

The Fools' Goldrush: Forgotten aspects of the Alum & Copperas industry in Dorset and South-West Hampshire, c.1450-1618¹

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Abstract

A reappraisal of primary sources suggests that the copperas industry in Dorset and south-west Hampshire became well-established somewhat earlier than is commonly thought, and continued later and with steadier success than is generally appreciated. While there are lengthy accounts of the history of the Dorset works² and good ones of copperas production more generally, writers have historically tended to dwell on the spectacular financial losses of two particular rival courtly speculators, and have failed to note the geographical limits of the evidence arising from their disputes. Recent investigations have focussed on interesting but necessarily localised archaeological evidence, and have in some cases relied on auto-affirming circular arguments from secondary sources. Incorrect dating of primary sources, particularly among the State Papers, although usually noted to be approximate, appears to have seriously impeded the chronological analysis of the industry, while in one instance acceptance of a partisan contemporary source has exaggerated threefold the claimed value of the industry at one point in time, hinting mistakenly at a volatility simply not evident in other sources.³

¹ This article was accepted for publication in *Southern History* in 2015, and finally appeared in the 2018 issue towards the end of 2019 without the corrections that I had made to the edited proofs. I'm grateful to the journal's successive editors – Andrew Spicer, Carl Griffin, and Simon Sandall – for their helpful comments and suggestions.

² Although among other errors it conflates the mines at Boscombe and 'Alum Chine', and fails to recognise the industry's successes, the best of these is Robert Bell Turton, 'The Dorset Mines', in *The Alum Farm. Together with a history of the origin, development and eventual decline of the alum trade in North-East Yorkshire, etc.*, (Whitby: Horne & Son, 1938) ch.III pp.35-58.

³ Repeated exaggerations of the success of the industry include the statement that alum production began 'on a commercial scale' at Kimmeridge c.1605, while a lease said to have been valued at £1500 p.a. in 1585 was actually sold for £500 p.a. in 1588, not £1300. The works at Parkstone, said to have been the first to open in 1564, were in fact the fourth some four years later, and the brief and oft-cited account of the local industry by W. Hyde Price is incorrect in most respects. Rhys Jenkins, *The Collected Papers of Rhys Jenkins: Links in the history of engineering and technology from Tudor times*, (Cambridge: Newcomen Society, 1936); Charles Singer, *The earliest chemical industry: an essay in the historical relations of economics & technology illustrated from the alum trade*, (London: Folio Society, 1948); J.H. Bettley, 'A Fruitless Quest for Wealth: the Mining of Alum and Copperas in Dorset c. 1568-1617', *Southern History*, V, No.23 (2001), pp.1-9; Joan Thirsk, *Economic policy and projects: the development of a consumer society in early modern England*, (Oxford: Clarendon, 1978); W. Sheldrick, 'Poole and the birth of the chemical industry', *Dorset Life*, 329, No.39-43 (2006); Peter S. Bellamy, Gill Broadbent, Mark Corney, Alan Hawkins, Mike Trevarthen and Clare Wilson, 'Investigations at Kimmeridge Bay by the Dorset Alum and Copperas Industries Project', *Proceedings of the Dorset Natural History & Archaeological Society*, 135, (2014), pp.284-296; Peter S. Bellamy, Gill Broadbent, Mark Corney and Clare Wilson, 'Investigations on the Studland Circles by the Dorset Alum and Copperas Industries Project', *ibid.*, pp.297-310; Peter S. Bellamy, Gill Broadbent, Mark Corney and Clare Wilson, 'Investigations on the South Shore of Brownsea Island by the Dorset Alum and Copperas Industries Project', *Proceedings of the Dorset Natural History & Archaeological Society*, 135, (2014b), pp.272-283; T. G. Allen,

This article relates evidence that so-called 'alum' was collected and, more significantly, manufactured on the Hampshire coast in the fifteenth century, demonstrates early problems with the emerging system of monopolies, and identifies the locations of three copperas manufactories established in the district before 1565. The invaluable evidence collected from the Exchequer Port Books was greatly facilitated by a new document digitisation and transcription project.⁴

I. Introduction

The Wealden iron industry was already well-established by 1556, when Agricola's *De Re Metallica* was first published.⁵ This series of books gave detailed descriptions of methods for chemical processing and surveying for raw minerals, and may have stimulated English minds to the realisation that some of the techniques already employed in the iron industry might be applied to the domestic production of alum and copperas. These industries were both heavily dependent on the supply of fuel, as was salt-making with the introduction of new techniques in Hampshire that called for the import of specialist evaporation equipment in 1564, and together these industries contributed to the energy crisis that drove the development of the coal industry and the supply of coal by coastal shipping.⁶ It is not necessary to reproduce here the excellent work of Allen, Cotterill, and Pike in relating the European historical context of the alum and copperas industry, but their primary focus on archaeological aspects of the copperas works at Whitstable tends to distract attention from the pre-eminence in Hampshire and Dorset of 'the first industrial-scale chemical production in England'.

Following discussion by Parliament in December 1566, Royal Assent was granted for an Act confirming and extending two patents previously granted by Queen Elizabeth for promotion of the domestic production of alum and copperas, both used, principally, as dye fixatives in the important English cloth manufactories. The preamble to the Act includes the curious statement that production 'hath bin ofte attempted in tymes of hir moost noble Progenytors', curious because the literature is virtually silent as to any such attempts, successful or otherwise.

Michael S. Cotterill and Geoffrey Pike, *Copperas : an account of the Whitstable Works and the first industrial-scale chemical production in England*, (Canterbury: Canterbury Archaeological Trust, 2004); Claire Cross, *The puritan Earl: the life of Henry Hastings, third Earl of Huntingdon 1536-1595*, (London: Macmillan, 1966), 94; TNA, C 2/JasI/W19/17 *Waterhous v Crewe: accounts of royalties and rents in respect of alum works in Canford and Christchurch*, 29 Oct 1608 x 28 Jan 1609; William Hyde Price, *Harvard economic studies: The English patents of monopoly*, (London: 1906), 82.

⁴ 'Portfolio' – the Exchequer Port Book Project – was created by the author in connection with his PhD research, and is hosted online by Winchester University at <http://portfolio.winchester.ac.uk>.

⁵ Jeremy Hodgkinson, 'Iron: a once-great Wealden industry', *High Weald Anvil*, (2002), pp.6-7; Georgius Agricola, *De re metallica*, (Basel: 1556).

⁶ Jeremy Greenwood, 'The Changing Technology of Post-Medieval Salt Production in Hampshire', *Hampshire Studies: Proceedings of the Hampshire Field Club and Archaeological Society*, 67, No.Part II (2012), pp.366-378, 368; John U. Nef, 'An Early Energy Crisis and Its Consequences', *Scientific American*, 237, No.5 (1977), pp.140-151.

The best-known evidence is a fleeting 1346 reference to 'alym de Wyghte', proscribed by the Dyers' Company of Bristol on account of its inferiority to foreign alum, but clues are also to be found among the extant medieval accounts of the two manors where copperas works are known to have operated after 1564, the manors of Canford in Dorset and of Westover⁷ in Hampshire, both of which at times escheated to the Crown with happy consequences for the survival of their records. Given the remoteness of its location, the *zabulum* licensed for collection at Durnelynchedclyffe in the manor of Canford in 1374 cannot reasonably have been ordinary coarse sand or gravel, much more readily acquired elsewhere: it was more likely used as a term encompassing various minerals, including the one specified by a licence recorded in 1462 for the collection of '*Alymen per costeram maris apud Durnelynchedclyffe*'.^{8,9}

Similarly, a 2s annual rent was paid to the bailiff of Westover '*per Alym[en] per coster[am] maris*' in 1419, but this had lapsed by 1438.¹⁰ A gap in the survival of the records prevents the dating of the most intriguing licence, recorded only as a 10s decayed rent in 1487 '*per licencia hend' ad faciend' et lucrand' alumen et al[ius] uni[ver]sus profic[ua] ut in foed[era]... infra totus litus maris infra hundr[edu]m de Westoure*'.¹¹ The particular interest here is that the licence was granted to John Cobbe, who in 1444 had been granted a Crown licence to practise alchemy, and that the licence was not only to profit from the *alumen* but also first to make it. The chemical processes required were well-known in the ancient world, and were among the secrets of medieval alchemists such as Cobbe.

Alumen was not a word used simply to denote what we know today as alum. The idea expressed by King Alfonso the Wise (1223-84) that the word derives from the substance's ability to make dyed colours more luminous is at odds with the fact that the most commonly occurring form of *alumen* is melanterite, which fixes only black dyes, and whose name is derived from *μελαντηρία*, meaning 'black pigment'. Indeed, some twelve centuries earlier, Pliny the Elder (A.D.23-A.D.79)

⁷ It is almost anachronistic to refer to the district as Westover: historically it took its name, 'West Stour' (normally written as 'Westesture' or 'Westoure'), from the part of the river which bordered and ran through it, and the first known reference to 'Westover alias Westower' is the grant at WSHC, 2667/2/1187 *Crown grant including the manors of Ringwood and Christchurch*, 22 Jun 1554. The 'East Stour', from the Christchurch supermanorial perspective, was the part of the river which flowed through the harbour with the Avon. The manor was usually referred to as 'Westower' or 'West Stour' at least as late as 1805.

⁸ Translation: 'Alumen by the sea coast at Durnelynchedclyffe'. The location is discussed in Stephen Gadd, 'Durnelynche: The Coastal Migration of the Hampshire-Dorset County Boundary', *Proceedings of the Dorset Natural History and Archaeological Society*, 137, (2016), pp.57-64.

⁹ TNA, SC 6/831/2 *Ministers' and Receivers' Accounts: Canford*, 1374-1375; Charlton Thomas Lewis and Charles Short, *A Latin dictionary founded on Andrews' edition of Freund's Latin dictionary*, (Oxford: Clarendon Press, 1879); TNA, SC 6/831/3 *Ministers' and Receivers' Accounts: Canford*, 1462-1464.

¹⁰ TNA, SC 6/978/21 *Ministers' and Receivers' Accounts: Christchurch: Reeve*, 1418-1420; TNA, SC 6/978/23 *Ministers' and Receivers' Accounts: Christchurch: Reeve*, 1437-1439.

¹¹ Translation: 'for a licence taken to make and work alumen and all other profits according to the indenture ... within the entire seashore of the hundred of Westover'. The terms are recited in the lists of decayed rents for several subsequent decades, but with cumulative distortions: TNA, SC 6/HENVII/673 *Ministers' and Receivers' Accounts: Christchurch, Ringwood, Warblington, Hunton Salisbury lands*, 1486-1488.

distinguished between white and black forms of *alumen*, the latter being used to give wool a brown or dark (*fuscis aut obscuris*) tint, and so the word *alumen* was clearly at that time used to denote a variety of different chemicals.¹² Charles Singer noted that the early medieval Latin language lacked an adequate technical vocabulary, and that the translators of scientific manuals often merely transliterated words from their original Arabic or Hebrew forms.¹³ This linguistic process may be evident as early as Pliny's time, for one of the principal sources of a white alum in antiquity was Yemen, the country whose name in Arabic (اليمن) is phonetically identical to the Latin word *alumen*, /ə'l(j)u:mən/.¹⁴

The mineral deposits found to this day on the coast of Dorset and south-west Hampshire include both ferrous sulphide (iron pyrites, or fools' gold) and its greenish oxidised form, ferrous sulphate (melanterite).¹⁵ True alum, a complex sulphate of both aluminium and iron, is not usually found naturally in Britain, where crystalline 'roche alum' was precipitated from ferrous sulphide in so-called roaching houses, using ammonia (from stale urine) and great quantities of heat.¹⁶ By a less demanding process, but still requiring copious amounts of fuel, artificial melanterite was also made from ferrous sulphide, the product being known as copperas. Alum, copperas, and the raw minerals used to produce them were referred to collectively and quite consistently as *alumen*, and it was only long after production had ceased that one of the coastal valleys near Bournemouth acquired the name Alum Chine.¹⁷ A problem exists, then, in published translations of Latin documents, where *alumen* is invariably rendered as 'alum', despite the distinction apparently drawn between alum and copperas in contemporary English minds.

The same manorial accounts for Westover which record Cobbe's licence to make *alumen* also record the loss of as much as 173½ acres of hilly land to coastal erosion during the late fourteenth and early fifteenth century. The loss is apparent through the decayed rents of numerous smallholdings recorded to have been wasted by the sea, or now *extra littus maris*,¹⁸ almost certainly in the hilly eastern part of the manor close to the medieval settlements of Wick, Tuckton, and Pokesdown, ranging towards modern-day Boscombe. Evenly distributed across this stretch of

¹² C. Singer, (London: Folio Society, 1948), 63-64; Oxford English Dictionary: *melanterite*, n. Oxford University Press <<http://www.oed.com/view/Entry/74829>>; Pliny the Elder, *Naturalis Historia*, (Leipzig: Teubner, 1906), XXXV,52.

¹³ C. Singer, (London: Folio Society, 1948), 52.

¹⁴ The observation of the phonetic coincidence is the author's own, and is not corroborated by the OED; the word in Arabic means "the righthand region", from the traditional perspective of an observer in central Arabia facing the rising sun. TNA, E 190/900/5 Poole: *Customer Overseas*, 1709; Oxford English Dictionary: "alumen, n.". (2014). Retrieved 20 Nov 2014, from <http://www.oed.com/view/Entry/328183>; 'al-SHAM ', in P. Bearman, Th. Bianquis, C.E. Bosworth, E. van Donzel and W.P. Heinrichs, eds., *Encyclopaedia of Islam*, Brill, IX:261b.

¹⁵ I acknowledge with gratitude the geological advice of Dr Ian West, whose extensive research of this coast is published in part at <http://www.southampton.ac.uk/~imw/bourne.htm>.

¹⁶ The chemistry of both alum and copperas production is clearly described in T.G. Allen, M.S. Cotterill and G. Pike, (Canterbury: Canterbury Archaeological Trust, 2004), 26-28.

¹⁷ This valley is not the one known in the sixteenth century as Alaman Chine: S. Gadd.

¹⁸ Translation: 'beyond the sea shore'.

coast, the cliff recession would have amounted to a very significant 180 linear metres. Considerably more land might have been lost from the heathland further west, where no rent-yielding enclosures existed at that time, and the cliff-falls are likely to have exposed deposits of iron pyrites, the presence of which is yet evident through chalybeate springs (resulting from the oxidation of iron pyrites) leaking from the now-stabilised cliffs to the east of Boscombe. Further east at Hengistbury Head, iron sulphates might well account for it being noted early in the seventeenth century that 'There is a marshy ground, parcel of this sheep pasture, which will re[s]tou[re] sheep that have been before infected with the water Coath, and this hath been proven by trial'.¹⁹ The extensive cliff erosion might account for the absence of any physical evidence of Cobbe's activity, while the guarded secrecy of alchemical methods would have made any documentary record improbable.

The papal monopoly on imported *alumen* after April 1465, with resultant rising prices, rather than inhibiting the English domestic production of *alumen* was more likely to have stimulated it: Pope Paul II's edict was directed only against the infidel producers and merchants.²⁰ Of greater consequence to domestic producers should perhaps have been the 11-year monopoly imposed by the English King Henry VI himself, by virtue of which no 'allome soyle' – of any 'kynde or condition' – could be traded within the realm between 31 May 1451 and 24 June 1462, except that brought to Southampton by the merchants of Genoa.²¹ Whether this actually had any effect on domestic production is debatable, as the suppression of such would surely have been an unintended consequence: the licence noted above in the Canford manorial accounts for collection of *alumen* for the year following Michaelmas 1462 could be showing either an immediate recovery or maintenance of a *status quo*. In any case, the continuing availability and superior quality of foreign *alumen*, at a price moderated somewhat by the gradual disintegration of the papal monopoly, appears to have suppressed domestic production until 1562.²²

II. The Elizabethan Alum & Copperas Monopolies

Richard Worsley reported in 1781 that at Alum Bay, on the north-west side of the Isle of Wight (and facing across the water the manor of Westover), 'copperas-stones are found on the coast, in

¹⁹ Iron sulphates are used in modern treatments for foot-rot in sheep. Coath: 'In Dorsetshire it is in common use, but it is used of sheep only: a *coathed* sheep is a *rotten* sheep; to *coath* is to *take the rot*'. MHA, 324/3 *A survey of the several Manors of Christchurch*, 1630 x 1635, f.38; William Crowe, *Lewesdon Hill*, (London: John Murray, 1827), 43.

²⁰ The edict is recited in C. Singer, (London: Folio Society, 1948), 145.

²¹ Thomas Astle, Rev John Topham and Rev Dr John Strachey, eds., *Rotuli Parliamentorum, ut et petitiones et placita in Parlamento: 18 Hen VI - 8 Edw IV*, v.5 (London: s.n., 1767-77), 216.

²² Following a notable breach of the monopoly by an English merchant in 1505, the papal grip on the English alum trade continued to slip, with cargoes of alum from Central Europe and the Orient coming especially to England. Efforts to hold on to the English trade saw the price at Civitavecchia of a hundred pounds of alum fall from three ducats to less than half a ducat by 1506, and later to about a third of a ducat. The papal monopoly was effectively over by 1517, when Indulgences could be purchased, and the profits of the Tolfa works declined. Nevertheless, papal interest remained, and threats of excommunication for the import of Turkish alum continued elsewhere in Europe long after the English Reformation. C. Singer, (London: Folio Society, 1948), 159-160.

such abundance, and of so good a quality, that vessels are often freighted with them for London'.²³ This location was likely to have been the source of the 'alym de Wyght' noted in 1346, but the few surviving manorial accounts for the period are unfortunately silent on the matter. Worsley also provided a transcription of an order dated 7 March 1561/2 from William Cecil to the Captain of the Isle of Wight, commanding him to assist 'One Bendall [sic]' in the 'Trial and Profe' of 'certen Oure of Alume' that the Queen had been informed was to be found on the island.²⁴

William Kendall's apparent early success in converting the ore into 'alum' is recorded in the patent granted to him on the last day of December 1562, allowing him a monopoly on production of 'alum' in Cornwall, Devon, Somerset, Dorset, Hampshire, Sussex and Surrey:

... William Kendall of launceston in the Countie of Cornewall gentleman to his greate travile and charges hathe founde out in sundrye partes of this oure Realme c[er]tayne Alume Ower in greate habundance and plentye and by longe studie and practise hathe devised the Waye and feate to make thereof good and pfecte Alume to the greate comoditie of us and this oure Realme ...²⁵

The patent also elucidates the reason for the new interest in a domestic supply:

... oure good and lovinge Subiects whoe by reason that all the Allume Whiche they in tymes paste have had and used hathe come frome beyonde the Seas have bene driven and yet are to buy the same at vearye greate and excessive prices ...

The reality or extent of Kendall's success has to be questioned, though, because just eighteen months later, on 3 July 1564, another, apparently incompatible monopoly was granted:

... Whereas Cornelius de Vos of london marchaunte and our liege made Subiecte hathe founde sondrie mynes and owres of Allome Coperas and other mineralls within c[er]tayne parts of this our Realme of England and dominions of the same and specially Within our Isle of Wighte in the County of Southr Whiche he entendeth at his owne proper costs and charges to Worke and trye out to the benefitt of us our Realme and Subiects ...²⁶

Failure to exercise a monopolistic privilege could lead to its forfeit, as was later discovered by the Earl of Northumberland, who in 1568 unsuccessfully challenged other mineral patents on the

²³ Richard Worsley, *The history of the Isle of Wight*, (London: printed by A. Hamilton; and sold by R. Dodsley, T. Cadell, G. Robinson, R. Faulder, and G. Nicol: Collins and Co. Salisbury; and Burdon, at Winchester, 1781), 273.

²⁴ TNA, E 190/906/11 *Weymouth: Customer and Controller Coastal*, 1715; TNA, E 190/906/10 *Lyme: Controller Overseas*, 1715; TNA, E 190/906/12 *Lyme: Searcher Overseas*, 1715; R. Worsley, (London: printed by A. Hamilton; and sold by R. Dodsley, T. Cadell, G. Robinson, R. Faulder, and G. Nicol: Collins and Co. Salisbury; and Burdon, at Winchester, 1781), xvi.

²⁵ TNA, C 66/987 *Patent granting to William Kendall, of Launceston, in Cornwall, the sole privilege of making alum*, 1563. A William Kendall of Launceston had been dealing with a Crown lease of a Welsh iron mine some 20 years earlier: TNA, E 190/905/2 *Weymouth: Customer Overseas*, 1714.

²⁶ TNA, E 190/903/9 *Lyme: Customer Overseas*, 1712.

ground that they were among the Royalties granted to his predecessors.²⁷ The confirmation of Kendall's patent in 1566 (see below) rather than its forfeit hints at some other reason for his usurpation, which was perhaps achieved by slander. The patent granted to de Vos stipulated, uniquely among the patents examined, that the ores should be digged for 'without fraude', and on 3 April 1568 Kendall wrote to Cecil 'in feare of your honor by ungodly Informa[̄]con', citing the 'trouble & wrongfull vexa[̄]con that I have had sence the comencement of my enterprize', and seeking Cecil's intervention with the Captain of the Isle of Wight to allow Kendall to continue. By this time, Cecil had relinquished a financial interest he had taken in the other monopoly, but no further record has been found of Kendall's activity.²⁸

The naïve novelty of the monopoly system is highlighted by the apparently unanticipated consequences of a contract made between the Queen and Cornelius de Vos. Although his monopoly was to run for 21 years, it was considered important that de Vos should get to work immediately with the production of alum and copperas, and so he was bound by a separate indenture, of the same date as the patent (3 July 1564), to open the mines within one year. There followed, as a result, what de Vos must have hoped would be a frenetic year of activity, during which time Italian workers were employed to assist in setting up the mineral works, until it was found that they were even less productive than the locals that they had been brought in to replace, at a cost of £300. They might have been sought out for their experience in and knowledge of the Papal alum works, so given that they demonstrated 'no skill att all in the same but suche as theie had learnd and gotten bie our englisshemenn', their allegiance has to be questioned. At the end of this year, de Vos's mineral-prospecting talents became redundant, and no further alum or copperas mines could be opened anywhere in the Realm for the next twenty years. This may explain why de Vos had sold his licence before 13 July 1565 and turned his attention to the neighbouring kingdom of Scotland, where he was to remain for many years.²⁹

On receiving his patent in 1564, and probably due to Kendall's continuing activity on the Isle of Wight, de Vos had turned his attention to the mainland, and in particular to the manors of Corfe, Canford and Westover, probably with prior knowledge that alum had been sought in the latter two manors during the reigns of the Queen's 'moost noble Progenytors', as is evidenced by the

²⁷ John Pettus, *Fodinae regales : or the history, laws and places of the chief mines and mineral works in England, Wales and the English Pale in Ireland*, (London: printed by H.L. and R.B. for T. Basset, 1670).

²⁸ No indication is given of the origin of the four tons of green copperas exported to Rouen by a Southampton merchant in a boat belonging to the Isle of Wight in December 1578. British Library, hereafter BL, Lansdowne MS 11 *BL Lansdowne MS 11 3 Apr 1568*, 3 Apr 1568, f. 17; TNA, E 190/903/11 *Weymouth: Customer and Controller Coastal*, 1711; TNA, E 190/902/10 *Weymouth: Controller Overseas*, 1711; TNA, E 190/815/7 *Southampton: Searcher Overseas outwards*, 29 Sep 1578 - 29 Sep 1579, f.3v.

²⁹ The indenture is recited in what is apparently an unexecuted draft contract for the sale by de Vos of an interest in his monopoly to Sir William Cecil, dated June 1565. De Vos must have sold his monopoly to James, lord Mountjoy, very soon afterwards, for Cecil purchased his interest not from de Vos but from Mountjoy, on 13 July 1565: TNA, E 190/903/11; TNA, E 190/902/10; TNA, SP 15/13 *Petition of James Lord Mountjoy to the Queen; Treatise by Lord Mountjoy, in answer to certain calumnies*, 1568-1580, f. 96.

medieval manorial accounts. His patent stipulated that he could operate nowhere without the landowners' consent, and his dealings with James, lord Mountjoy, who owned the manor of Canford, are well-known, it being to Mountjoy that de Vos sold his licence before 13 July 1565. Most of the surviving documentary evidence for the industry concerns only the manor of Canford, where Mountjoy had a freehold interest in the land: elsewhere, the mines only operated under licence from him. Any transactions by de Vos or Mountjoy concerning the manor of Westover are obscure, and any profits arising from the mineworks there are not conspicuous in any surviving manorial accounts. At this time, Westover was held by Katharine, dowager Countess of Huntingdon, but the manor was from 1562 leased by her to her son, Henry, third Earl of Huntingdon. There was certainly opportunity between July 1564 and 1 December that year, when the lease was cancelled, for mineworks in Westover and Huntingdon's fascination with them to have been established, but he did not regain control of Westover until after his mother's death on 23 Sep 1576. A theory that he purchased from his mother the freehold of the Westover mineworks is supported by their absence from manorial accounts and surveys, the modest valuation of the manor on the Countess's death, and by the lack of any other known origin for the freehold estate at Boscombe which existed before 1712. Huntingdon's tortuous acquisition of Mountjoy's interest in the manor and mines of Canford, beginning as early as 1570 but not completed until 1586, is quite thoroughly documented elsewhere, but Huntingdon's early interest in the Westover mineworks and the possibility that this seeded his desire to acquire Mountjoy's mines have not been noted. A valuable freehold interest in the district, distinct from that of his mother, might account for what is thought to have been Huntingdon's promotion of the parliamentary representation of Christchurch, recorded for the first time in 1571.³⁰

Mountjoy must have realised the limitations of the licence when he bought it in 1565, but equally must have already planned to seek powers to open new mineworks. It is a curious and significant fact that he sought these powers not from the Queen herself under the Crown patent scheme, newly tried, tested, and in his own experience found wanting, but from Parliament. Parliament had been prorogued on 10 April 1563 and was to have reassembled in October that year, but this was repeatedly postponed until September 1566. Within a month, on 5 October, Mountjoy

³⁰ Westover was apparently not of *particular* interest to Huntingdon in 1562, for the lease included *all* of his mother's real estate. HLC, mssHA HAMsc/10/7 *Receiver's Accounts; 3rd Earl of Huntingdon*, 1560-1576; HLC, mssHA HAMsc/10/8 *Receiver's Accounts; 3rd Earl of Huntingdon*, 1560-1576; HLC, mssHA HPP/11/9 *Indenture of covenante betwene my oulde Ladie and my Lorde*, 5 Oct 1562; C. Cross, (London: Macmillan, 1966), 333; HLC, mssHA HAP/OS3 *Grant of livery, with schedule, of lands of dowager Countess to her son, Henry, Earl of Huntingdon*, 30 Jun 1578; MHA, 324/3; TNA, C 142/183/58 *Inquisition Post Mortem: Katharine, Countess of Huntingdon*, 20 Dec 1577; NRO, BRA 1118/53 *Schedule of deeds concerning Boscombe Estate, 1712-1836*, 1712-1839; R.C. G., 'Christchurch', in P. W. Hasler, ed., *The History of Parliament: the House of Commons 1558-1603*, (London: HMSO, 1981); Henry A. Merewether and Archibald John Stephens, *The history of the boroughs and municipal corporations of the United Kingdom*, v.II (London: Stevens and Sons, S. Sweet, and A. Maxwell, 1835), 1305.

shipped from Poole to London about 1½ tons of copperas (the first surviving record of such),³¹ as if to prepare the way for the presentation of his Bill on 29 October. In the discussion which followed, Kendall's pre-existing monopoly was overlooked until the final stages, but was protected in the Act which passed into law on 31 December 1566. Mountjoy's monopoly was to operate for 21 years from 1 April 1567.³²

... where also aswell great quantitie of Owers apte for the purpose aforesayd, as also such necessities as must be occuppyed in bringing to p̄feccon of the woorkes aforesayd, are founde moost aboundantlye wthin the Groundes of hir Highnes humble Subjecte James Lord Mountjoye, by meane whereof and of suche Devyse and Travayle as the sayd Lord Mountjoye hath therein used, he hath growen to such knowledge and p̄feccon of the sayd Woorkes as heretofore hath not ben atteyned unto by any wthin her Ma^{ties} Realme; And for that, that the sayd Cornelius de Vos was otherwise of no sufficyent welthe and habilitie to bring the sayd Owers to suche effect and perfeccyon as was requysite, and lest the sayd Enterpryse shoulde be as heretofore againe gevin over and forsaken, the said Lord Mountjoye hath to his great chardges fyrst by composicyon wth the sayd Cornelius atteyned the interest of the sayd Letters Pattent; And also sins wth his greate Coosts Trayvaile and Diligence caused to be made good and p̄fect Coperas, in suche sorte as he is yearely able to serve this Realme wth a very great quantitie of Coperas at more reasonable Pryses then the lyke is nowe browht into this Realme out of the p̄tes of beyonde the Seas and in good Hope to have lyke Successe in woorking of Allome w^{ch} is a verie necessarye cōmoditie for the use of Draperye ...³³

The Act also preserved the terms of the indenture by which de Vos granted a tithe of the mines' produce to the Crown, but as this indenture was bound to the original patent, it continued to be limited to the produce of the mines opened within a year of the patent's grant, and the chance of avoiding a Crown tithe on the produce of any new mineworks might have been the chief reason for Mountjoy to seek a Parliamentary monopoly. He later complained that the unexpected delay to the confirmation of his monopoly had resulted in the loss of the main season's work and profit in the mines. He also claimed that his intent had been to sell the mines as soon as the monopoly was confirmed, but the delay obliged him to mortgage lands and thus become embroiled in spiralling debt. However, the speed with which new works were set up within six months at

³¹ An earlier entry, in September 1565, recording the shipment from Poole of about a quarter of a ton of copperas did not mention Mountjoy, and the copperas cannot with any certainty be said to have originated in the district: TNA, E 190/817/11 *Southampton: Customer and Controller Coastal*, 1590, f.3v.

³² '2nd Parliament of Queen Elizabeth I', in P. W. Hasler, ed., *The History of Parliament: the House of Commons 1558-1603*, Boydell and Brewer, 1981); *Journal of the House of Commons: 1547-1629*, v.1 (1802), 75-76,79; TNA, E 190/818/3 *Southampton: Surveyor Coastal*, 1593, f.1r.

³³ *The Statutes of the Realm*, v.4 (London: Great Britain Record Commission, 1810), 522-523.

Ockman's House, near Parkstone, in trust for Mountjoy's wife and children, belies his stated exit strategy.³⁴

Notwithstanding the optimism expressed in the Act concerning Mountjoy's chances of success, before the Act came into force Cecil leased back to Mountjoy, free of any rent charges, the tenth-share in the enterprise that he had purchased a year earlier. While this appears at first to have been a magnanimous gesture, its significance is really that it absolved Cecil of any liability for the future costs of the enterprise, and demonstrates a lack of confidence in Mountjoy's ability to make a success of it. There is no evidence in the Exchequer Port Books to support the boast made in 1571 that 'alum' was then 'made better and cheaper in England than in Spain', though it was probably true of copperas, and Mountjoy himself acknowledged in April 1572 that despite having assigned two of his manufactories to the task, there remained doubts that he could produce significant quantities of alum, and Italian merchants continued to trade in alum at Southampton. No alum is recorded in the Customs Account Rolls examined below, only copperas, but the Exchequer Port Books do suggest that alum was successfully and steadily, if not profitably, produced between 1575 and 1601.³⁵

One last hint of attempts made to manufacture alum in the time of Elizabeth's 'moost noble Progenytors' came (probably) in 1572:

And the want of due considera^on of all these 3 is by diligent practise and observation I am fully persuaded hath bene the onely cause that those which have attempted the bringing to perfection of those owers hath with discouragement and error *as well many yeres since* as now also of late dayes given up their enterprise. The which 3 matters to be considered or known are theise. The perfectt knowlage of chusing the owers, secondly of seasoning them, & thirdly also of congeling.³⁶

These 'hints' from Lord Mountjoy are filed together with a document relating to the foundation of the 'Society of the new Art' dated March 1572, but the recital of these skills and the mention of

³⁴ In his complaint, Mountjoy referred cryptically to some experimentation which he hoped would render the mines extremely valuable. This gives a likely date for the complaint as 1571, when efforts were being made to transmute iron to copper. TNA, SP 15/13, f. 96; TNA, SP12 86 *Letter: William Meadley to Burghley*, 19 Apr 1572, f. 33; TNA, SP 13/H/20 *Examination of George Carleton and John Hastings, on behalf of William Lord Mountjoy*, Jun 1582; HLC, mssHA HAD/2366 *Lease of alum house near Poole; James Blount, Lord Mountjoy, to John Hastings & George Carleton*, 20 Feb 1567/8.

³⁵ TNA, E 190/902/10; TNA, E 190/818/13 *Southampton: Searcher Overseas*, 1600, f.2r; TNA, E 190/819/1 *Southampton: Searcher Overseas: imported wines*, 1601, f.1r; TNA, E 190/819/12 *Southampton: Collector of New Impositions Overseas*, 1611, f.1v; TNA, E 190/820/8 *Portsmouth: Customer Overseas*, 1615, ff.5r,5v; TNA, E 190/820/13 *Portsmouth: Collector of New Impositions Overseas*, 1616, f.1v; Mary Anne Everett Green, ed., *Calendar of State Papers Domestic: Elizabeth, Addenda 1566-79*, (1871), 344; TNA, SP 12/86 *Letter: Lord Mountjoy to Leicester and Burghley*, 28 Apr 1572, f. 144; TNA, E 190/814/9 *Exchequer Port Book: Southampton: Searcher Overseas and Coastal*, 1573, f.2r.

³⁶ 'Congeling' is apparently another term for 'roaching', discussed above: BL, Lansdowne MS 13 *Lord Mountjoy: Some imperfect hints for making alum and copperas by Englishmen*, 1572?, f. 125.

previous failures feature also in the preamble to Mountjoy's 1566 Act, and might have formed a part of his petition in respect of that Act. Otherwise, the later dating allows the possibility that Kendall was among those who had 'of late dayes' given up attempts to make alum and copperas. In any case, together the Act and the 'hints' reinforce the notion that de Vos was not the first to have brought the industrial method to England, and that any efforts made by John Cobbe in this regard had met with failure.

III. The Crown tithe and locations of the works

The tithe-charge on the produce of the de Vos mines led to the creation of documents from which can be deduced a good deal about their operation and output. The valuation of the tithe made in 1577, in preparation for its lease to John Engelberd (at £13 6s 8d per annum), reveals by implication which three of the mines had already been opened before the expiry of de Vos's licence on 3 July 1565. These were 'one howse & Myne at Bascombe, called Bascomb howse sett & lyinge in the Cownties of Southt & Dorã, or ether of them, one other howse & myne at Brountsey in thisle called Brountsey, and one other howse & myne called Allam & Chyne', and were at places known today as Boscombe, Brownsea Island, and Branksome Dene Chine (Figure 3). The last of these appears on a seventeenth-century map (Figure 4) labelled as 'Alaman', probably a corruption of *alumen* which became, successively, 'Allam & Chyne' and 'Alum Chine', although the name was later transposed to a more easterly chine. As noted above, de Vos must therefore have treated with the owners of three separate manors, those of Westover (Boscombe), Corfe (Brownsea Island) and Canford (Branksome Dene Chine).³⁷

On 15 October 1575, Mountjoy granted to Henry Smithe a 12-year licence to make up to 200 tons of alum and copperas per annum at and between 'Allamhanchyne and dearlingechyne',³⁸ and to 'edifie erect and builde at or neere the Chynes aforesaid suche house & houses Edifices and buildings as the said Henry Smithe his executors or Assignes shall thinke good convenient and necessary for the fartheringe and maynteyninge of the said works'. Ever anticipating an upturn in his fortunes, Mountjoy stipulated that the lease could be revoked if he were to pay £50 on 2 February 1575/6, and in addition by 2 May 1576 pay either 100 marks or make other compensation for any lead and iron 'bestowed in and upon the premisses'. The buildings erected under this licence were probably those noted in 1586 (in addition to those at 'Allam cheyne' erected by de Vos) at 'darlinge Cheyne', now known confusingly as Alum Chine.³⁹

³⁷ TNA, E 190/903/1 *Poole: Customer and Controller Coastal*, 1712; TNA, E 190/903/6 *Lyme: Customer and Controller Coastal*, 1711.

³⁸ These places were described as 'within the mannor of Canford', but probably spanned the boundary between the manors of Canford and Westover: S. Gadd.

³⁹ A part of the puzzle not yet solved concerns the location of 'the merchanntes house', intended by Mountjoy in 1572 to be set to producing alum (as opposed to copperas), together with the houses at Ockman's and at Alaman. The most likely scenario is that the buildings erected under the 1575 licence were to replace others leased to merchants and noted to have been destroyed by fire. HLC, mssHA HAD/2367 *HLC mssHA HAD/2367 15 Oct 1575*, 15 Oct 1575; TNA, E 190/907/3 *Lyme: Customer Overseas*, 1716; TNA, SP 12/86, f. 144.

Contrary to the suggestion of an earlier date, it was probably not until the late 1570s that Mountjoy licensed the trials for the making of alum at Kimmeridge by John Clavell. The only known record of this is a document which can be circumstantially dated with some certainty to about 1617, and which noted the trials some 40 years earlier, but the works at Kimmeridge are neither included in nor noted to be excluded from the June 1577 valuation. They were in a different location from the later works set up in about 1610 by his son, Sir William Clavell, for it was noted of the early works in about 1617 that 'the ruins of which worke, or some other of antiquitie yet remaynes'.⁴⁰

The rush to mine and process fools' gold might have been excited by the Crown's valuation and subsequent lease of the de Vos tithe in 1577, although the following March Mountjoy took the surrender of mining premises at Cales (modern-day Sandbanks, at the entrance to Poole Harbour) which had been recently set up, mortgaged, and which had become the subject of a dispute. The surrender authorised the lessee to remove 'any the tymber frame and edifice' that he had erected, and there is no known subsequent trace of activity there.⁴¹

The exemption of the tithed mines from customs duties explains the inclusion of details recorded in the Exchequer Customs Accounts Rolls of the output of these and other local mines in the

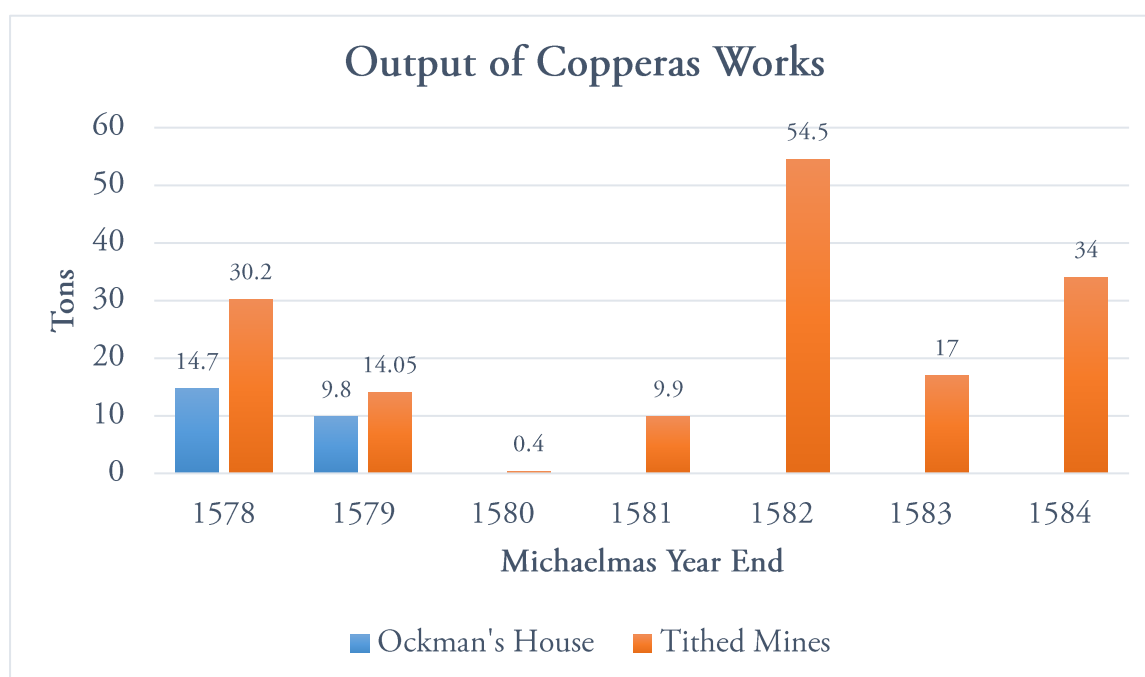


Figure 1: Output of copperas works as recorded in Customs Account Rolls, Michaelmas 1577 – Michaelmas 1584.

period Michaelmas 1577 – Michaelmas 1584, during Engelberd's tenure of the tithe (see Figure

⁴⁰ John P. Ferris, 'Alum at Kimmeridge', *Somerset & Dorset Notes & Queries*, XXIX, (1969), pp.81-85, 82; TNA, E 190/903/1. This analysis of dating and physical separation of the two sets of works at Kimmeridge differs from that proposed in P.S. Bellamy, G. Broadbent, M. Corney, A. Hawkins, M. Trevarthen and C. Wilson.

⁴¹ DHC, D-WIM JO-39 *Surrender and bonds concerning mineral works at Cales, Canford Magna*, 24 Mar 1578; DHC, D-BKL/N/A/2/44 *Map of Canford Magna and Poole Harbour*, 1622x1628.

1). Although the lease of the tithe was reassigned by letters patent in 1585 and again in 1586, no separate record appears after 1584, presumably because the indenture which gave rise to it would have expired with de Vos's original 21-year patent on 4 August 1585. The most striking feature of the accounts is that they demonstrate enormous variability in the output of the mines, ranging from less than half a ton in 1580 to 55 tons in 1582. They also show that the nominal value of a ton of copperas increased over the period from £3 6s 8d to £5. The output from Ockman's House is recorded for 1578 and 1579 only, at 15 tons and 10 tons respectively. Although latterly he made an annual profit, over 7 years Engelberd lost on average a little under £3 per annum on his lease.⁴²

Nothing, of course, is recorded in these Rolls of any produce consumed locally or carried by land, but they show that none of the produce of the mines was shipped from the port of Southampton, the ambit of which extended as far west as Christchurch. Most of it passed instead through Poole, but there is a curious order preserved in the Poole Borough Record Book which shows that for a short while, until the practice was condemned by Cecil (by then Lord Burghley) in February 1583/4, some of the produce was shipped directly from the shore, close to the mines:

... lately there hath ben sundry barques and boates laden with copporas from one of the mynes called Okemans which is distante from this Towne of Poole aboute two myles and in the cheffest parte of the Channell of this haven which copporas hath ben usually heretofore laden in this Towne at a place commonly called the key where all merchants goodes by prescribed order are appointed to be laden and unladen tyll now of late yt is founde out by those of the mynes of Okemans that all manner of goods passing a long the Coast may be laden at any other place and not at the place appointed for goodes to passe beyonde the Seas for that (say they) there is no barr in the Statute to the Contrary ...⁴³

The concern locally was that the ships would dump their ballast in the channel, and 'in few yeres' choke the haven. An unfortunate implication of this practice is that even where they have survived (those for the probable receiving port of London in this period have not) the Exchequer Port Books are unlikely to present a complete record of the output of these mines and of others elsewhere along the coast.

The other particularly useful documentary survival is a deposition made by Richard Morris, the clerk of works of the mine at Boscombe, Hampshire. Engelberd's lease of the tithe, granted 20 December 1577, was retrospective, from 30 September that year, and in the Exchequer case heard

⁴² TNA, E 190/906/3 *Weymouth: Searcher Overseas*, 1715; TNA, E 190/906/4 *Lyme: Customer Overseas*, 1715; TNA, E 190/906/5 *Poole: Searcher Overseas*, 1715; TNA, E 190/906/6 *Weymouth: Customer and Controller Coastal*, 1715.

⁴³ DHC, DC-PL B/1/1/1 *Poole Borough Record Book*, 1566-1701, f.21. The loophole was not apparently closed until February 1592, when Burghley steered regulations through the Exchequer limiting the loading and unloading of goods to established places and requiring the presence of customs officials: B. Y., *The modern practice of the Court of Exchequer in prosecutions relating to His Majesty's revenue of the Customs*, (In the Savoy [London], 1731), Clause IX, 455.

the following April it was claimed that Roger Warfield, the licensee of the mine, had failed to render the tithe. Morris stated that the terms of Engelberd's lease included no obligation on the part of the mine operator to take care of delivery of the produce, and that Engelberd would have to arrange for its collection from Boscombe himself. On 27 April 1578, he also estimated the output of the three tithed mines in the seven months since the beginning of the lease: about 10 tons⁴⁴ had been produced at each of the tithed mines at Boscombe and Branksome Dene Chine, and a further 8 tons at Brownsea Island, somewhat below what had been and was to become again the normal level of output.⁴⁵

A domestic surplus of copperas is suggested by the exports to Rouen of 4 tons in 1578, and to St Malo of about half a ton in 1581.⁴⁶

IV. Competition

In 1585, it was predicted that most of the copperas production would cease with the end of the monopoly at the end of March 1588. This claim would prove to be unfounded, but may have been a factor in the drawing to a close of the dispute that had raged between Huntingdon and William, Lord Mountjoy since the death of his father, James, in 1582. Having bought out any remaining interest in the monopoly in May 1586, Huntingdon sought to have its few remaining months confirmed to him by the Queen and Parliament, but control over the production of copperas was already disintegrating, perhaps due to confusion caused by the legal wrangling. Huntingdon's request was mis-dated by those who catalogued it among the State Papers, and has consequently been misinterpreted as a request for a renewal of the monopoly. He acknowledged that copperas was being made by just two others, but claimed that it was of poor quality, with a high sulphur content that would burn cloth, and in consequence the reputation of English copperas was being damaged and imported copperas made more desirable.⁴⁷

In 1582 it had been proposed to make at Keswick copperas which 'will excell in goodness, both that which is made here in England by the Lord Mountioye his Priviledge, or any other Coppris coming from beyond the Seas', while as early as 1579 William Lambarde found at Queenborough Castle in Kent 'one Mathias Falconar (a Brabander) who did (in a furnesse that he had erected) trie and drawe very good Brimstone and Copperas, out of a certein stone that is gathered in great plenty upon the Shoare neare unto Minster in this Ile'.⁴⁸ Cornelius Stephenson, who had been

⁴⁴ A hogshead of copperas weighed, typically, about a quarter of a ton, consistently from 1581 to 1656: TNA, E 190/815/9 *Exchequer Port Book: Southampton: Searcher Overseas outwards*, 1580, f.18v; TNA, E 190/907/11 *Weymouth: Searcher Overseas*, 1716.

⁴⁵ TNA, E 133/3/464A *Non-payment of dues from lease to John Enggelberd of the tenth part of the profits of mines in Dorset and Hampshire*, 27 Apr 1578.

⁴⁶ TNA, E 190/815/7, f.3v; TNA, E 190/815/9, f.18v.

⁴⁷ TNA, E 190/906/15 *Poole: Customer and Controller Coastal*, 1715; TNA, E 190/907/4 *Lyme: Controller Overseas*, 1716; T.G. Allen, M.S. Cotterill and G. Pike, (Canterbury: Canterbury Archaeological Trust, 2004), 41.

⁴⁸ TNA, E 190/907/13 *Poole: Customer and Controller Coastal*, 1717; William Lambarde, *A Perambulation of Kent: conteining the description, hystorie, and customes of that Shire*, (London: Baldwin, Cradock and Joy, 1826), 228.

tenant of several copperas mines in Dorset since 1572, had defrauded Huntingdon, decamped, and set up works at Whitstable by 1586.⁴⁹ No qualms appear to have been expressed about infringing the monopoly in any of these cases.

Nevertheless, the copperas works at Boscombe and at Branksome Dene Chine were evidently still operating in 1599, by now in the hands of the fourth Earl of Huntingdon, although we see at this time the first notable stirrings of competition with the commoners which might eventually have driven copperas production elsewhere, and motivated a search for new sources of fuel to replace the turf which was gathered in large quantities from the heathland. On 11 June 1600, several of the commoners responded to accusations brought by the Attorney General in the Star Chamber that they had burned the tools, and the turves which had been dug and stacked, belonging to the workmen of the alum and copperas workhouses. In their denial of the charges, the commoners explained that it was their custom to set fire to portions of the heathland for its 'better Husbanding and manuring', and that there was no intent to 'destroy the said heath and to bring the poor Tenants or Inhabitants thereabouts to great want and extremity for lack of food for their cattle'.⁵⁰

The 21-year lease of all of his Hampshire and Dorset mines, including the whole of Brownsea Island, granted by the third Earl of Huntingdon in 1588, was to expire on 25 March 1609. The rent was to be paid to the fifth Earl following the fourth Earl's death in 1604, which supports the notion that the freehold of the Boscombe mine had been separated from the manor of Westover, which by this time had been sold to Thomas, lord Arundell of Wardour. Edmond Nicholson, an associate of one of the assignees of the lease, continued to ship copperas from Poole at least as late as October 1606, but Huntingdon had apparently ceased to receive his rent before November 1608.⁵¹

In June 1610, Huntingdon claimed that his copperas works in the manor of Canford were still in operation, and that he intended to develop them further, although their supposed continuation was disputed by the burgesses of Poole who were, superficially at least, concerned that the works would deprive the commoners of fuel: on balance, it seems likely that Ockman's House had been dismantled, while the manufactory at Branksome Dene Chine was in some state of decay, although it is notable that the wooden structures appear to have survived long enough to have been recorded

⁴⁹ It is highly improbable that Stephenson received a patent to produce copperas at Whitstable as early as 1564, as has been claimed, because the first evidence of his ownership of land there in 1588 concurs with other evidence that he did not begin production much before that date, while nationwide monopolies were held successively by de Vos and Mountjoy. TNA, SP 12/86, f. 144; TNA, E 190/907/4; T.G. Allen, M.S. Cotterill and G. Pike, (Canterbury: Canterbury Archaeological Trust, 2004), 41; TNA, E 134/42Eliz/East14 *Thomas Gauntlet v. Edward Ewer, Arthur Bedle alias Bedolph: making of "Coprassse"*, 17 Nov 1599 x 16 Nov 1600.

⁵⁰ TNA, STAC 7/10/9 *Attorney-General v. Canford & Christchurch commoners: burning of turves and tools belonging to alum and copperas works*, 11 Jun 1600.

⁵¹ The lease to Philip Smith was to bring Huntingdon and his heirs £500 per annum, not the £1300 repeated elsewhere. TNA, C 2/JasI/W19/17; TNA, E 190/823/12 *Southampton: Controller Overseas: imported wines*, 1634, f.2r.

pictorially some fifteen years later. The burgesses of Poole were probably more concerned about supplies of fuel for their growing commercial brewing interests, while nothing was said of the copperas works outside the manor of Canford in this dispute.⁵² There is no suggestion that the copperas production at Brownsea observed by Celia Fiennes shortly before the works closed at the end of the seventeenth century illustrates a continuation of the Elizabethan works, for the whole island was said to be of almost no worth in 1623, and furthermore the production which is known to have been revived after 1665 has been deduced to have been on a different site.⁵³

In any case, the primary sources give a more nuanced and less conclusive picture of the industry into the seventeenth century than is generally accepted. Total collapse of the industry cannot account for the fifteen tons of 'english copperas' shipped from Poole in 1619, but some reversal – and a local market – are suggested by the import of one ton in 1626.⁵⁴

V. The Jacobean Alum Monopolies

Notwithstanding the continuance of copperas production on the south coast, in August 1604 a 7-year patent of monopoly was granted to Richard Powell and Hugh Lee for, among other things, the 'searching digging myning or triall' of all metals and minerals, including, specifically, coal, alum and copperas. There was, however, a clause protecting any pre-existing patents which remained in force, and an exemption for any minerals already known to exist. This patent, then, was designed to promote the discovery of new sources of minerals, and could be interpreted as a consequence of a realisation that the days of the industry on the south coast were numbered.⁵⁵ Powell was later to complain that his patent had been revoked by the grant of a new patent for alum production, and that in consequence he was under threat of prosecution by his associates, who had presumably invested financially in his undertaking.⁵⁶ In the absence of any explicit mention of Powell's patent, any such revocation can only have been implicit and cannot have extended to minerals other than alum.

The nationwide patent for the 'making and digginge of and for Allomes and liquors for Allomes' granted to Yorkshire landowners in January 1606/7 was more deliberately conscious of the works

⁵² The Canford map has been dated by Michael Stead, based on the recorded names of landowners, to between the creation of the Cooper Baronetcy on 4 July 1622 and Lord Mountjoy's elevation to Earldom on 25 July 1628. TNA, C2 JasI/H27/34 *Henry, Earl of Huntingdon v Roger Mawdley et al. re turf-cutting and alum/copperas works*, 1610; DHC, D-BKL/N/A/2/44.

⁵³ Celia Fiennes, *Through England on a Side Saddle in the time of William and Mary*, (London: Field & Tuer, 1888); John Preston Neale, *Views of the Seats of Noblemen and Gentlemen in England, Wales, Scotland and Ireland*, (London: W. H. Reid, 1818); Geraint Dyfnallt Owen, ed., *Calendar of the Cecil Papers in Hatfield House: 1612-1668*, v.22 (London: HMSO, 1971), 177; P.S. Bellamy, G. Broadbent, M. Corney and C. Wilson, 'Investigations on the South Shore of Brownsea Island by the Dorset Alum and Copperas Industries Project'.

⁵⁴ TNA, E 190/953/13 *Southampton: Customer Overseas: imported wines*, 1663, f.1v; TNA, E 190/827/5 *Southampton: Controller Overseas*, 1671, f.4r.

⁵⁵ TNA, C 66/1642 Mineral Patent granted to Richard Powell and Hugh Lee, 30 Aug 1604.

⁵⁶ The complaint is dated in the calendar, hesitantly, to 1610, but it seems more likely to have been provoked by the patent granted in January 1606/7. Geraint Dyfnallt Owen, ed., *Calendar of the Cecil Manuscripts: Calendar of the manuscripts of the Most Hon. the Marquis of Salisbury, 1609-1612*, v.21 (London: HMSO, 1970), 282.

on the south coast, and specifically excluded any place where Mountjoy had operated. It is unlikely that 'allomes' were intended to include copperas (as in the inclusive sense of *alumen*), for the patent is not known to have interfered with the continuing copperas works at Whitstable. The patent also heralded a ban on the import of alum, which was to take effect after two years, supposedly giving time for the Yorkshire works to become established.⁵⁷

John Clavell, at Kimmeridge, must immediately have seen the potential value of breathing life into the industry he had investigated with Mountjoy some thirty years earlier, and so it was probably at this time (and no earlier) that he discussed the project with his son, William, who later reported that the discussion prompted him to seek out coal as a fuel for the enterprise. John survived long enough, by just two days, to see the import ban come into effect, although it was not reinforced by proclamation until 19 June 1609.⁵⁸ Clavell's search for coal is very likely to have been prompted in part by knowledge of the developing conflict with commoners at Canford and Westover, but clearly infringed Powell's patent: again we see the impotence of monopolies where they stood in the way of commerce and the commonwealth.

Any operations at Kimmeridge may have ceased long before Clavell signed over the property of the Purbeck Alum Works on 31 Jan 1617/18, for according to a letter sent from Kimmeridge on 21 October 1616, an inventory had been completed and the property already sequestered. The documents cited earlier probably originated in the period between this sequestration and the writing of a letter to the Lord High Treasurer on 3 December 1617, advising that Clavell should surrender the works.⁵⁹

Unfortunate gaps in the survival of the Exchequer Port Books (for both Poole and Weymouth) make it difficult to assess the extent of any success with alum production at Kimmeridge, although the Crown's interest has ensured the survival of some accounts from the 5-year period when Clavell was in partnership with the alum patentees, from 11 March 1612/13. The only alum production recorded in these accounts was in Yorkshire, and no alum is recorded in the Poole Port Book for 1613. However, £4 was allowed for 'uryne gatherede about the Isle of Purbecke, and delivered for the workes there x^{ton} at viij^s the tonne', and it is difficult to avoid the conclusion reached by Clavell's partners when they closed down the operation in 1618 that he was doing little more than taking the piss.⁶⁰

⁵⁷ TNA, E 190/907/9 *Poole: Customer Overseas*, 1716.

⁵⁸ J.P. Ferris; Mary Anne Everett Green, ed., *Calendar of State Papers Domestic: James I, 1603-10*, (1857), 521.

⁵⁹ WYAS, WYL100/PO/8/V/3 *Bond in £600 by Sir William Clavell that he will allow free disposal of all property and goods by Sir Arthur Ingram at the Purbeck Alum Works*, 31 Jan 1618; WYAS, WYL100/PO/8/VII/3 *Letter to Thomas, Earl of Suffolk, informing him that the inventory of the alum houses in the Isle of Purbeck is now complete*, 21 Oct 1616; J.P. Ferris; WYAS, WYL100/PO/8/VII/8 *Letter from Sir Arthur Ingram and Robert Johnson to the Lord High Treasurer advising that Sir William Clavill should surrender his alum works at Purbeck to the King*, 3 Dec 1617.

⁶⁰ TNA, AO 1/2486/349 *Auditors of the Imprest and Commissioners of Audit: Roll 349: R. Johnson, Paymaster of works for alum in Yorkshire and Dorset*, 1612-1615; TNA, E 351/3381 *Declared Accounts: Works for alum in Yorkshire and Dorset*, 1 Nov 1612 - 12 Feb 1629.

VI. Analysis of the Poole Exchequer Port Book data

The purpose of the Exchequer Port Books, resulting from an Exchequer Order of November 1564, was to create a central record of goods noted entering and leaving the various ports of England and Wales. The detail recorded in these books varied over time, but generally each entry would give at least the name of the ship and its master, the names of merchants with cargo aboard, and the type and quantity of their goods.⁶¹ Data relevant to this study have been extracted from the Portfolio database and published separately online.⁶²

On first sight, the patchiness of survival of the Poole Port Books is rather discouraging, and the large variance in industrial output from one year to the next shown by the Customs Account Rolls suggests that no single Port Book's data can really be indicative of the data of another lost book. Conversion to standard units of volume or weight can present problems: copperas, for example, is usually measured in hogsheads which weighed about a quarter of a ton, but shipments are also at other times recorded in tons or in *doleae* (tuns), or in a combination of these measures. Nevertheless, ignoring the possibility of significant local consumption⁶³ or land-carriage of the produce, it is possible to see clear trends in the productivity of the local alum and copperas industry. To compensate for the fact that the Books cover varying lengths of time period, shipments noted in a Port Book can be totalled and divided by the number of days covered in order to obtain an estimate of the daily output. These estimates can then be plotted to illustrate trends in output, as in Figure 2. With remarkable consistency, the output recorded in shipments from Poole can be seen to be about 100 tons per annum for thirty years between 1572 and 1602. Without more general shipping data, it is impossible to estimate whether any seasonal variation in shipping of the mines' produce reflects any seasonal variation in its production.

The output recorded in the Exchequer Port Books reflects the dip in productivity at the start of the tithe lease period indicated by the Customs Accounts Rolls, and also the subsequent recovery. Without the Accounts Roll evidence, the dip might reasonably have been overlooked as a sampling anomaly, and there is no obvious reason for it, especially considering the setting up of new works under the 1575 lease, which allowed the production of an additional 200 tons per annum of alum and copperas.⁶⁴ The production method necessitated the weathering of freshly-mined material for a year or two, but the rebound in production is not observed until 1582.

⁶¹ A detailed account of this aspect of customs regulation can be found in Stephen Gadd, 'Illegal quays: Elizabethan customs reforms and suppression of the coastal trade of Christchurch, Hampshire', *The Economic History Review*, 71, No.3 (2018a), pp.727-746.

⁶² Stephen Gadd, 'Alum & Copperas shipped from Poole, 1565-1620', (2018b), <<https://doi.org/10.6084/m9.figshare.7151603>> [accessed 1 Oct 2018].

⁶³ One likely local consumer of copperas was the New Drapery established at Christchurch in 1569 by John Hastings, who at that time was also a lessee of Ockman's House. This industry continued for some years, but the Port Books show no evidence that it ever achieved its aim of producing frizados for the export market.

⁶⁴ HLC, mssHA HAD/2367.

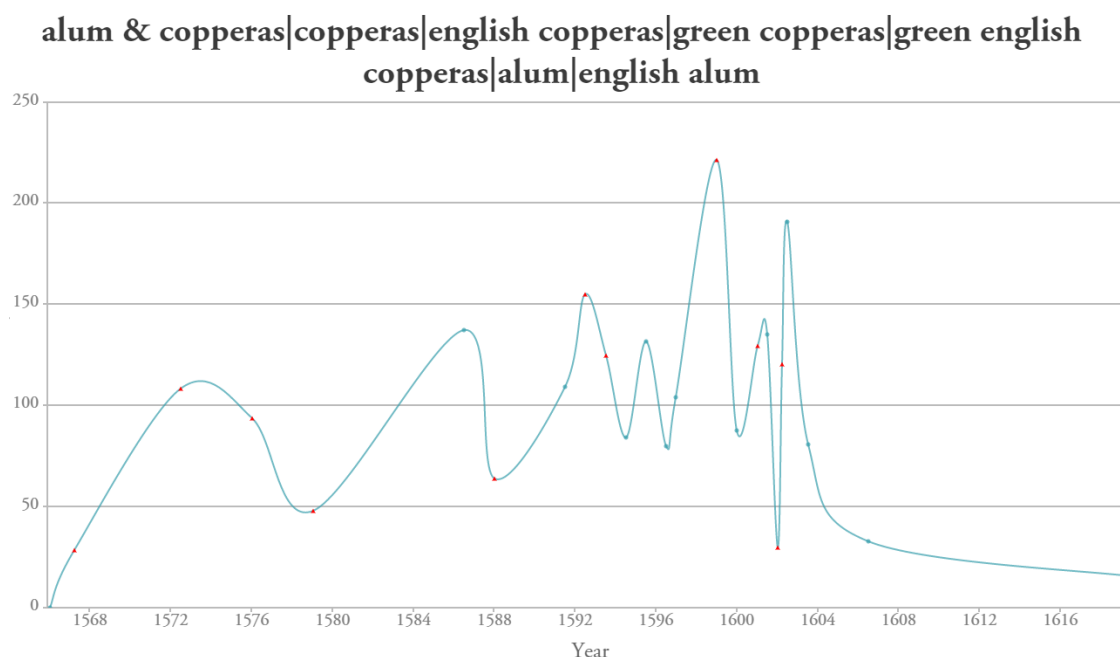


Figure 2: Sample output from the Portfolio Exchequer Port Book Project's prototype graphing system, showing estimated annual output in tons of the commodities listed above. Tuns are (as is conventional) treated as 4 hogsheads, i.e. equivalent to 1 ton, while bags of alum (recorded in insignificant numbers) are guessed to weigh perhaps 0.05 tons.

The faltering output offered those with faith in the enterprise what they might have hoped was an opportunity to make a quick profit, but Edward Meade's offer to lease the Queen's pre-emptive rights over the non-tithe output of the de Vos mines was perhaps pitched rather too low. While Engelberd was paying £13 8s 6d for the tithe, Meade offered just £7 2s 8d per annum for the 90% remainder. The offer is not known to have been accepted, but it suggests that there were at that time very serious doubts about the long-term viability of the de Vos mines, and their temporary decline remains unexplained. At about the same time, Meade took a £300 per annum lease of Ockman's House, which he declared to be 'utterly decayed', and over the following four years spent £800 on its repair, increasing its annual value – by his estimation – from £40 to £500. Given that in 1579 (see Figure 1) the output of copperas of Ockman's House was a little under 10 tons (considerably less than the 50 tons authorised by a lease ten years earlier), and allowing for the 50% increase in the value of copperas noted above, Meade's figures would imply a yield from Ockman's House alone of at least 125 tons in 1583.⁶⁵ Meade was probably exaggerating, but his investment in a decayed Ockman's House could easily account for the recovery evident in the Port Book figures.

Annual output peaked at over 200 tons at around the time of the conflict with the commoners in 1599, and although it was not mentioned in the surviving deposition, it would be unwise to ignore

⁶⁵ BL, Lansdowne MS 27 *Edward Meade's petition for a lease of the Queen for the pre-emption of alum and copperas*, 1 Feb 1578-28 Feb 1578, f. 142; HLC, mssHA HAD/2366; TNA, E 190/908/8 *Poole: Customer and Controller Coastal*, 1717.

the possibility that a marked increase in consumption of the fuel from the heath over the previous three or four years had sparked the conflict. Put another way, avaricious practices might have brought about the collapse of the industry. The fall in production evident before 1608 is consistent with the claim made in 1610 that one of the mineworks had been long-since dismantled.

Some of the Port Books list only the dates of voyages chartered by named merchants, without indicating the content of the cargos, but in the Elizabethan period at least they usually give the burthen of the vessel, and so it is possible to see that Roger Warfield, who had the lease of at least the Boscombe mine, made 8 separate shipments in 1574 (one to Rye, the others to London), in vessels which ranged in burthen from 8 to 30 tons. Other Port Books show that vessels were typically laden to at least 80% of their burthen, and so – given that Warfield with one exception, noted below, shipped only alum or copperas in other years - we can estimate that he shipped nearly 100 tons of alum and copperas that year, remarkably consistent with the average daily output recorded in other years, and suggestive that he had responsibility for the entire output of the industry at that time. Interesting marginalia that can be viewed in the Portfolio system, but which would be absent from any graphed abstract of the data, includes a note that Warfield's cargo of 13 casks of English copperas (and a bedstead) was lost on the coast of Normandy in October 1575.

All of the raw data, including marginalia where noted, can be downloaded from the Portfolio web site, where transcripts of individual voyages are hyperlinked to images of the source documents.

VII. Conclusions

In August 1566, before he yet had his monopoly, Mountjoy believed that with sufficient financial investment he could at the end of two years (the time taken to process a single batch of copperas stones), deliver '150 tons of alum, and 150 tons of copperas'.⁶⁷ Considering the fact that his output that year was only 1½ tons, this might have seemed overambitious, but in fact, notwithstanding Mountjoy's failure ever to overcome his financial insolvency, it can now be seen that the biennial output of the industry which he in large part founded had perhaps exceeded his initial target in respect of copperas within four years, and within about 20 years the combined biennial total of alum and copperas produced was not far short of the 300 tons he had predicted. That he appears never to have mastered the art of producing alum profitably should not detract from that achievement, and though he had a monopoly it should not be forgotten that this was no licence to print money: a considerable investment of time and cash was required before any returns could be expected, and the more output that Mountjoy licensed, the lower the monopoly-value of any successive licences would become, and the fewer would be the places where he could grant such licences. There was always a ceiling to the value of the monopoly, and Mountjoy's initial assessment of it was surprisingly accurate.

⁶⁷ TNA, E 190/907/15 *Lyme: Customer and Controller Coastal*, 1717.

No quantitative assessment of the Elizabethan-Jacobean alum and copperas industry in Dorset and south-west Hampshire is known to have been attempted before now, nor has it been appreciated that this industry was not the first attempt to do something more than merely harvest the minerals occurring naturally on this coast. Methodical analysis of seemingly unmanageable quantitative data has revealed a much more nuanced, accurate and interesting picture of these historical events than the flashes of courtly glamour which have distracted the writers of some earlier accounts. The despair and failures recorded so graphically in contemporary correspondence and litigation have overshadowed acknowledgment of the success of the industry, and of Mountjoy in particular, in creating employment and reducing dependence on imports from unreliable foreign sources, or indeed in producing, possibly and briefly, a domestic surplus of copperas. The works in Hampshire at Boscombe, and the probability of Huntingdon's early interest there, have hitherto been overlooked entirely.

The Spanish Armada passed within sight of the Dorset and Hampshire copperas works in 1588. Its subsequent defeat was to open up the Mediterranean to English merchant vessels, with a considerable consequent decline in the price of foreign alum. By this date, too, the religious wars had suppressed Antwerp's appetite for undyed English woollens, allowing England to develop, competitively, foreign markets for more valuable finished cloths.⁶⁸ Nevertheless, the domestic alum industry and its then-evident success must already have had a moderating effect on the 'excessive prices' of foreign alum complained of in 1562, preventing a repeat of the problems experienced a century earlier under the papal monopoly which had failed to stimulate any conspicuous domestic production.

This article underlines heavily the weight of quantitative data that could be used to inform local, national, and even international debates about industrial and commercial development, but which yet remains woefully underexploited in the Exchequer Port Books; it highlights the possibilities of an important technological approach that could address this issue with wide-ranging benefits to historical study. This local study also informs the national history of the nascent patent monopoly system, in particular the potentially torporific process of acquiring a Parliamentary patent and the seemingly whimsical uncertainty of Crown patents. It shows, too, that while the legal clumsiness of the Queen's tithe contract with de Vos could have strangled the development of the English copperas industry at the moment of its rebirth, monopolies were later treated with more pragmatism, disregarded when they stood in the way of progress and the common good.

⁶⁸ Jane Schneider, 'Fantastical Colors in Foggy London', in *Material London, ca. 1600*, (Philadelphia: University of Pennsylvania Press, 2000) pp.109-127, 120.

Abbreviations:

BL	The British Library
DHC	Dorset History Centre, Dorchester
HLC	The Huntington Library, San Marino, California
MHA	Archives of Meyrick of Hinton Admiral, Hampshire
NRO	Norfolk County Record Office, Norwich
TNA	The National Archives, Kew, UK
WSHC	Wiltshire & Swindon History Centre, Chippenham
WYAS	West Yorkshire Archives Service, Leeds

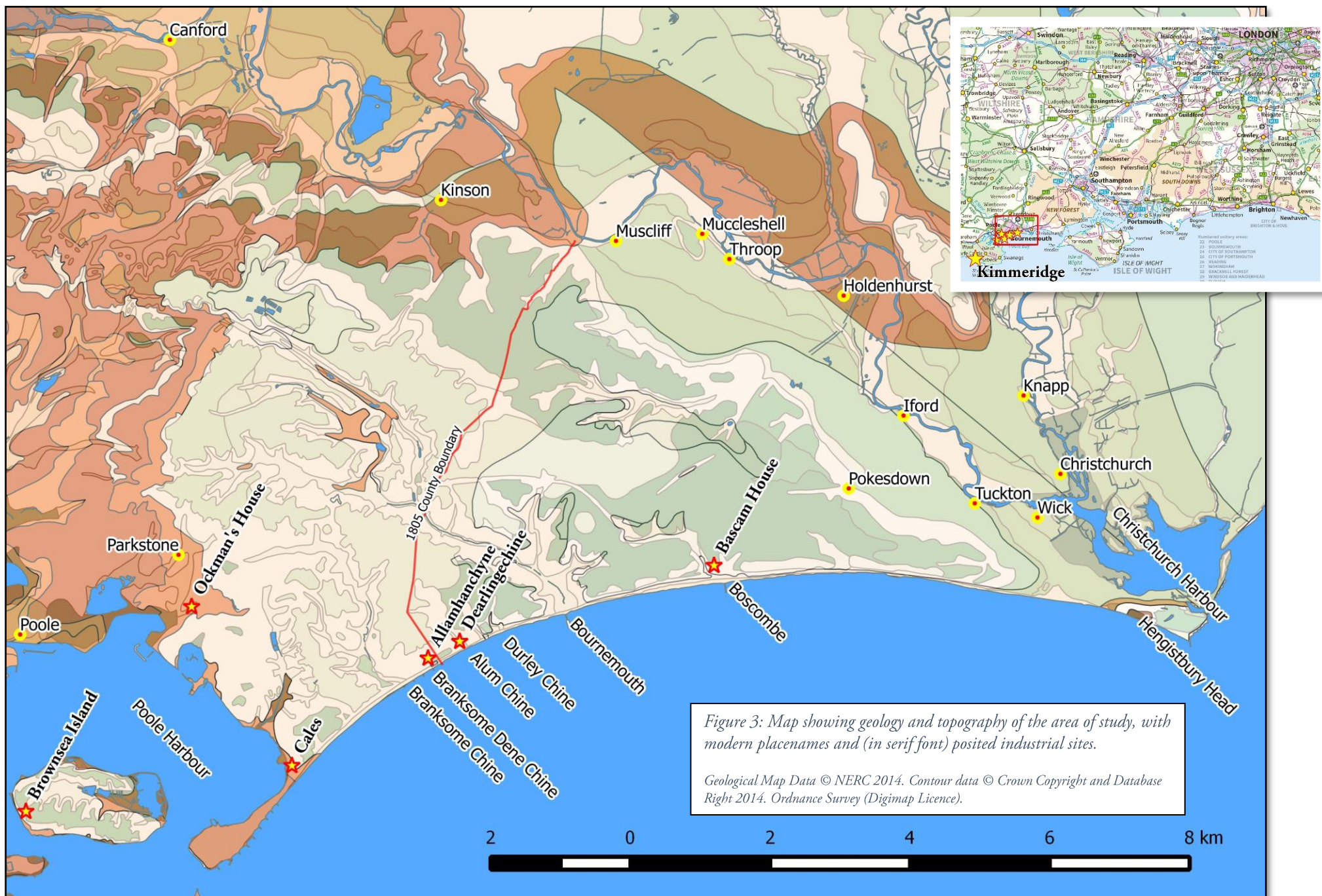


Figure 3: Map showing geology and topography of the area of study, with modern placenames and (in serif font) posited industrial sites.

Geological Map Data © NERC 2014. Contour data © Crown Copyright and Database Right 2014. Ordnance Survey (Digimap Licence).



Figure 4: Detail from map of the manor of Canford, c.1625, showing the track leading from the Christchurch-Poole road to the workhouse at Alaman: DHC, D-BKL/N/A/2/44.