Limehouse Porcelain:

Are 'Limehouse' Porcelains in Fact all Limehouse? Evidence from Archaeology, Science, and Historical Documents

W. R. H. Ramsay, Pat Daniels, & E. G. Ramsay

Printed Invercargill, New Zealand, 2015

Graphic Design by Jane Watkinson

ISBN 978-0-473-32594-7

Resurgat Publishers
resurgat@outlook.com
Phone + 44 (0)1367 243163

Resurgat

Limehouse Porcelain:

Are 'Limehouse' Porcelains in Fact all Limehouse? Evidence from Archaeology, Science, and Historical Documents

W. R. H. Ramsay [a], *Pat Daniels* [b], *E. G. Ramsay* [c]

[a] Southern Institute of Technology, Invercargill, New Zealand
[b] Private researcher, Faringdon, Oxford, United Kingdom
[c] Director Owaka Museum, New Zealand

CONTENTS

ABSTRACT

Geochemical studies of a total of 47 wasters and sherds from the Limehouse porcelain site have recognised three refractory ceramic bodies, a siliceous-aluminous (Si-Al) body, a siliceous-aluminous-calcic (Si-Al-Ca) body, and a transitional type between these two end-members. A lead-bearing sub-group of the Si-Al-Ca type is also recognised. Analyses of porcelains held in private collections have identified a soft-paste magnesian-phosphatic (Mg-P) body, which for over 20 years has also been attributed to Limehouse, based on decorative idioms. Predicated on archaeology, science, and historical documents it is proposed that these porcelains with a soft-paste body are not Limehouse in origin and an attribution to other mid-18th C manufactories is discussed.

Keywords: Porcelain, Limehouse, Bow, Lund's Bristol, soapstone, bone ash, Cornwall.

INTRODUCTION

The mysterious Limehouse porcelain manufactory was first mentioned in the publication by the Camden Society in 1888 of letters by Dr. Richard Pococke FRS, Bishop of Meath and Bishop of Ossory. Subsequently Dr. H. Bellamy Gardner (1928) in conjunction with A. J. B. Kiddell, discovered a number of advertisements for 'new-invented blue and white Limehouse ware' in *The Daily Advertiser* of 1747 and 1748 and Aubrey Toppin (1931) recognised that the Limehouse manufactory must have been located in Fore Street near Dick or Duke Shore in Limehouse. For the next 60 years speculation continued as to the type of wares produced by this east of London concern with some suggesting that there had been confusion with Bow, also located east of London (Hurlbutt, 1928, p. 33; Fisher, 1947, p. 68). A good summary of the then existing knowledge as to the potential site of the Limehouse manufactory and the names of some of the likely workers at that potworks is given by Watney (1963, 1973). It was not until construction of the Limehouse Link Road connecting Canary Wharf with the Highway and Rotherhithe Tunnel was commenced that an excavation of the site, spurred on by John Potter (Potter, 1998), was undertaken in the Spring of 1990.

The excavation uncovered a large number of ceramic wasters and two published studies were presented (Freestone, 1993; Owen, 2000). In both instances two distinct ceramic bodies were recognised namely a siliceous-aluminous (Si-Al) type and a siliceous-aluminous-calcic (Si-Al-Ca) type with the former covered with a lime-alkali glaze and the latter with a lead-based glaze. Watney (1993) confirmed this two-fold division of the Limehouse output stating that,

Both from visual and analytical studies it is plain that there are two types of ceramic material from Limehouse:

A subsequent study of these wasters by Jay and Cashion (2013) increased the number of porcelain types obtained from the Limehouse site at 20 Fore Street to three, with the identification of a transitional body between these two end-member types with average compositions of 17.8 wt% Al_2O_3, 2.9 wt% CaO, 1.8 wt% K_2O (Table 1). Of note is that several of their samples (319[33], 471[43]) show the presence of very minor barium whilst four wasters from context [404] have an average PbO content of 5.8 wt%, thus indicating that the Limehouse proprietors experimented with the addition of lead to their Si-Al-Ca porcelain body at least once (Jay and Cashion, 2013, Table 4).

In what we regard as one of the more significant 'red herrings' in English ceramic studies, Watney (1993, p. 29) asserted that analyses of 'Limehouse' pieces from collections showed the presence in some of significant amounts of MgO, suggesting the use of soapstone, but he noted that positive proof of its use at Limehouse was lacking. He further stated that it is impossible to judge, on visual examination, which pieces contain this ingredient and which do not. Unfortunately, Watney failed to publish these analyses of supposed magnesian composition, and he declined to provide information as to the analyst, where analysed, and even what items were analysed. Watney's unsubstantiated claims as to magnesian Limehouse wares have been accepted by a number of subsequent authors (Freestone, 1993; Sandon, 1993; Lockett, 1993; Hobbs, 1995; Spero, in Spero and Burt, undated) and so has grown the notion that Limehouse pioneered the use of soapstone.

At the time of the initial excavation, Freestone (1993) commented that based on analyses there was no evidence of the use of soapstone on the Limehouse site, although unpublished XRD analyses of porcelains attributed to Limehouse from private collections indicated the presence of steatite or soapstone. Freestone concluded that the absence of such magnesian sherds may reflect the vagaries of archaeological sampling. This notion that Limehouse produced magnesian porcelains was supported by Sandon (1993, p. 221) where he states that the Limehouse porcelain body contained soaprock, which was the significant ingredient in Bristol

TABLE 1: CHEMICAL AND PHYSICAL FEATURES ASSOCIATED WITH THREE REFRACTORY LIMEHOUSE BODIES AND A SUSPECT 'LIMEHOUSE' SOFT-PASTE Mg-P BODY

	Refractory Si-Al Experimental Body	Refractory Transitional Body	Refractory Si-Al-Ca Body	Soft-Paste Mg-P Body
Composition of the body	~77 wt% SiO_2, 16 wt% Al_2O_3, 0.5 wt% CaO, 1.4 wt% K_2O, negligible PbO.	~70.6 wt% SiO2, 19.5-15.3 wt Al_2O_3, 2.0-4.4 wt% CaO, 1.3-2.3 wt% K_2O, ~0.6 wt% PbO.	~73 wt% SiO_2, ~11 wt% Al_2O_3, ~6.5 wt% CaO, ~6 wt% Na_2O + K_2O, negligible PbO but see Jay and Cashion (2013, Table 4) wasters from context [404].	~65 wt% SiO_2, ~3 wt% Al_2O_3, 9-12 wt% MgO, 5-7 wt% P_2O_5, +/- PbO.
Composition of the glaze	~72 wt% SiO_2, ~5 wt% Al_2O_3, ~2 wt% MgO, 7-11 wt% CaO, ~8 wt% Na_2O + K_2O, lead-free.	~79 wt% SiO_2, 5.1 wt% Al_2O_3, 4.1 wt% CaO, 3.1 wt% K_2O, 3.4 wt% Na_2O, 0.7 wt% PbO, 0.4 wt% SnO.	48-56 wt% SiO_2, 4-7 wt% Al_2O_3,# ~3-6 wt% CaO, 2-4 wt% K_2O, 25-33 wt% PbO. Minor Sn reported (Owen, 2000).	~55 wt% SiO_2, 4-7 wt% Al_2O_3, 2-4 wt% K_2O, ~30 wt% PbO.
Nature of the body	Slightly pink body, porous of earthenware type with low-degree of vitrification. Well potted with an experimental appearance.		Thickly potted, less porous than the Si-Al type (more dense), greyish colouration. Matrix to the body is highly vitrified and continuous. Some chipping around edges.	Tends to be more thinly potted, whiter body, and lower porosity. Potting possibly more sophisticated. Found in pickle dishes, cream jugs, leaf dishes.
Refractory body	High-fired and refractory. Mineralogy includes mullite, +/- sanidine.	High-fired and refractory. Mineralogy includes mullite, +/- sanidine.	High-fired and refractory. Mineralogy includes mullite, diopside, +/- bytownite.	Lower fired soft-paste body. Tougher & less friable.
Firing faults	Underfired with poorly vitrified body.		Often misshapen and can be blistered. A number collapsed during the glaze firing. Often messy, dirty.	Some smoke damage, firing cracks.
Nature of the glaze	Poorly-fitting, often blistered and crazed, and rather opaque. Low viscosity and tendency to devitrify.		Well-fitting, well-controlled glaze. 'Pepperings' in some glazes, brownish or greyish glaze.	Glaze well-fitting and tends to greyish bluish-white colour. Typically lacks black peppering in glaze.
Underglaze blue decoration	Rather pale blue with linear and broadly painted floral designs.	Pale cornflower blue.	Greyish tone blue.	Typically a darkish or inky blue tone.
Inferred raw materials used in the body	Ball clay, crushed silica, source of potassium possibly saltpetre, KNO_3.	Ball clay, crushed silica, source of calcium possibly lime-alkali glass.	Ball clay, crushed silica, crushed lime-alkali glass, +/- minor cobalt-bearing smalt.	Steatite, bone ash, crushed silica, minor lead-free glass frit. Reanalysis of one shell dish indicates presence of significant PbO.
Translucency	Non-existent.	Unknown but likely to be poor.	Poorly translucent in shades of brown or orange in thinner parts.	Better translucency in shades of green or grey green.
Extant examples	To date, only from factory wasters.	To date, only from factory wasters.	Examples recognised both from collections and from wasters.	Examples in collections recognised but no wasters from Limehouse.

Fitzwilliam platter (Fig. 1d) has 0.4 wt% Al_2O_3

Data in part after Drakard (1993), Potter (1998), Tyler et al. (2000), Watney (1963, 1973), Spero (2013a,b; 2014), and Jay and Cashion (2013)

porcelain. Subsequently Spero in Spero and Burt (undated, p. 64) continued this line of reasoning and stated that the Limehouse production stood apart from both contemporary Bow and Chinese importations in three particular respects; namely an innovative use of moulded ornamentation, a series of models associated with silver forms, and almost certainly the first use of soapstone on a commercial scale, probably introduced only during the final stages of the factory's brief existence.

It was not until some 20 years after Watney's claim as to the presence of MgO in 'Limehouse' porcelains from private collections that a husband and wife team from the other side of the world actually tracked down what appear to be two examples of Watney's magnesian 'Limehouse' porcelains (Ramsay et al., 2013), but in fact these examples prove to be bone ash - soapstone, are not refractory as are all wasters recovered on the Limehouse site, and based on evidence presented here, almost certainly not Limehouse in origin. Evidence from private collections for the presence of magnesian-phosphatic (Mg-P) porcelains, whose decorative features appear to mirror those found on wasters and sherds from the Limehouse site, was presented by Ramsay et al. (2013) (Tables 1, 2). At that time these authors raised concerns as to whether this soft-paste body was ever made on the Limehouse site at 20 Fore Street.

Although Watney had previously recorded the difficulty in differentiating between these compositional types by subjective observation alone, there have been a number of subsequent publications in which it has been claimed that by visual examination between one and three Limehouse recipe types can been recognised. A feature of all of these contributions has been a reluctance to integrate visual features with the scientific evidence. Panes (2009) states that the Limehouse paste is light in weight and by implication represents one recipe type. Spero (2006, p. 341) writes that the Limehouse body (singular) is tougher, more durable and technically more advanced than that of two small shell-dishes which echo Limehouse in their general appearance, except that they seem to be lower-fired and therefore more brittle and hence, in his eyes, must predate Limehouse, thus supporting

Spero's notion of a Greenwich attribution for these two dishes.

Subsequently Spero (2013a,b; 2014) recognises two Limehouse bodies; one prone to chipping, having an almost opaque, slightly brownish glaze whilst the other, possibly later ware, having a more greyish-blue toned glaze associated with a slightly more translucent and more durable body, seldom subject to chips and cracks. However no mention is made by Spero of the use of soapstone as initially claimed by him (Spero *in* Spero and Burt, undated, p. 64) and Sandon (1993) in the case of what was deemed to be the later of the two bodies. This line of thinking is continued by Spero (2014) where he argues that a shell dish (No. 45) demonstrates the,

sturdy nature of this material, at least from the period of the 'improvement', advertised in June 1747.

Gabszewicz (2014, p. 5) makes the comment that both he and Spero recognise three porcelain types within the group considered to be Limehouse as a probability. Unfortunately Gabszewicz fails to substantiate what these three types are and likewise overlooks the work of Ramsay et al. (2013, Table 3) where three distinct bodies are identified with scientific and visual criteria supplied.

Predicated on connoisseurship there are between one and three body types credited to Limehouse, whilst rational science recognises three recipe types based on 47 analyses of wasters and sherds derived from the Limehouse site. These three body types are all refractory and are a Si-Al body, a Si-Al-Ca body, and an intermediate transitional type. A fourth recipe type is a soft-paste Mg-P body recognised only from porcelains in private collections previously attributed to Limehouse. It is this latter 'suspect' group which is the subject of this paper.

WERE THE SOFT-PASTE Mg-P PORCELAINS PRODUCED AT LIMEHOUSE?

As previously noted, the notion that Limehouse may have used soapstone in some of its output can be traced back to Bernard Watney (1993) when he suggested the use of this raw material based on unpublished analyses of porcelains from private collections. Subsequently Ramsay et al. (2013) identified soft-paste Mg-P porcelains that feature decorative idioms long regarded as indicative of Limehouse. However, if one integrates historical documents, archaeology, and science then the possibility arises that the 'Limehouse' soft-paste Mg-P body was not made at 20 Fore Street. We contend that there are now a number of points that question whether the soft-paste Mg-P body was ever made at Limehouse. A key feature to come from our research is that according to historical documents, soapstone was not commercially available from Cornwall when Limehouse was supposed to have been producing soapstone porcelains in 1747.

Absence of Mg-P wasters at 20 Fore Street:

Analytical work by Freestone (1993) on 21 items recovered from 20 Fore Street and a further 7 samples (Owen, 2000) failed to identify any wasters with significant amounts of either magnesium or phosphorus. At the time Freestone quite reasonably suggested that this absence may reflect the vagaries of an archaeological excavation. More recently Jay and Cashion (2013) have carefully combed the Limehouse sherd collection held at the London Archaeological Archive and Research Centre (LAARC) and have targeted any waster that visually appeared different from the bulk of the collection. To this end they analysed a further 19 wasters or sherds and in each case none was found to contain significant magnesium or phosphorus. However, they did report that sherds recovered from context [404] had PbO levels ranging from 4 - 8.6 wt% with the average being 5.8 wt% PbO thus demonstrating a firing of the Si-Al-Ca body with the addition of lead and the sherds/wasters being dumped together in context [404] on the Limehouse site.

As previously noted there are now 47 analyses of Limehouse wasters and sherds in the public domain and not one displays elevated magnesium or phosphorus. Moreover the Limehouse excavation failed to find evidence of stock-piled soapstone, bone ash, or any animal bones. One possibility to explain this reflects the vagaries of an archaeological excavation. The second possibility raised by Ramsay et al. (2013) is that the magnesian-phosphatic wares were not made at 20 Fore Street but on a second site on the northern side of Fore Street. This we now reject. A third possibility and the most likely explanation is that the soft-paste Mg-P composition is not of Limehouse origin.

TABLE 2: ANALYSES OF THREE LIMEHOUSE REFRACTORY BODIES AND SUSPECT 'LIMEHOUSE' SOFT-PASTE MG-P BODY

	Limehouse refractory body										**Soft-paste body**		
	Si-Al		**Transitional**	**Si-Al-Ca**							**Mg-P**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**11a**	**12**
SiO_2	76.1	78.1	73	73.3	72.5	74.8	71.8	73.6	74.4	73.7	62	60.5	69.6
TiO_2	0.7	1	0.9	0.5	0.8	0.4	0.5		0.2	0.6			
Al_2O_3	16	16.9	18.6	10.7	10.8	11.6	12.2	12.7	10.8	12.3	3.1	3.1	2.7
FeO	0.5	0.7	1.4	0.5	0.7	0.2	0.2		1	0.3	0.2		
MgO	0.2	0.2	0.5	1	1	0	0.6		0.7	0.3	12.5	13.5	9.4
CaO	0.5	0.4	2.3	6.7	6.2	6.8	8.1	7.5	7.7	7	8.8	8.3	9.8
Na_2O	0.7	0.6	0.6	2.5	2.5	2.7	3.3	3	2	2.7	3.7	3.1	1
K_2O	1.3	1.4	1.3	2.9	3.3	2.7	3	3	3.1	2	2.7	2	1.7
P_2O_5	0.1	0.2	0.2	0.3	0.1	0	0		0	0.2	6.7	4.9	4.7
PbO	<3.8		0.3	<1.2	1.3	1.3	0.3			0.2		4.5	0.8
SO_4	0.1		0.4#	0.3							0.5		
	100	99.5	99.5	99.9	99.2	100.5	100	99.8	99.9	99.3	100.2	99.9	99.7

S as SO_3

1. Single bulk analysis of Si-Al porcelain body (Owen, 2000) - total Fe as Fe2O3.
2. Average analysis of 4 Si-Al porcelain bodies (Freestone, 1993).
3. Transitional body (Jay and Cashion, 2013: No. 471-15); see Figs. 1b,c.
4. Average analysis of 6 Si-Al-Ca porcelain bodies (Owen, 2000) - total Fe as Fe2O3
5. Average analysis of 4 Si-Al-Ca porcelain bodies (Freestone, 1993).
6. Si-Al-Ca body from underglaze blue platter, Fitzwilliam Museum, Cambridge; see Fig. 1d.
7. Si-Al-Ca body from underglaze blue sauce boat (Godden Collection, Bonhams, 2010: Sale No. 18425, Lot 43); see Fig. 1e.
8. Si-Al-Ca body from underglaze blue pickle dish with Chinese vase decoration (private collection); see Ramsay et al., (2013, Fig. 2c).
9. Si-Al-Ca body to broken underglaze blue pickle dish with Chinese vase decoration (Godden Collection).
10. Si-Al-Ca body to polychrome ribbed coffee cup (Watney Collection - Phillips, 2000a: Sale No. 30,924, Lot 538); see Fig. 1f.
11. Mg-P body from underglaze blue pickle dish (private collection); see Fig. 1g.

11a. Reanalysis of No. 11. Note the absence of S and the presence of a distict amount of PbO. See Appendix for discussion.

12. Mg-P body from underglaze blue pickle dish (Godden Collection, Bonhams, 2011: Sale No. 19105, Lot 254); see Fig. 1h.

TABLE 3: ANALYSES OF GLAZES ASSOCIATED WITH THREE LIMEHOUSE REFRACTORY BODIES AND SUSPECT 'LIMEHOUSE' SOFT-PASTE MG-P BODY

	Limehouse glaze to refractory body											**Soft-paste body**	
	Si-Al		**Transitional**	**Si-Al-Ca**								**Mg-P**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
SiO_2	70.96	72.8	79.2	55.98	47.78	48.1	53.8	54.9	50.8	56	55	54	55
TiO_2		0.3	0.4			0.2	0	0		0	0.1		
Al_2O_3	4.24	5.3	5.1	7.12	3.3	6.7	0.4	7	9.1	4.5	6	7	4
FeO	0.49	0.5	0.3	0.49		0.4	0.1	0.2	0.2	0	0.1		
MgO	2.35	2.2	1.8	1.01	0.4	1.1	0.3	0.4	0.2	3.25	1	0.4	3
CaO	10.77	7.6	4.1	5.15	2.22	4.7	5.7	3.5	5	1.5	5.5	5	1
Na_2O	4.77	5.1	3.4	1.32	0.87	3	1.3	3.5	3	3.5	4	3	3
K_2O	3.8	3.9	3.1	2.26	1.68	2.5	4.4	3.5	3	3	2.5	2	4
P_2O_5	0.58	0.5	0.6				1.3	0.2		0	0.2	0	0
PbO		0.4	0.7	25.25	40.91	30.5	32.8	26.7	28.5	28	25.5	29	29
SnO_2	0.35	0.4	0.4	1.07	1.22	2.7							
	98.31	99	99.1	99.65	98.38	99.9	100.1	99.9	99.8	99.75	99.9	100.4	99

1. Glaze to Si-Al porcelain body (Owen, 2000).
2. Glaze to Si-Al porcelain body average of 3 analyses (Freestone, 1993).
3. Average analysis of inner and outer glazed surface (Jay and Cashion, 2013: No. LLK26[471]15) includes 0.4% CoO, 0.2% SO3; see Fig. 1b,c.
4. Low-Pb glaze type (Owen, 2000) total Fe as Fe2O3.
5. High-Pb glaze type (Owen, 2000) total Fe as Fe2O3.
6. Glaze to Si-Al-Ca porcelain body average of 2 analyses (Freestone, 1993).
7. Glaze to underglaze blue Limehouse platter, Fitzwilliam Museum, Cambridge; see Fig. 1d.
8. Glaze to underglaze blue Limehouse sauce boat (Godden Collection, Bonhams, 2010: Sale No. 18425, Lot 43); see Fig. 1e.
9. Glaze to broken underglaze blue Limehouse pickle dish with Chinese vase decoration (Godden Collection).
10. Glaze to underglaze blue Limehouse pickle dish with Chinese vase decoration (private collection); see Ramsay et al., 2013, Fig. 2c.
11. Glaze to ribbed polychrome Limehouse coffee cup (Watney Collection - Phillips, 2000a: Sale No. 30,924, Lot 538); see Fig. 1f.
12. Glaze to underglaze blue suspect 'Limehouse' pickle dish (private collection); see Fig. 1g.
13. Glaze to underglaze blue suspect 'Limehouse' pickle dish (Godden Collection, Bonhams, 2011: Sale No. 19105, Lot 254); see Fig. 1h.

Technical ability required by the Limehouse proprietors :

Although various commentators have argued that Limehouse was highly innovative in a number of aspects in its porcelain output even down to the first use of underglaze blue decoration in English porcelains, Ramsay et al. (2013) proposed that Limehouse recipes were highly derivative from Bow, even to the use of underglaze blue as specified in the 1744 patent of Heylyn and Frye. In particular the refractory Si-Al-Ca body (Table 1) sought to mimic the Bow first patent, hard-paste body that used imported Cherokee clay, but in the case of Limehouse, a ball clay was substituted for china clay and crushed quartz was added to the mix. Based on previous analytical work by Freestone (1993), Owen (2000), and Jay and Cashion (2013) the evidence is that Limehouse was concentrating on a high-fired, refractory body rather than a low-fired, soft-paste body. Three refractory bodies were trialled and developed during the factory's short existence. A sudden change in formulation and firing regime to produce a soft-paste, Mg-P body, so late in its life (Spero in Spero and Burt, undated, p. 64), would have been difficult if not impossible to achieve for a relatively small, failed concern with assumed limited financial capital, even if soapstone had been available.

Apparent factory upheaval by mid-1747:

Ramsay et al. (2013) recorded that at some time between June 1746 and February 1746/7 Joseph Wilson, the assumed proprietor of Limehouse, occupied a second site on the north side of Fore Street, not as Joseph Wilson and Co. as recorded for 20 Fore Street, but as Joseph Wilson only (see also Latham, 1987 p. 34; Tyler et al., 2000). This second site was bracketed with Messrs. Rayner & Stanton in the second Land Tax assessment of February 1746/47 (vol. 26, p. 103) £7-10-0 rent and £0-5-0 tax. In addition Wilson continued to pay rent and tax on 20 Fore Street as Joseph Wilson and Co. for February 1746/47 £18 rent and £0-12-0 tax (vol. 26 p. 10). The second site on the north side of Fore Street in the previous assessment for June 1746 (vol. 25, p. 130) was marked 'Empty late George Kirkham' and also bracketed with Messrs. Rayner and Stanton (£1-10-0 rent, £1 tax). Land tax assessment was paid on both properties in June 1747 (vol. 27, p. 11 and vol. 27, page 135). However the insurance policy for 20 Fore Street for July 21st, 1747; policy No. 60695 is marked 'Vcd' which Ramsay et al. (2013) interpret as meaning 'Vacated'. These authors, based on their reading of the policy, question whether something of significance happened at Limehouse during mid-1747 to cause the insurance policy to record that the site at 20 Fore Street had become 'vacated'. Latham (1987), who first drew attention to the insurance document, also raised the question as to something of significance occurring on the Limehouse site mid-1747. If there was some sort of upheaval during 1747 it might have been inauspicious to have launched into an entirely new recipe type, bearing in mind that soapstone was probably unavailable, as demonstrated below.

Advertisements in "The Daily Advertiser":

Some time after its inception and initial production commenced, the factory advertised its wares in *The Daily Advertise*r between September 22nd, 1746 and September 30th, 1748 (Drakard, 1993, Appendix 1). A feature of the advertisements, dating from March 16th, 1746/47 through to November 11th, 1747, is that all appear to be describing a refractory ceramic body, a feature concurred with by Mr Pinchbeck in his advertisement of October 28th, 1747. In the earlier advertisements from March 16th and March 19th, 1747 (Gregorian), and April 4th, 1747 the proprietors announced to the public,

The new-invented blue and white Limehouse Ware, which as to duration, &c, is no ways inferior to China, consisting of great Variety of....

However in the advertisement of June 20th, 1747 the wording showed minor changes to read,

THE NEW-INVENTED LIMEHOUSE WARE, consisting of great Variety of useful and ornamental Vessels, which as to Duration etc. is no way inferior to China, 'being now greatly improved', is to be had of most of the Dealers in China and Earthen-Ware in Town,.......

Ramsay et al. (2013) took this latter advertisement of June 20th to mark the change in production from the refractory Si-Al-Ca body to a more translucent, whiter, soft-paste, Mg-P body - a suggestion taken up by Spero (2013a,b, 2014), who however fails to reference the work of Ramsay et al. (2013) and their compositional data demonstrating three distinct 'Limehouse' porcelain types. Spero argues that this later ware (assumed here to refer to the soft-paste, Mg-P body recognised by Ramsay and co-workers) to be 'tougher' and less vulnerable to chipping.

However, all advertisements dating from March 16th through to June 20th, 1747 refer to the Limehouse body being,

.........as to Duration, &c, is no ways inferior to China,.....

Figure 1: Images of Limehouse refractory and suspect 'Limehouse' soft-paste Mg-P porcelains.

Fig. 1a

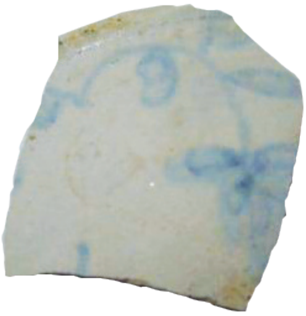

Fig. 1b

Fig. 1c

Fig. 1d

Fig. 1e

Fig. 1f

Fig. 1g

Fig. 1h

Fig. 1a. LLK26[471]33 Limehouse refractory sherd of the experimental Si-Al type. The associated glaze is of the lime-alkali type. After Jay and Cashion (2013); with permission John Willey & Sons Inc.

Fig. 1b. LLK26[471]15 External view of refractory transitional Limehouse sherd. The associated glaze is of the lime-alkali type, Table 2(3) and Table 3(3). After Jay and Cashion (2013); with permission John Willey & Sons Inc.

Fig. 1c. LLK26[471]15 Internal view of refractory transitional Limehouse sherd, Table 2(3) and Table 3(3). After Jay and Cashion (2013); with permission John Willey & Sons Inc.

Fig. 1d. Octagonal platter in underglaze blue. Limehouse refractory Si-Al-Ca porcelain, 22 cm wide. Fitzwilliam Museum, Cambridge. Photograph by the authors. Table 2(6) and Table 3(7).

Fig. 1e. Sauceboat in underglaze blue. Limehouse refractory Si-Al-Ca porcelain, (Godden Collection, Bonhams 2010 : Sale No. 18425, Lot 43). Photograph by the authors. Table 2(7) and Table 3(8).

Fig. 1f. Ribbed polychrome coffee cup. Limehouse refractory Si-Al-Ca porcelain, 5.9 cm high. (Phillips, 2000a: Sale No. 30,924, Lot 538). Photograph by the authors. Table 2(10) and Table 3(11).

Fig. 1g. Pickle dish in underglaze blue. Suspect 'Limehouse' soft-paste Mg-P body, 10.7 cm high. (Phillips, 2000b, Sale No. 30,926, Lot 898). Photograph by the authors. Table 2(11) and Table 3(12).

Fig. 1h. Pickle dish in underglaze blue. Suspect 'Limehouse' soft-paste Mg-P body, 10.2 cm high. Formerly Godden Collection (Bonhams, 2011: Sale No. 19105, Lot 254). Photograph courtesy of Geoffrey Godden. Table 2(12) and Table 3(13).

and it appears that the proprietors saw no difference in durability between those wares produced prior to June 1747 and those after. Rather, the wording in the June advertisement,

....now greatly improved

may have referred to new improvements in firing methods that reduced the output of dirty, speckled, and messy-looking porcelains referred to by Sandon (2009, p. 22). The mention in all advertisements between March to June of the words, *Duration, &c in no ways inferior to China,* is taken to refer to the Limehouse refractory Si-Al-Ca porcelains being able to withstand thermal stress. The Limehouse proprietors had only recently 'perfected' the refractory Si-Al-Ca body based on a ball clay recipe apparently in mid to late -1746 and it seems that the timeline for a small struggling concern was too short to change over to a completely new soft-paste recipe requiring different raw materials, alternate sources, new supply lines, and very different kiln-firing techniques.

As pointed out by Ramsay et al. (2013) the advertisement in *The Daily Advertiser* of October 28th, 1747 by Mr Pinchbeck announced that he had a range of wares for sale,

......and with great Variety of useful and ornamental Goods, in the New Limehouse Ware; which for Strength and enduring the Fire, far exceeds China, or any other Ware hitherto invented.

This wording clearly relates to the higher-fired, refractory Si-Al-Ca body and not to a soft-paste, Mg-P body. Jay and Cashion (2013) report that of the nineteen (19) sherds analysed by them, seventeen (17) contained mullite and two (2) sillimanite, both indicative of a refractory ceramic body (Table 1). A further clue that the Limehouse proprietors were intent on producing a high-fired, refractory body, rather than a soft-paste, Mg-P body can be found in their advertisement of November 11th, 1747 where it is claimed that,

.....beg Leave to assure the Publik of still daily Improvements, but don't in the least doubt, in Process of Time, to equal a foreign Nation, whose Ingenuity has preserv'd it to themselves for many Ages.

It appears that this press statement is a clear reference to a Chinese high-fired, refractory body (not to Asiatic-inspired decorative idioms) and hence would militate against Limehouse ever attempting to produce a lower-fired, Mg-P body, which in the eyes of mid-Georgians would have equated with a technological and compositional failure. Thus there is evidence from two sources, namely Mr Pinchbeck and the Limehouse proprietors themselves, that Limehouse was producing a refractory body as late in its existence as October - November 1747.

Limehouse recipe types as reflected in Pomona compositions:

As with the unsubstantiated claim by Watney as to the presence of a magnesian body in some 'Limehouse' porcelains in private collections there is mention of a single 'magnesian' waster found at the Pomona excavations.

In the absence of any substantive information or analytical data on this item we regard it as either misleading or an exotic item. In contrast, rational analyses of 20 sherd and waster samples from the Pomona excavations were undertaken by the British Museum Research Laboratory in 1971 (Bemrose, 1973, p.9).

Two main Pomona groups were recognised reflecting Limehouse compositions as derived from sherds or wasters from the Limehouse site. One Pomona group of nine sherds was high-fired, contained mullite in the ceramic body, comprised Al2O3 over 15 wt%, and showed low CaO in amounts not in excess of 1 wt% (Bemrose, 1973, p. 9). This group equates with the refractory Si-Al or experimental group of Limehouse (Table 1, Table 2). The second group of eleven Pomona sherds lacked mullite, had CaO varying between 3 - > 7wt%, and had Al2O3 contents in ten of the samples below 10 wt%. In concert with some Limehouse Si-Al-Ca wasters from context [404] (Jay and Cashion, 2013, Table 4) the addition of lead was a feature of this Pomona Si-Al-Ca body.

These two broad Pomona groups represent a direct compositional link with 'genuine' Limehouse porcelains which in turn were derivative from Bow. There appear to be several phases in the development of this Pomona concern relating to porcelain. The first was the construction of a pot oven lately built to burn china. This account contained in a 'to let' notice dated 1746/47, was inserted by the brother of the then deceased Samuel Bell Jnr (1684-1744), John Bell, Samuel's heir at law and by occupation a London exchange broker (Bemrose, 1973, p. 4). This advertisement tells us that the house, garden, warehouses, workshops, and three pot-ovens, including one lately built to burn or fire china, were up for rent. This kiln for firing china might appear to have been constructed by Samuel Bell Jnr prior to his death in 1744 and was now being rented by Mr Steers. Ramsay et al. (2013, p. 38) suggest that this construction of a china kiln and the production of an amount of porcelain wares could not have been by Steers, who had only been on-site for about a year. A direct link with Bow is evidenced by the mention in the advertisement of Crowther, at St Katherine's near the Tower and a Mr Brittain, whom we assume was John Brittain also associated with Bow. Brittain claimed that he had worked at Bow, Chelsea, Vauxhall, Plymouth, and Bristol, with the exception of Worcester, on their early trials (Daniels et al, 2013, p. 35). The link between Limehouse and Pomona appears to be through the arrival of Joseph Wilson, assumed to be the potter from Limehouse as recorded by the Rev. Richard Pococke in a letter dated July 14th, 1750 to his mother. Ramsay et al. (2013, p. 38) speculate that if the waster bowl recovered on the Pomona site was in fact dated July 26th, 1748 as suggested by Watney, then this porcelain bowl would have coincided with the arrival of Wilson from Limehouse, thus explaining why form and composition in ceramics found both at Limehouse and Pomona are similar.

Soapstone and Kynance Cove, Cornwall:

The early experimentation and use of Cornish soapstone in relation to porcelain production is discussed by Nance (1935), Hobbs (1995), Jones (2006/07), Daniels (2007), Ramsay et al. (2013), and Daniels et al. (2013).

The interest in soapstone dates back to the Royal Society and Dr Walter Pope FRS in 1667. However the lack of any mention of either bone ash or soapstone in the experimental porcelain specifications undertaken or commissioned by the Royal Society in 1708 (Ramsay et al., 2013, Table 5) suggests that neither material was actively being experimented on at that date. By the 1720's John Woodward FRS was utilising soapstone and suggesting the production of what may have been limited commercial wares.

If soapstone has been used at Limehouse in the period c. 1747 it must have been sourced from Kynance Cove, as this was the only significant coastal soapstone deposit known prior to the discovery of Gew Graze in mid-1748. From the writings of William Borlase, the Cornish scientist, he was sending soapstone samples commencing with two shipments to Leyden in 1735 and 1737 at the request of John Andrews, who at the time was studying there. These samples were derived from Kynance Cove based on Borlase's description of the locality contained in the Parochial Memorandums complied c. 1740 (Hobbs, 1995, p. 371). However on July 18th, 1748 Borlase wrote to Emanuel Mendes da Costa FRS that he had sent him,

.....a small box with several sorts of Soapy rock....and that,.....it is from a new discovery of the same soapy substance in a creek about a mile to the W.N.W. of Kynas (sic) Cove and in every respect at least equal to what was there but is now almost eaten out by the sun and other (Hobbs, 1995).

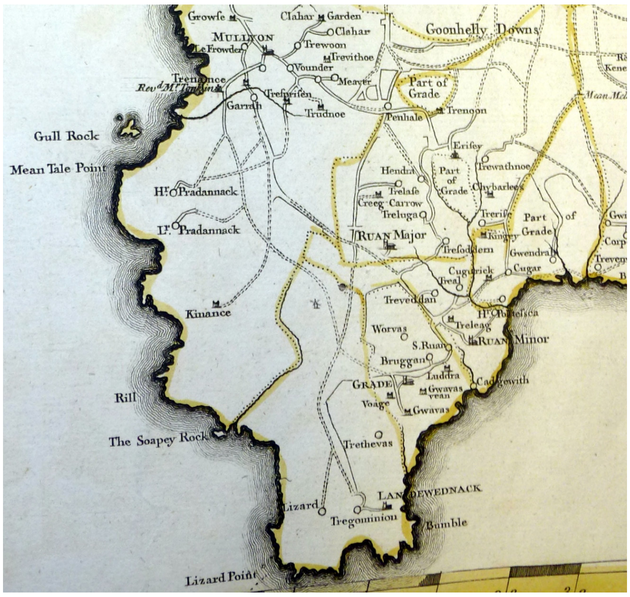

Figure 2: Map of the Lizard Peninsula, Cornwall by Thomas Martyn, published according to an Act of Parliament February 16th, 1749 (Gregorian). Here the presence of soapstone at Kynance Cove is marked but the Gew Graze deposit, which Benjamin Lund took out a licence for in March 7th, 1749 (Gregorian), is not as yet recognised. Courtesy of Cornwall Record Office.

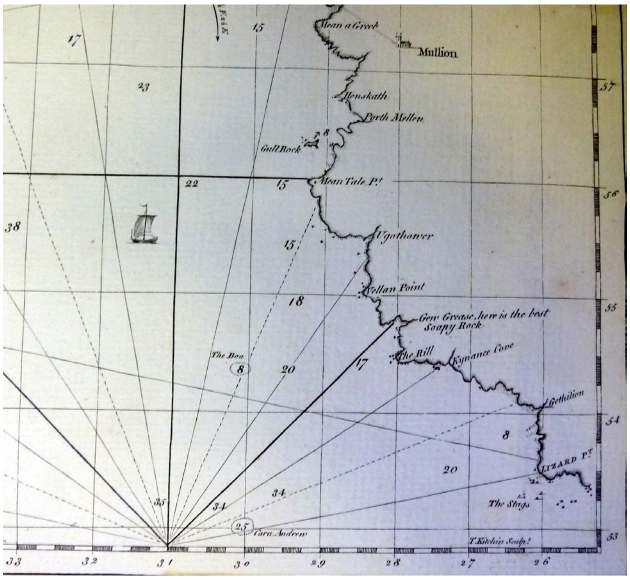

Figure 3: A new and exact chart of Mounts Bay and parts adjacent from the Lizard to Cape Cornwall shewing the several rocks, sands, soundings, setting of the tides, places of anchorage, land-marks and variation of the magnetic needle, by John Thomas, John Nancarrow, and Dionysius Williams, published 1751. Note the recognition by this date of soapstone at Gew Graze and the absence of any mention of the reported worked-out deposit at Kynance Cove. Courtesy of Cornwall Record Office.

On the basis of Borlase's letter, it is assumed that by 1746 or 1747 the Kynance Cove deposit had been all but worked out and was of little further commercial interest.

Additional support for the argument that the Gew Graze soapstone locality was not discovered until mid-1748 comes from the Thomas Martyn map published according to an Act of Parliament 16th February, 1748/49 (Fig. 2) as first noted by Hobbs (1995, p. 371). According to William Ravenhill (1979) Martyn, in about 1735, embarked on the surveying for a map of Cornwall, which according to advertisements in *The Sherborne Mercury or Weekly Advertiser* for 8th, 15th, and 22nd February 1748/49 was, *now engraving and will be published by Subscription in about two Months Time.* In this map the Kynance Cove soapstone deposit is identified yet no mention of the Gew Graze deposit is made. Subsequently, an additional map surveyed by Thomas, Nancarrow, and Williams was published in 1751 (Fig. 3). This map failed to mention the Kynance Cove deposit but marked clearly the recently discovered Gew Graze soapstone locality as the best site for soapstone. Hobbs (1995, p. 371) by researching the letters of Borlase, pinpoints the discovery of the Gew Graze deposit to between April 12th, 1748 and July 18th, 1748 by which time Limehouse had ceased production.

It has been previously argued (Daniels, 2007; Daniels and Ramsay, 2009; Daniels et al., 2013) that this exhaustion of the Kynance Cove deposit is why Bow decided to discontinue the use of soapstone in mid-1746 and consequently it is difficult to accept that the Limehouse proprietors would have launched into the use of soapstone in or around 1747 with distinct supply problems and almost certainly with the knowledge that this deposit was all but worked out. This notion of failure of supply is echoed by Watney (1973, p. 30) where he states that soapstone may have been given up as a result and likewise by Hobbs (1995, p. 371).

DISCUSSION

Based on the arguments put forward in this contribution there is a group of soft-paste Mg-P 'Limehouse' porcelains that may not have been made on the Limehouse site on either the south or north side of Fore Street. If this notion has veracity, then there are two other factories that need to be considered as the source of these soft-paste Mg-P porcelains which have been suggested to be of a London origin (Watney, 1993). If this is the case the obvious candidate is Bow. Daniels (2007), Daniels and Ramsay (2009), Daniels at al. (2013), and Ramsay and Ramsay (2007a,b) have argued that the George II busts and historical wall brackets were made at Bow commencing in early-mid 1745. Consequently the question to be asked is, bearing in mind the substantial nature of these busts and the required technology necessary to produce them, what other magnesian or magnesian - phosphatic (Mg or Mg-P) porcelains were produced at Bow prior to and contemporaneously with these magnificent busts and brackets? A possible answer is to be found in a reattribution of these soft-paste 'Limehouse' Mg-P wares comprising shell dishes, creamboats, and leaf dishes to Bow. Daniels (2007) and Ramsay et al. (2013) have proposed that a number of Staffordshire potters who came to London may have established themselves initially at Bow before moving on. Had one group then moved to Limehouse in 1746, this might explain the similarities in shapes and decorative idioms found in these 'Bow' soft-paste Mg-P porcelains and those of the later refractory Limehouse bodies dating to 1746 - 1747.

The alternative possibility is that these soft-paste Mg-P wares may be of Lund's Bristol attribution. Previously, Ramsay et al. (2013) argued that a chemical distinction between Limehouse wares and those of Lund's Bristol was the presence or absence of lead. In that publication they presented the analyses of the two soft-paste 'Limehouse' shell dishes under discussion here. Although one such shell dish showed minor lead (0.8 wt % PbO, Table 2, No. 12; Fig. 1h - this publication) they concluded that both could in essence be regarded as lead-free. Subsequent analysis of the other shell dish by Dr Bill Jay (Fig. 1g) demonstrates higher lead to be present than that reported by Ramsay et al. (2013). This new analysis is given in Table 2, No. 11a - this publication - alongside the 2013 analysis (Table 2, No. 11 - this publication). Consequently the main chemical division previously used by Ramsay et al. (2013) to separate soft-paste look-alike 'Limehouse' from Lund's Bristol porcelains based on the presence or absence of lead may not be valid.

This problem of identifying Lund's Bristol porcelains, other than a small group of wares impressed with the name Bristol or Bristoll, involving the presence or absence of lead, extends to previous subjective means previously used as discussed by Ramsay et al. (2011). Spero (2013a,b; 2014) has argued that the Limehouse body is tough and sturdy, more so than Lund's Bristol, and on the other hand that the Bristol body is generally very tough and sturdy, far more so than Limehouse (Spero in Spero and Burt, undated, p. 70).

We recognise three recipe types and a lead-bearing sub-type of the Si-Al-Ca body as representing genuine Limehouse porcelains. We have also identified two types for Lund's Bristol (Mg-P-Pb and Mg-Pb) plus a Si-Al body as reported by Richard Pococke. Previous claims that these two factories can be separated on the alleged 'toughness' of either body coupled with misty blue painting and the absence of crazed glazing on Lund's Bristol are in our opinion without foundation. All too often there has been an unwillingness to relate visual observations with the different types of recipe bodies and this represents a major failing in English ceramic studies. If these soft-paste Limehouse wares that we recognise are of Bristol origin, then the considerably increased number of wares now attributed to this factory does not sit well with the short operating period of that factory. Hobbs (1995, p. 372) has speculated that Lund's Bristol did not commence quarrying in earnest at Gew Graze till the spring of 1750 and the advertisement for apprentices did not appear until November 1750.

As noted above, references to the use of soapstone prior to the discovery of Gew Graze would most likely have applied to the deposit at Kynance Cove which in our opinion, was utilised by Bow before the decision to discontinue the use of soapstone in mid-1746 (Daniels, 2007, p. 212; Daniels et al., 2013; p. 23; Ramsay et al., 2013, p. 18). Based on compositional considerations these authors have demonstrated a Bow - Limehouse technology pathway with regard to the three refractory bodies derivative from Bow and used at the latter concern coupled with the use of a Si-Al-Ca glaze on the Limehouse Si-Al body (Ramsay et al., 2013). In contrast, Panes (2009, p. 46) has argued that Limehouse remains an exciting experiment in early English porcelain manufacture which cannot fail to have influenced Bow, in particular, in their formative years. Unfortunately Panes fails to provide substantive evidence for this notion and fails to reference and integrate prior research (Daniels, 2007; Ramsay et al., 2001; Ramsay et al., 2003; Ramsay et al., 2004; Ramsay and Ramsay, 2006; Ramsay et al., 2006; Ramsay and Ramsay, 2007a,b; Ramsay and Ramsay, 2008) which questions this view. The overwhelming evidence based on both composition and historical documents is that Limehouse was highly derivative from Bow - historically, technically, the innovative use of moulded decoration, the use of silver shapes, and even to the use of underglaze blue as specified in the 1744 patent of Heylyn and Frye (Ramsay et al., 2006; 2011; 2013).

We have now demonstrated a compositional link between Bow and Lund's Bristol with regard to the use of both soapstone and bone ash (Ramsay et al., 2011; Daniels et al., 2013). The speed with which Benjamin Lund adopted soapstone (and bone-ash) suggests that he was fully conversant with the technology required for firing magnesian and magnesian - phosphatic porcelains compositionally derivative from Bow (Daniels, 2007; Daniels et al., 2013). An obvious additional connection between Bow and Bristol is to be found with the business partners Edward Heylyn and Benjamin Lund (Daniels, 2007, p. 216).

Daniels et al. (2013) argue that there is likely to have been a common parent for the magnesian and magnesian-phosphatic recipe types used at Lund's Bristol. The magnesian recipe then spread to Vauxhall, Worcester, and Chaffers Liverpool. Watney (1993) argued that this parental concern was to be found in London and he assigned the compositional source to Limehouse based on unpublished anecdotal analytical data that supposedly showed that Limehouse manufactured a magnesian (soapstone) body. Based on our work, that parental concern was not Limehouse but Bow, which we have previously argued acted as a technology transfer conduit in the early 1740's, if not the 1730's, linking the magnesian porcelains produced by Woodward, Secretary to the Royal Society of London in the 1720's, with later porcelain concerns such as Lund's Bristol, Vauxhall, and Worcester operating in the early 1750's. On this basis Limehouse and Pomona with their Si-Al and Si-Al-Ca bodies and Lund's Bristol, Worcester, and Vauxhall with their magnesian and/or magnesian - bone ash bodies would have been all compositionally derivative from Bow.

There has now been some 25 years of discussion on Limehouse porcelains since the on-site excavations in 1990, but to our knowledge there has been little or no comment that one group is of a high-fired, refractory body and the second suspect group, soft-paste, neither has there been any apparent previous attempt to identify and publish analyses of porcelains reflecting the anecdotal claim by Watney that some Limehouse porcelains in private collections are magnesian. Tyler et al. (2000, p. 5) make comment that the Limehouse output was limited to a soft paste fabric made in imitation of true, hard-paste porcelain. This we disagree with as published analytical data from sherds recovered from the Limehouse site show this material to be both high-fired and refractory. The recognition of these two contrasting groups (refractory and soft-paste) reflects investigations principally involving archaeology, composition and mineralogy.

CONCLUSIONS

Based on archaeology, chemical analyses, and mineralogy of factory wasters, sherds, and extant porcelain items, four recipe types have been recognised supposedly derived from Limehouse. Three of these, namely a Si-Al body, a Si-Al-Ca body, and a transitional body are all refractory and have been definitely linked to the Limehouse site at 20 Fore Street, Duke Shore by means of archaeology. Moreover the Si-Al-Ca recipe has in addition now been recognised in extant porcelain items in public and private collections with their identity and analyses published. We contend that all three recipe-types and the associated Si-Al-Ca glaze were derivative from Bow. The fourth recipe type is of a soft-paste magnesian -phosphatic (Mg-P) composition identified by analyses of porcelains in private collections. Based on archaeological evidence, historical documents, and chemical analyses considerable doubt is raised as to whether this fourth body type was ever produced at Limehouse. We contend that soapstone was not commercially available when Limehouse was supposedly producing its soft-paste, Mg-P porcelains c. 1747.

If not of Limehouse manufacture, two alternatives are possible. The first is from an earlier production at Bow between the early - mid 1740's and the second is later production by Benjamin Lund at Bristol c. 1749. We favour Bow as the source for the majority of these soft-paste Mg-P porcelains but accept that some may also be attributed to Lund's Bristol. The attribution of some porcelains to Lund's Bristol is currently hindered by conflicting and subjective visual parameters but nevertheless we see a clear compositional link between the use of soapstone at Bow in the early to mid-1740's and Lund's Bristol by 1749.

It is concluded that in English ceramic studies there needs to be better integration between the subjective visual parameters and objective science. Over-reliance on decorative idioms for an attribution may at times be misleading.

ACKNOWLEDGEMENTS

This enquiry into the use of soapstone in early English porcelains has benefited from two research grants from the American Ceramic Circle and the Southern Institute of Technology, New Zealand. We record our gratitude to Robert Felce of Cornwall who provided details regarding the two maps of the Lizard Peninsula together with extensive background discussions on the use and location of soapstone in Cornwall. Permission to publish the Martyn map and the Thomas, Nancarrow & Williams' map was given by the Cornwall Record Office. Both Dr Bill Jay and Ray Jones provided much welcome discussion and debate and we thank them. John Wiley & Sons, Inc. gave permission to reproduce three sherd images shown in Figure 1. Permission to sample various porcelain items was granted by the Syndics of the Fitzwilliam Museum, Cambridge, Geoffrey Godden, Dr Bill Jay, and Paul Crane. We acknowledge that both Dr Bill Jay and Ray Jones have independently come to broadly similar ideas to us that one group of porcelains previously attributed to Limehouse may not in fact be Limehouse.

APPENDIX 1

Of late it is becoming apparent that with some analyses of porcelain bodies there may be problems in regard to determining lead and sulphur. Usually, with SEM-EDS analyses the Pb Mα line at 2.345 ke V has been used but by using the Mα line at 2.345 ke V the problem of S overlap created by the S Kα line at 2.307 ke V and potential problems with pulse pile-up or sum peaks created by the presence of high Si and high O in the sample, potentially capable of creating a peak at 2.265 ke V, is removed (Jay et al., in press). In our initial analysis of shell dish No. 11 from a private collection (Table 2, Fig. 1g) lead was given as below detection level and sulphur as $SO4^{--}$ as 0.5 wt%. Reanalysis of this item by Dr Bill Jay using a JEOL 840A electron microscope at an accelerating voltage of 20 ke V and using the Pb Mα line has given 4.5 wt% PbO and sulphur as $SO4^{--}$ below detection level (No. 11a, Table 2).

REFERENCES

Bemrose, P., 1973: The Pomona Potworks, Newcastle, Staffs. *Transactions of the English Ceramic Circle,* 9(1), pp. 1-18 + plates.

Bonhams, 2010: *The Geoffrey Godden Collection of Blue and White Porcelain,* Sale No. 18425. London, 119 pp.

Bonhams, 2011: *Fine British Pottery and Porcelain,* Sale No. 19105. May 18th, Lot 254.

Borlase, W., 1740: *Parochial Memorandums of Cornwall of 1740.* RIC.

Borlase, W., 1758: *The Natural History of Cornwall.* E. & W. Brooks Ltd., London, 326 pp.

Camden Society, 1888: *Travels through England of Dr. Richard Pococke.* The original letters are held by the British Museum.

Daniels P., 2007: *The Origin & Development of Bow Porcelain 1730-1747Including the Participation of the Royal Society, Andrew Duche, and the American Contribution.* Resurgat Publishers, Oxon., 343 pp.

Daniels, P., & Ramsay, W. R. H., 2009: Bow porcelain: New primary source documents and evidence pertaining to the early years of the manufactory between 1730-1745, and the John Campbell's letter to Arthur Dobbs. *Southern Institute of Technology Journal of Applied Research,* 1, pp. 1-30.

Daniels, Pat, Ross & Gael Ramsay, 2013: *The George II Busts and Historic Wall Brackets: The Motivation, Symbolism and Technology by which the Models can be dated to 1745-6 and Attributed to the First Bow Factory in Middlesex.* Resurgat Publishers, Oxon, 83 pp.

Drakard, D., (Editor) 1993: *Limehouse Ware Revealed.* English Ceramic Circle, London, 88 pp.

Fisher, S. W., 1947: *English Blue and White Porcelain of the 18th Century.* B. T. Batsford, London, 190 pp.

Freestone, I. C., 1993: A technical study of Limehouse. *In*; D. Drakard, Editor, *Limehouse Ware Revealed.* English Ceramic Circle, pp. 68-73.

Gabszewicz, A., 2014: Foreword, *In; Simon Spero 50th Anniversary Exhibition 1964-2014 Early English Porcelain 1748-1783.* Pardy & Son (Printers) Ltd, Ringwood, pp. 1-5.

Gardner, H. B., 1928: The earliest references to Chelsea porcelain. *Transactions of the English Porcelain Circle,* 1, pp. 16-22.

Hobbs, B. K., 1995: New perspectives on soapstone. *Transactions of the English Ceramic Circle,* 15(3), pp. 368-392.

Hurlbutt, F., 1928: *Bristol Porcelain.* London and Boston, The Medici Society, 164 pp. and plates.

Jay, W. H., & Cashion, J. D., 2013: Raman spectroscopy of Limehouse porcelain sherds supported by Mossbauer spectroscopy and scanning electron microscopy. *Journal of Raman Spectroscopy,* 44(12), pp. 1718-1732.

Jay, W., Cashion, J., & Blenkinship, B., in press: Lancaster Delftware: A Raman spectroscopy, electron microscopy and Mössbauer spectroscopy compositional study. *Journal of Raman Spectroscopy,* John Wiley & Sons.

Jones, R., 2006/07: The Origins of Lund's Bristol Porcelain and the Site of the Bristol Manufactory. *Transactions of the Northern Ceramic Society,* 23, p. 88.

Latham, J. P. M., 1987: Some thoughts on Limehouse and other early English factories. *Transactions of the English Ceramic Circle,* 13(1), pp. 33-35.

Lockett, T. A., 1993. The development of porcelain bodies in England 1745-1820. *Antique Collecting,* 27(10), pp. 4-7.

Martyn, T., 1749: *Map of The Lizard Peninsula.* Published by an Act of Parliament 16th February 1748/49. Cornwall Records Office.

Nance, E. M., 1935: Soaprock Licences. *Transactions of the English Ceramic Circle,* 3, pp. 73-84.

Owen, V. J., 2000: A preliminary assessment of the geochemistry of porcelain sherds from the Limehouse site. *In;* K. Tyler & R. Stephenson, Editors, *The Limehouse Porcelain Manufactory, Excavations at 108-116 Narrow Street, London, 1990.* Museum of London Archaeological Service, Monograph 6, 73 pp.

Panes, N., 2009: *British Porcelain Sauceboats of the 18th Century.* Gomer Press, Wales. ISBN 978 0 9562267 0 9. 280 pp.

Phillips, 2000a: *The Watney Collection, Part II.* Sale No. 30,924. Phillips Son and Neale Limited, London, 170 pp.

Phillips, 200b: *The Watney Collection, Part III.* Sale No. 30,926. Phillips Son and Neale Limited, London, 176 pp.

Potter, J., 1998: The Limehouse story. *In;* David Barker & S. Cole, Editors, *Digging for Early Porcelain.* City Museum & Art Gallery, Stoke-on-Trent, pp. 40-53.

Ramsay, W. R. H., Gabszewicz, A., & Ramsay, E. G., 2001: Unaker or Cherokee clay and its relationship to the 'Bow' porcelain manufactory. *Transactions of the English Ceramic Circle* 17, pp. 474-499.

Ramsay, W. R. H., Gabszewicz, A., & Ramsay, E. G., 2003: The chemistry of 'A'-marked porcelain and its relation to the Edward Heylyn and Thomas Frye patent of 1744. *Transactions of the English Ceramic Circle* 18, pp. 264-283.

Ramsay, W. R. H., Hill, G., & Ramsay, E. G., 2004: Re-creation of the 1744 Heylyn and Frye ceramic patent wares using Cherokee clay: implications for raw materials, kiln conditions, and the earliest English porcelain production. *Geoarchaeology* 19, pp. 635-655.

Ramsay, E. G., & Ramsay, W. R. H., 2006: Bow first patent porcelain: New discoveries in science and art. *The Magazine Antiques.* Brant Publications, New York, September issue, pp. 122-127.

Ramsay, W. R. H., Davenport, F. A., & Ramsay, E. G., 2006: The 1744 ceramic patent of Heylyn and Frye: 'Unworkable unaker formula' or landmark document in the history of English ceramics? *Proceedings of the Royal Society of Victoria* 118 (1), pp. 11–34.

Ramsay, E. G., & Ramsay, W. R. H., 2007a: Bow: Britain's Pioneering Porcelain Manufactory of the 18th Century. *International Ceramics Fair, Park Lane Hotel, London,* June 2007, 16p.

Ramsay, W. R. H., & Ramsay, E. G., 2007b: A classification of Bow porcelain from first patent to closure: c. 1743-1774. *Proceedings of the Royal Society of Victoria* 119 (1), pp. 1-68.

Ramsay, W. R. H., & Ramsay, E. G., 2008: A case for the production of the earliest commercial hard-paste porcelains in the English-speaking world by Edward Heylyn and Thomas Frye in about 1743. *Proceedings of the Royal Society of Victoria* 120 (1), pp. 236-256.

Ramsay, W. R. H., Ramsay, E. G., & Girvan, L., 2011: *Lund's Bristol Porcelain: ....and both are called fine ornamental white china.* Privately published Invercargill, NZ, 14 pp. ISBN 978-0-473-24549-8. <www.Bowporcelain.net>

Ramsay, W. Ross H., Daniels, Pat, & Ramsay E. Gael, 2013: *The Limehouse Porcelain Factory: Its Output, Antecedents & the Influence of the Royal Society of London on the Evolution of English Porcelain based on Composition and Technology.* Privately published Invercargill, NZ, 42 pp. ISBN 978-0-473-23459-1.

Ravenhill, W., 1979: *Devon and Cornwall Notes,* vol. XXXIV.

Sandon, J., 1993: *The Dictionary of Worcester Porcelain volume 1 1751-1851.* The Antique Collectors' Club Ltd., Woodbridge, Suffolk, 384 pp.

Sandon, J., 2009: *British Porcelain.* Shire Publications Ltd., 112 pp.

Spero, S., 2006: What we do not know about 18th Century English porcelain. *Transactions of the English Ceramic Circle,* 19(2), pp. 315-342.

Spero, S., 2013a: *Simon Spero, The Bunny and Paul Davies Collection of Early English Porcelain 1745-1792.* Pardy & Son (Printers) Ltd, Ringwood, 72 pp.

Spero, S., 2013b: *Simon Spero Exhibition 2013 English Porcelain and Enamels 1745-1780.* Pardy & Son (Printers) Ltd, Ringwood, 64 pp.

Spero, S., 2014: *Simon Spero 50th Anniversary Exhibition 1964-2014 Early English Porcelain 1748-1783.* Pardy & Son (Printers) Ltd, Ringwood, 72 pp.

Spero, S., & Burt, R., undated: *Lund's Bristol and Early Worcester Porcelain 1750-58, The A. J. Smith Collection.* Published by C. and J. Smith, Sealprint Ltd., London, 273 pp.

Thomas, J., Nancarrow, J., & Williams, D., 1751: *A New and Exact Chart of Mounts Bay and Parts Adjacent from the Lizard to Cape Cornwall.* Cornwall Record Office.

Toppin, A. J., 1931: A note on the Limehouse China Factory. *Transactions of the English Porcelain Circle,* 3, pp. 70-73.

Tyler, K., Stephenson, R., Owen. J. V., & Phillpotts, C., 2000: *The Limehouse Porcelain Manufactory, Excavations at 108-116 Narrow Street, London, 1990.* Museum of London Archaeological Service, Monograph 6, 73 pp.

Watney, B., 1963: *English Blue & White Porcelain of the 18th Century.* Faber and Faber, London, 137 pp.

Watney, B., 1973: *English Blue & White Porcelain of the 18th Century.* Second Edition, revised and reset, Faber and Faber Limited, London, Boston, 145 pp. and plates.

Watney, B. M., 1993: Limehouse wasters and Limehouse porcelain. *In;* D. Drakard, Editor. *Limehouse Ware Revealed.* Published by the English Ceramic Circle, 88 pp.

Limehouse Porcelain:

Are 'Limehouse' Porcelains in Fact all Limehouse? Evidence from Archaeology, Science, and Historical Documents

With the discovery of the Limehouse porcelain site in 1990 these porcelains have become prominent with auction houses, dealers, and collectors. Prior to the Limehouse excavation the consensus was that the first use of soapstone in English porcelains lay with Benjamin Lund at Bristol. This belief was based on the soapstone licence awarded Lund in early 1749, the observations by Richard Pococke, and the chemical analyses by Eccles and Rackham in 1922. However, with the discovery of the factory site the earliest use of soapstone was awarded to Limehouse based on unsubstantiated claims that some Limehouse porcelains in private collections contain magnesium. This we regard as one of the more significant red herrings in English ceramics in that no evidence to support this notion has ever been published in the literature - not even images of these alleged magnesian 'Limehouse' porcelains. Consequently, Limehouse has grown in stature to become the first to use soapstone, the first to employ moulding, the first to mirror silver forms, the first to use underglaze blue decoration, and even regarded as a role model for Bow. However, in our previous Limehouse monograph we demonstrated that this short-lived, failed concern was in fact highly derivative from Bow, a concern that was in existence ten, if not fifteen years before Limehouse. In this account we continue this line of research and argue that a group of soft-paste, magnesian wares previously attributed to Limehouse because of comparable decorative idioms is not of Limehouse origin. We contend that one can only arrive at this new understanding by integrating chemistry with historical records and connoisseurship.