 Lodge immediately adjacent to the cutting (foreground) of an eluvial streamworks on Buttern Hill. To its right is a ditched rectangular platform, a turf stead on which the locally cut fuel used in the lodge's stone fireplace was stored. (Photo: Peter Herring)

studies, appears to have been used over a period of 300 years, probably sporadically and probably largely for crushing ore-bearing material excavated from an adjacent openwork, a linear excavation opened on the back of a lode (Austin et al. 1988, 62-66). Openworks continued to be created as late as the first half of the 20th century in some parts of Cornwall, but may generally have been supposed to have been old-fashioned by the 18th (Sharpe 2008, 51). Broadly similar in form to openworks were stockworks in which swarms of closely spaced lodes or veins were removed *en masse* with the rock in which they lay, before the material was broken and dressed to abstract the ore, as in the great Carclaze Pit (in Blackmore) (Bristow 2008), at the remarkable site, an enormous pseudo-openwork, at Treveddoe in Warleggan (Sharpe 2008, 50-55, *figs 44 and 45*) and on the high western slopes of Kit Hill (Herring and Thomas 1990, 111-112, *fig. 62*).

Adam Sharpe sets out the various ways that miners turned their attention directly onto lodes through pits, proto-shafts, adits and shafts proper, using, broadly successively, muscle, horse, water and steam power to pump workings dry enough to work and to hoist ore and materials (Sharpe 2008, 50-68). In most of Cornwall's mining fields individual lodes can be found that retain evidence of each (e.g. Fig. 12), but they are most easily seen on Rillaton Common, on the seven broadly parallel lodes lying between Stowe's Hill and Minions (Sharpe 1989; 2008, *figs 50 and 51*).

A once-common feature, now much less visible in

Cornwall's mining grounds than it is on Dartmoor, is the blowing house. Here waterwheel-driven bellows raised a kiln's temperature to the level where dressed black tin melted, around 1,100 degrees centigrade. Sandy Gerrard estimated that there would have been around 120 blowing houses in Cornwall in the early sixteenth century alone (to meet the local needs of numerous tinning areas), but the sites of only 15 are known, and those mostly through documentary sources (cited in Sharpe 2008, 82). On Dartmoor, however, blowing houses are found in large numbers beside its fast-running streams, close to the tin grounds (Greeves this volume). In Cornwall the relatively short distances from moorland mines to optimal mill sites on or beyond the edges of the granite uplands, where small streams fell faster and so generated greater power, meant that few blowing houses were established on the granite itself. Most lay downslope and their sites either lie undiscovered in the woodlands of gorges or have been lost to change, either of function (becoming grist or fulling mills) or of land use (to agricultural improvement). One surviving ruined blowing house is the small building at Coombe in the valley east of Millpool, Cardinham (SX 1229 7070), found during the Bodmin Moor survey. The waterwheel, whose pit is still detectable beside the remains of the building, appears to have powered stamps (probably for reprocessing slag) as well as the blowing house's bellows, as there is a four-head mortar stone alongside the building and tiny fragments of crushed slag in the nearby stream (Herring & Rose 1990, 470; Sharpe 2008, 82 and *fig. 63*).

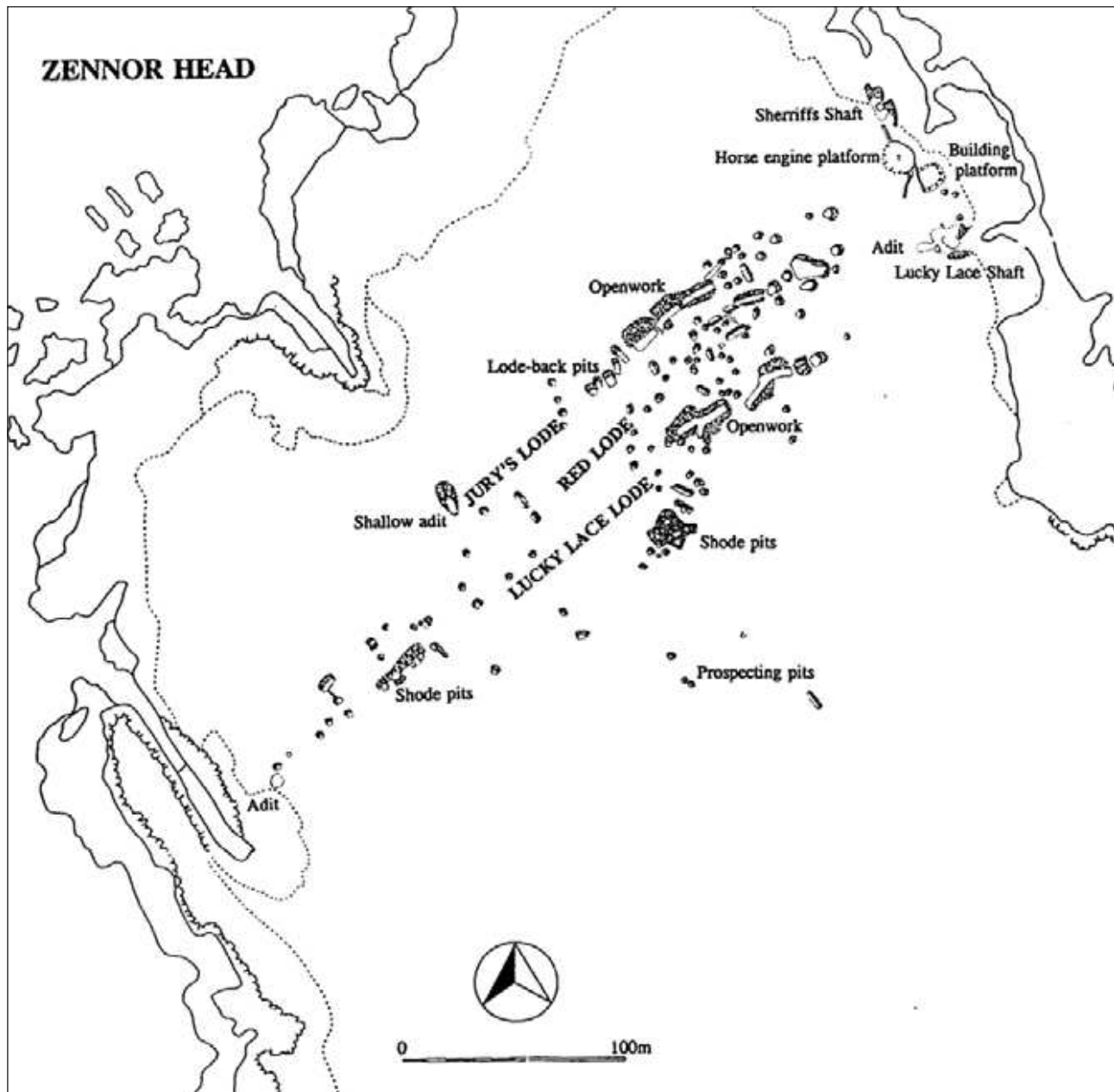


Figure 12 Three closely spaced lodes on cliffs at Zennor Head: prospecting pits searched for shode, worked in a small shambles, and then lodes worked by openworks, lode-back pits, adits and finally shafts. Records are poor, so this archaeological survey, coupled with later 19th century descriptions (from which the names are drawn) provides the clearest evidence of a superficially simple mine's complicated story. (From Herring 1986, fig 3)

It is not certain when Cornish tinworkers first turned their attention from shode to lode, from streamworks and shode-pits to openworks and lode-back pits. Lewis followed Pryce in thinking it might have been in the 15th century, but Gerrard suggested that there was lode mining in western Cornwall by the 13th century. He saw the shift westwards of higher levels of tin coinage (and thus production) away from Cornwall's richest streamworkings and towards areas where tin remained largely in lodes in the preceding centuries as confirmation of fleeting documentary

hints. Archaeological evidence for early working of the lodes can now support that interpretation. Two lines of closely spaced lode-back pits on the eastern and southern slopes of Godolphin Hill (in Breage parish in west Cornwall) appear to have been dug before a lane was run from the Godolphin settlement to the common. This was most likely in the 13th century (Herring 1997, 179 and 297) and before a large deer park was established, probably by the 15th century and possibly by the 14th century respectively (Herring 1997, 293; Herring 2001, 17-21; Figs 13 and 14).

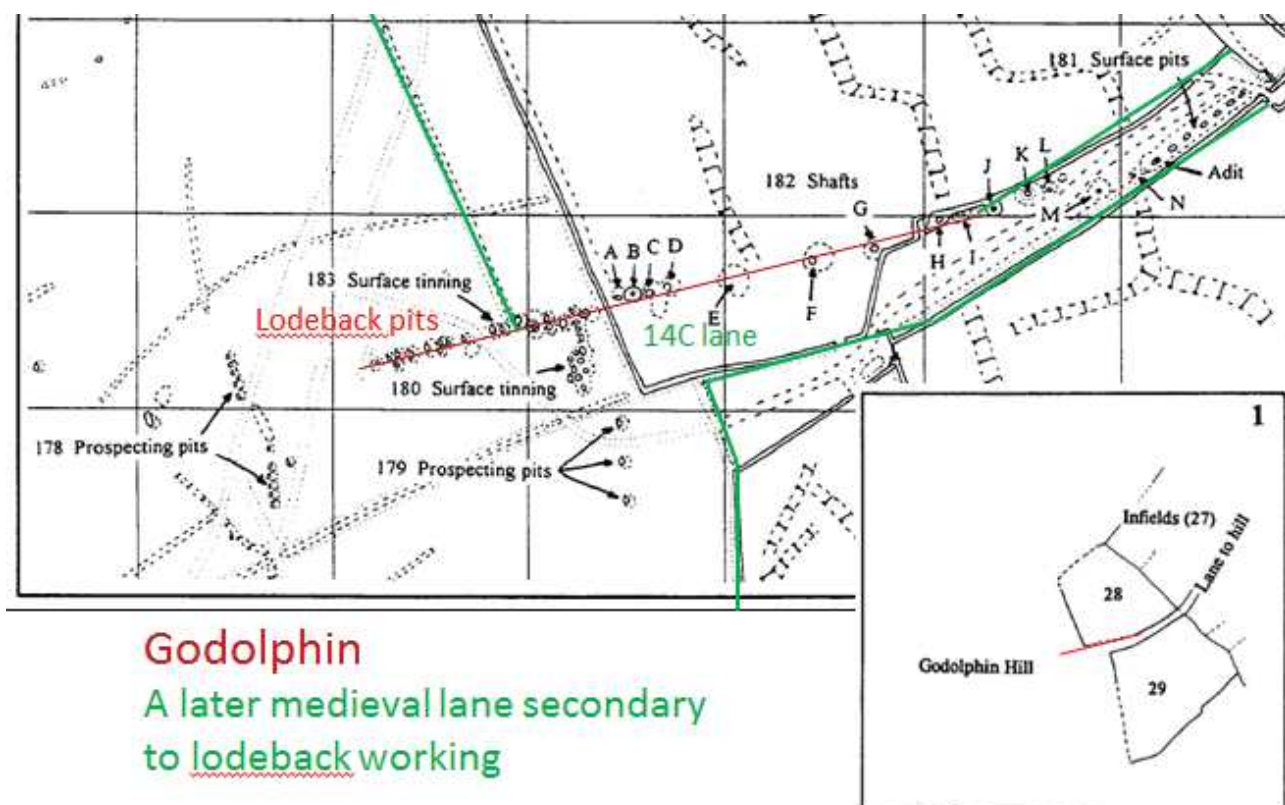


Figure 13 Analytical survey of a medieval lane from Godolphin house to the pastures on Godolphin Hill (left). Its sides were largely banks or built hedges, but in one stretch (shown in red) re-used a line of contiguous lode-back pits, indicating that lodes were being exploited here by the 13th century. (From Herring 1997, figs 55 and 97)

Godolphin is the place *par excellence* in Cornwall for illustrating the effect of the wealth created by tinning on later medieval, early post-medieval and early modern society. In the late 13th and early 14th centuries Alexander de Godolghan, named from the hamlet on poor farmland on the cold northern slopes of the granite hill now called Godolphin, began acquiring land around his ancestral home, land that was astutely selected as all of it seems to have borne rich tin lodes, at Sparnon, Trescowe, Herland, Carsluick and Nanjenkin, among other places. By the late 14th century the tin-based wealth of the family had increased to such an extent that a chapel was licenced at the 'manor' of Godolghan and in the 1470s mention is made of a former 'castle' there, probably a fortified house set within a large rectangular precinct (Herring 1997). In a few more decades the Godolghans were providing sheriffs for Cornwall, were being knighted and were acting directly for King Henry VIII in suppressing local uprisings. John Leland visiting at this time (the late 1530s) noted that there were 'no greater Tynne Workes yn al Cornwall than be on Sir Wylliam Godolcan's Ground'. By now the family were Members of Parliament, were

marrying into Cornwall's greatest families, and were being made Governors of Scilly.

Their wealth and influence continued to grow so that by the turn of the seventeenth century Sir Richard Carew in his *Survey of Cornwall* noted first the accomplished personal qualities of Sir Francis Godolphin and then, to give him, and them, context, stated that:

by his labours and inventions in tin matters, not only the whole country hath felt a general benefit, ...but her Majesty hath also received increase... by the same at least to the value of £10,000. Moreover, in those works which are of his own particular inheritance, he continually keepeth at work three hundred persons or thereabouts, and the yearly benefit that out of those his works accrueth to her Majesty amounteth, on a yearly average, to £1000 at the least, and sometimes to much more... not to be matched again by any of his sort and condition in the whole realm. (Carew 1602, 153r).

Godolphin's wealth was indeed phenomenal, with the proportion of his tin-based earnings paid as a form of tax, £1000 per annum, worth many millions of pounds today. Indeed, at around the same time,

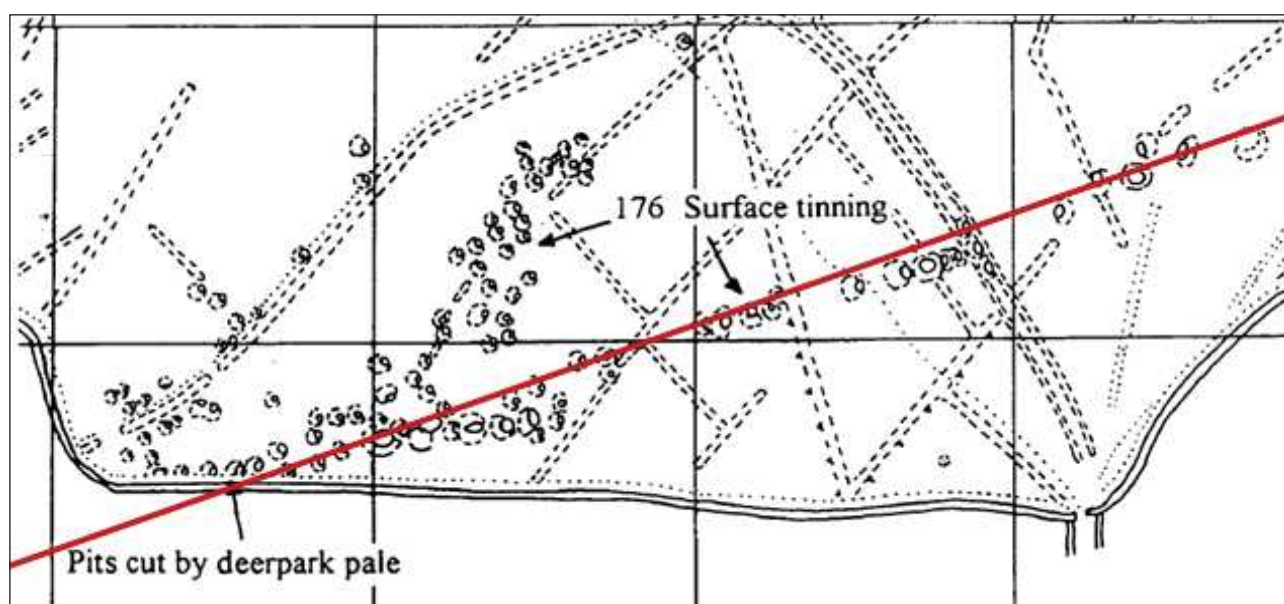


Figure 14 The deer park on Godolphin Hill was probably established by the 15th century and possibly by the 14th century. Its southern side clearly slices through lode-back workings, again indicating an early date. (From Herring 1997, fig 54)

John Norden stated that ‘Godolphyn Ball ... hath bene to Sir Francis and his auncestors manie yeares as a minte’ (1604, 33). Such resources enabled the invitation of continental mining experts to Godolphin and they contributed to substantial technological improvements in stamping (wet stamps) and smelting, at Godolphin mines, including Great Work, the ‘inventions in tin matters’ celebrated by Carew. These developments enabled the acceleration of capitalisation in tin mining at Godolphin and elsewhere in southwest Britain.

Godolphin continued to be a place of innovation for at least two more centuries, with Cornwall’s earliest recorded use of blasting to expedite the breaking of lode-bearing rock, in 1689, taking place on Godolphin Mines, possibly at Wheal Vor, and in the second decade of the 18th century the earliest use of a steam or ‘fire’ engine (a Newcomen engine) to pump water from a Cornish mine, again possibly at Wheal Vor (Earl 1968, 38; Barton 1969, 16). By the time these last two breakthroughs in the development of Cornish mining had taken place the Godolphins themselves had largely left the exquisitely beautiful and remarkably architecturally advanced house, regarded in 1649 as a ‘stately ancient palace’ (Taylor 1649, 19). It was by some way the largest house in Stuart Cornwall, if the numbers of hearths (49) recorded for the Hearth Tax in 1664 is a guide to its scale (Stoate 1981).

The younger, more dynamic, Godolphin-born spawn of the last Sir Francis Godolphin to reside

permanently at the family home, moved their affairs to London and by the turn of the 18th century, Sidney, the third child, (b.1645), was one of the most powerful politicians of his day. He had been appointed First Lord of the Treasury in 1684 by Charles II, and again in 1690 and 1700 by William III. He was then given the highest political position in the country, Lord High Treasurer, by Queen Anne in 1702. He remained in post for eight years. Sidney proved effective at raising state funds and then utilising them to consolidate Protestantism in Britain and contain France within Europe. He was closely involved in overseeing the 1707 Acts of Union that created the Kingdom of Great Britain and in 1706 was made the 1st Earl Godolphin (*ibid*). ‘Few ministers in English history have done so much to shape the future of their country’ (Sundstrom 2014). Sidney’s younger brother Henry later became Provost of Eton College (1695-1732) and the Dean of St Paul’s cathedral (1707-26) (Sundstrom 1997).

It was tin (and later copper) that had produced the transformative wealth that took the Godolphins from being a modest farming family to the highest positions in state within four centuries. They changed their name to one, Godolphin, that was first easier for the English to say and second allowed them to use the dolphin, symbol of swiftness and love, as their device. Their home, now owned by the National Trust, retains on the sides of its main square court four clearly distinguishable phases, the earliest from the 1470s, the last the 1630s, each of which was



Figure 15 The 1630s north front of Godolphin House, for long the largest and most sophisticated house in Cornwall, and home to its most influential family, all built upon the wealth drawn from tin working. (Photo: Peter Herring)

substantial, innovative and stylish, displaying status and taste, but also closeness to the pulse of British society (Herring 1997, 187-194; Fig. 15). The house partly overlies a large later medieval garden, one of the grandest to survive in Britain, and again a means of displaying status to influential visitors. Surrounding it was the large deer park whose creation was an appropriation of former common land (and thus an exercise in power) and involved the unabashed sterilisation and, perhaps, display to those who went hunting with the Godolphins, of two of the earliest tin lodes to be worked in Cornwall (above).

Other Cornish families benefitted from early tin wealth, some of them also ultimately derived from poor peasant households who took risks and received the rewards of success, though none quite so spectacularly as the Godolphins.

So tinworking affected the Cornish landscape by funding flowerings of ostentatious displays of the wealth gathered into the hands of tin lords, the grand houses, their deer parks and later their landscape parks, often, like Godolphin, and Tehidy immediately adjacent to the mines and the poorer homes of the miners. The Bassets' 14th century deer park deliberately, even callously, enclosed its mining area's dominant hill, Carn Brea, taking the former common grazing into private use and replacing cattle and sheep with beautiful, sporty but, from a peasant's perspective, useless fallow deer (Herring 2003, 39).

We can also consider how tinworking contributed to revolutionary economic and then social changes at the lower, peasant levels of medieval Cornish society that in turn transformed the form, fabric and



Figure 16 Tin working contributed to Cornwall's unusually diversified and commercialised medieval economy in which opportunities to thrive led to dismantlement of former communal ways of farming. At Boscastle Cornwall's last unenclosed strip field system, known as Forrabury Stitches (front right), lies within a more extensive pattern of former strip fields (e.g. beyond the town), enclosed piecemeal and then more systematically from the later medieval period onwards, turning a land of dispersed hamlets into one of dispersed and isolated farms (Photo: Peter Herring)

character of the two-thirds of Cornwall that make up its Anciently Enclosed Land. This transformation took place so long ago, half a millennium or more, that it is not closely documented in the records made for the state and the church, nor in the papers that survive from the manorial bureaucracies of estates, the sources that support most medieval histories of Cornwall. But the processes and their outcomes are still clearly visible in Cornwall's landscape and are recorded, analysed and interpreted by archaeologists.

In short, until the later 13th century, and from the Middle Bronze Age, Cornwall's rural settlements were hamlets, typically from two to half a dozen households, from round house groups through enclosed hamlets (the rounds) to the open hamlets that worked the small *tre*-estates in the early medieval period and the first centuries of the later medieval period. From the later 13th century these hamlets, and the communal and cooperative ways of organising land and work, sharing and minimising risk, and increasing and maintaining security, and the sociability and social pleasures that they supported (and upon which they depended) were increasingly replaced by single farmsteads (Herring 2006). Some of these were the result of amalgamation of holdings within a hamlet and then the shrinkage of the hamlet to a single household; the archaeological remains of such shrunken hamlets may be found across Cornwall,

with the earthworks of many lost homesteads still visible in orchards, mowhays and yards. Other single farmsteads were new creations, established either within the reorganised open strip fields of the former hamlet or beyond them, as farmers colonised that other important part of the formerly more communal world, the common.

The shift from hamlets to single farmsteads began a considerable time before the climatic disasters and then plagues of the early and middle decades of the 14th century that are often turned to as determiners of much later medieval change. Other causes for those 13th century changes identified in Cornwall must be sought and may be found in the consequences for communalism and cooperation of the rapid increase in commerce, driven in large part by tinning.

The arrangements visible in many hamlets suggest there may have been a tension between their constituent households. Archaeological surveys indicate that each household had its own property and kept it close; cows were housed in the same building as the people, in the lower end of the longhouse, and the household's hay, corn, fuel etc. was ricked

in the mowhay, usually placed on the far side of the longhouse when seen from the central communal townplace (Herring 2006). Each household had the potential to create more wealth, to have more cattle, and to grow, store and sell more goods. On the other hand, each household was also bound to the hamlet community. Each shared in the communal resources, whether land in the open fields and the common meadows and pastures, labour like herding, equipment like ploughs, infrastructure like wells, corn-dryers and bakehouses, and each shared in the risks. The consequence was that when a household was strong, its members healthy and capable, it may have felt held back by another that was less able to pull its weight.

Those working the land in later medieval Cornwall (and much of Devon) obtained it in ways that have been described as 'non-manorial' (Hatcher 1970a; 1970b). In contrast to middle England, land in Cornwall was largely held from its owner in return for money rather than labour. Farmers were therefore accustomed to taking their surpluses to the market to obtain the coin with which they paid their rent.

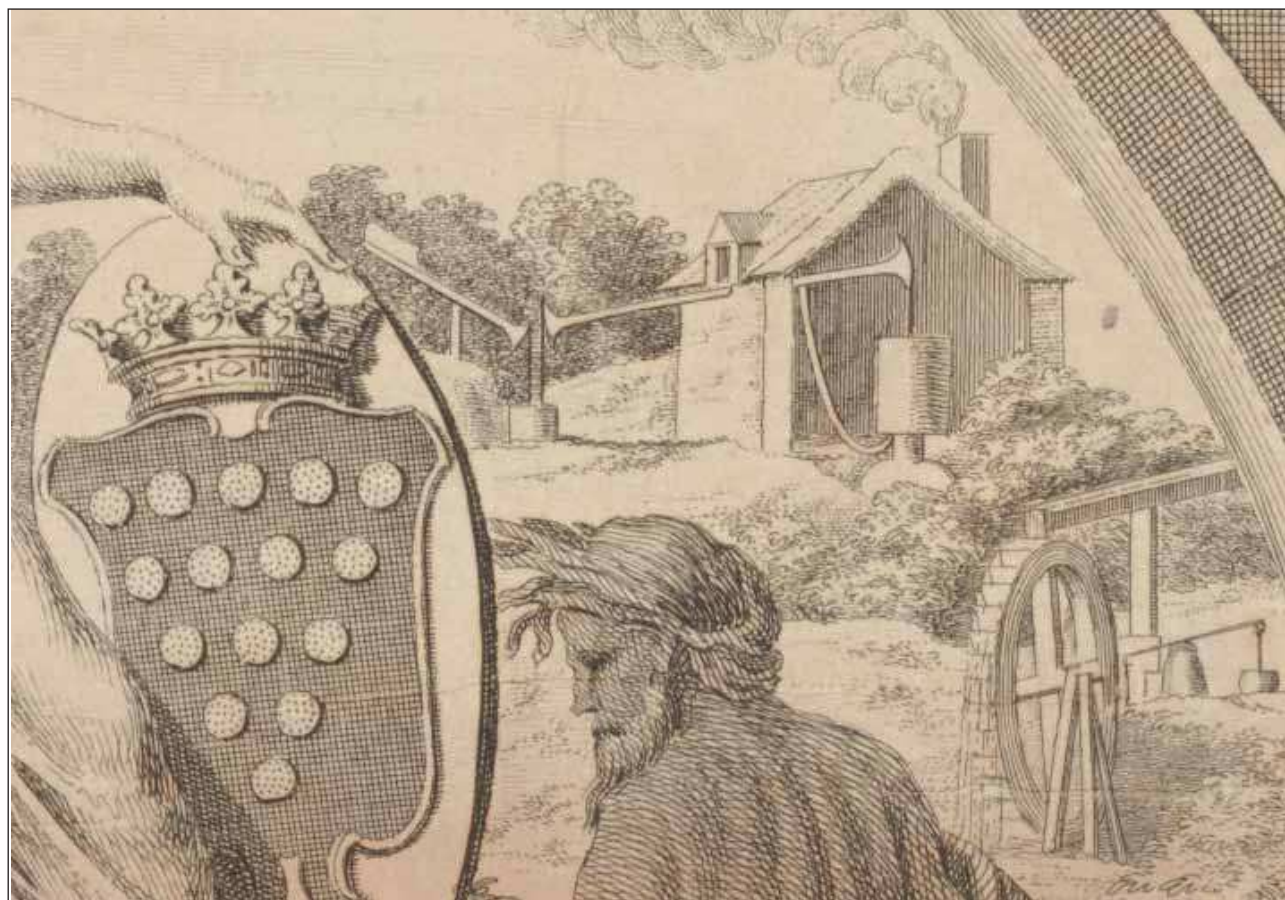


Figure 17 The cartouche of Thomas Martyn's map of Cornwall of 1748 displays Cornish mining scenes, including this very early image of a Newcomen steam engine pumping from a shaft. Note the external boiler and the balance bob. An earlier form of power, a waterwheel, is also shown. (Image: Harvard Map Collection, Harvard Library)



Figure 18 The Wheal Edward stamping engine's house, was part of the Wheal Owles mine in St Just at the time of a terrible disaster in 1893 when 20 men drowned as miners broke through to flooded older workings. (Photo: Peter Herring)

The introduction into this world of the fairly sudden ability to earn substantially more money, either through tinworking itself or through the victualing of the tinning workforce, may have been the factor that caused the breakdown of cooperation and the rise of individualism in hamlet after hamlet. Those stronger households such as that of Alexander de Godolphan, could have and probably would have seen their earning power become even greater relative to the hamlet's weaker households and can be expected to have been encouraged by the examples seen in other neighbouring hamlets, leading to the numerous local decisions that eventually ended the long history of hamlets in Cornwall.

Tinworking would therefore have contributed to the shaping of much of Cornwall's post-medieval and modern landscape: the hedging in of formerly open fields, whether just one or two strips or groups of them and the creation of a settlement pattern of dispersed farmsteads rather than one of dispersed hamlets (Fig. 16). Much of Cornwall may therefore be seen to be, to varying degrees, the outcome of tin working, if not a tin-working landscape.

Miners were enabled by their Charters (from that of King John onwards), to dig where they would (with surprisingly few exceptions – graveyards and private gardens), and the remains of their endeavours are seen throughout Cornwall. The following of lodes has left lines of overgrown spoil heaps that cut across the patterns of earlier fields, as at Rosemergy in Morvah, Gwedna in Breage, or Halabezack in Wendron, amongst many other examples. Others run out onto wild promontories, like Zennor Head (Johnson et al. 1995, *fig. 1*; Fig. 12), and up onto

upland commons like Bosiliack and Ding Dong in Madron (Buckley 2009, 107; 110). Open shafts could therefore be encountered in much of the central spine of Cornwall, with hedges or fences installed to prevent valued grazing animals from falling in as much as to safeguard people. (see Sharpe 2008, *fig. 47* for an impression of what such early shafts may have looked like, and how hazardous they would have been.)

The introduction of steam engines in the 18th century (Fig. 17) enabled mines to be sunk substantially deeper, as shown graphically by Thomas Pryce's 1778 section drawing of part of the Dolcoath complex where two fire engines drew water from 90 fathoms (540 feet, or 165m) below surface to the mid-depths from which subterranean waterwheels pumped it up to the lowest drainage adit (Pryce 1778, plate IV). Wheal Vor had already, in the early part of the century been pumped by its primitive Newcomen engine to around 60 fathoms (360 feet, 110m) deep through six lifts of ten fathoms each (Jenkin 1927, 99). James Watt's external steam condenser (introduced in 1765) improved engine efficiency and meant mines required less coal, making many more of them viable, so that by 1778 there were over 60 fire engines in Cornwall and Devon (mostly in Cornwall). Further improvements included those made in the first years of the 19th century by Camborne-born Richard Trevithick that enabled development of high pressure steam engines at roughly the same time that plunger pumps finally

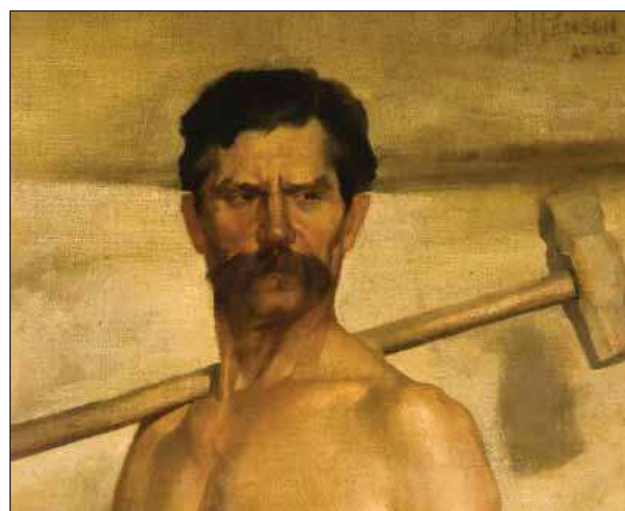


Figure 19 To be a successful miner involved considerable personal responsibility, strength and courage, all contributing to the heroic status of the miner, and all captured in this late Victorian painting, *Cornish Miner*, by Frederick Thomas Penson (1866-1951) (The Potteries Museum and Art Gallery)



Figure 20 The Pridacoombe valley on Bodmin Moor is one of many marginal areas of Cornwall transformed in the early modern period by the creation of new farms stimulated by the market for foodstuffs swollen by the thousands of industrial workers. Some holdings, like these, created in the 1830s, were occupied by miners, streamers and labourers. (Photo: Peter Herring)

replaced, in most but not all mines, the antiquated technology of rag-and-chain and bucket pumps (Barton 1969). Cornwall had often been several steps ahead of the ‘industrial revolution’, which swept much of the rest of Britain in the last quarter of the last millennium, but the technological improvements of the 18th and 19th centuries did enable even it to work its mines on different levels of production and depth so that by the later Victorian era nearly 3000 engine houses had been built in Cornwall. The main shaft at Dolcoath was then as deep as 550 fathoms, or 3300 feet, or one kilometre.

As noted, celebration of the profound effect of early modern Cornish mining technology on mining and society in Britain and around the world led to the inscription by ICOMOS in 2006 of the Cornwall and West Devon Mining Landscape World Heritage Site, a designation that has helped reinforce further the association of tin mining and Cornish (and West Devon) identity. Much effort has been taken since the 2006 inscription to draw out narratives of Cornish miners, emphasising how rewarding and dangerous their life was. Several horrific disasters have befallen Cornish miners below-ground (39 miners drowned in the East Wheal Rose lead mine in 1846, 20 more at Wheal Owles in 1893, and 31 fell to their deaths when the man-engine collapsed at Levant Mine in 1919), in addition to the much more numerous individual tragedies as men died by candlelight,

falling down shafts, being crushed by rock falls and caught by blastings. Others succumbed to diseases caused or exacerbated through mining or had their lives reduced by the effects of grindingly hard work, bad air and poor food. Another calamity to which mines were susceptible was that caused by changes in economic circumstances, from the high costs of materials that made late medieval mining difficult to the effects of fluctuations in global tin prices. Mines could be suddenly closed and communities thrown into turmoil as recently as the final decades of the 20th century (when Geevor (Fig. 1) and South Crofty mines were last closed). To work and survive underground required initiative, strength and skill; the risks (physical and economic) were so great that the tin miner was rightly transformed into a hero for the Cornish (Fig. 19).

Women and children also played vital roles in mining in Cornwall, and on Dartmoor, especially on the dressing floors. Their contributions, working conditions and lives are also being researched, enabling their history to be better understood, appreciated and celebrated. For example, Lynn Mayers (2008) has helped draw the ‘bal maiden’ from obscurity, bringing the lives of many child workers out of the darkness as she has done so.

The miner, the bal maiden and the boy or girl on the buddle or shaking table worked long days in poor conditions. When their shift was done most returned

to simple homes, many of them in the villages that old farms and hamlets had swollen into, some like the churchtown of St Just having become small mining towns. New hamlets had also been created, like Minions, and rows or terraces of cottages housing miners' families were built in corners of fields and on commons convenient for the local mine (Sharpe 1992, 26-7). Not all miners, or those who worked in the numerous ancillary industries, were poor. The successful and the professional families built substantial houses, villas, on the edges of towns and in the country beyond them.

The post-medieval and early modern Cornish landscape was altered not just by the 3000 engine houses and the thousands of other related structures, the dressing floors and the dumps, pack-horse ways, tramways and railways, the terraces and villages and the noises and the smells of mining and the other associated industries, but also by another later wave of effects on farming landscape. This was largely in the form of extensions to field patterns, whether by the creation on rough grazing land of new farms and new smallholdings or by established farms extending their fields on to the rough ground in order to grow a little more for the ready market for foodstuffs required to feed the mining and manufacturing people. Lords benefitted again. As they received their toll or cut of the mines' profits, so they also drew still more in the form of rent from their farmland, as exemplified by the plans and the successes of the Rodds of Trebartha in creating the parish of Boldventure (later Bolventor) in the heart of Bodmin Moor. Here the new units were mainly farms of around 30 acres, taken on terms of three lives, and mainly by the families of tin streamers and clay workers. William Jory took on Middle Pridacoombe at a rent of £2 per annum and was required by the Rev Edward Rodd to take in fields from the 'wastrel' and within 12 months to build a dwelling-house and a chall (cowhouse). By 1841 he had done that and also enclosed and improved 26 acres (Herring and Giles 2008, 143-6; Fig. 20).

The labouring communities of Cornwall welcomed and nurtured Methodism and other forms of nonconformist Christianity. They had been poorly served in the 18th and early 19th centuries by the established Anglican church, both in terms of the inadequacy of the churches that could not accommodate their swollen populations and congregations on Sundays and in the service provided to them by clergy who were often absent

or neglectful (Rowe 1993, 67.1-67.40). It should be noted that chapels and their congregations are found throughout Cornwall, not just in the mining areas (Lake et al. 2001). For example, the parish of North Petherwin, in the rural Culm Measures, had five chapels: two Wesleyan, two Bible Christian and one Free United Methodist. Most of the Cornish were affected by Methodism and the extent of their nonconformism reflects the connectedness of Cornwall's communities. Mining families were also often fishing, farming and quarrying families. Cornish people on meeting still enjoy establishing the various ways they may be related by blood, by friendship, by chapel, by work and by place. Much is and was shared, including ways of living and working that were hazardous and uncertain.

The emphasis in its teaching on taking personal responsibility and drawing reassurance from a shared faith in the face of danger and change, linked Methodism to a typically resourceful Dumnonian personal character that was reinforced by the unusual range of its uncertainties. In the end it may be this, coupled with the early commercialisation, or economic diversification of the Cornish, compared with much of the rest of Britain, that sets Cornwall and west Devon apart as a landscape that has been fundamentally affected by the ways people have responded to uncertainty and opportunity, including through industry. Methodism's importance now is its symbolisation of how the essence of being Cornish, and of being a tin worker, is and was living with and being open to uncertainty.

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