New evidence for local manufacture of artefacts at Parramatta, 1790–1830

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Analysis of artefacts from recent excavations at Parramatta by Casey & Lowe has revealed new information about different levels of early industry in Parramatta. The proposition that certain varieties of bone buttons, earthenware smoking pipes and sandstock roofing tiles were made at Parramatta rather than Sydney Cove will be discussed using examples from a range of sites as well as technological and historical references. The buttons are revealed to be part of a widespread practice of bone working by seafarers, convicts, prisoners of war and slaves. The pipes are compared to those produced using similar methods and materials by individual seventeenth-century pipe makers in isolated settlements of Chesapeake Bay, USA. The tiles are shown to be an example of a British building technique that could not be successfully adapted to Australian conditions.

INTRODUCTION

Hand-manufactured objects have been found at numerous early colonial sites across the Sydney metropolitan area; those described here came from six locations at Parramatta on the south side of Parramatta River (Fig. 1). The sites excavated by Casey & Lowe from 2002–2006 were the Parramatta convict hospital at the new Parramatta Justice Precinct (PJP), the Parramatta Children’s Court site (PCC), the Meriton residential redevelopment on the northeast corner of George and Charles Streets (G&C) and the former Roads and Traffic Authority site at 109–113 George Street (RTA) (Casey & Lowe 2005b, c, 2006a, b, c). The Commonwealth Government Office Block and Law Courts site (GSP) on the south side of George Street, opposite PCC & PJP sites, was excavated by Edward Higginbotham in 1985 (Higginbotham 1986, 1987). The site of the Officeworks Superstore at 41–53 George Street was excavated by Martin Carney (Carney 1996).

From the foundation of the settlement in 1790 these parts of Parramatta had been occupied by a succession of convicts, leaseholders and later residents. At PJP there were two successive convict hospitals, built in 1792 and 1818, to the west of Marsden Street beside the Parramatta River. Converted into a public hospital in 1848, many of the 1818
structures survived until c1902. To the south and southwest of the hospital precinct were lots 98 and 99 which fronted onto George Street.

After exploring the Parramatta River as far as Prospect Hill in April 1788, Governor Phillip decided that the focus of settlement should be shifted to Rose Hill (Parramatta). The availability of arable land and good fresh water sources made this a logical conclusion, with the intention that Sydney Cove was to remain the port. To this end land was soon cleared and cereal crops of wheat, barley and maize planted. By September 1790 a settlement with a wide grid of a few streets was founded on the south side of the river, the central thoroughfare being High (George) Street stretching from the eastern landing place to the soon to be built government house on Rose Hill.

Although the government had first call on any new imported consignment which would be stored in the Commissariat at Sydney Cove until distributed throughout the colony, many goods including liquor and tobacco were purchased by military and civil officers who sold or traded them in the colony for a large profit. This trade became an entrenched monopoly after the departure of Governor Phillip when officers were the first to board any newly arrived British storeship or American whaler and assess its cargo (Collins 1798 (1):415; Gillen 1988:129 quoting Rev Thomas Fyshe Palmer in the 1795 London Star; Gov. Hunter to Portland, 12 November 1796, PRO, CO 201/13:249–250).

The goods purchased by the Commissariat reveals the priorities of the governor, which was to provide food, shelter and security for those in the new colony. Smaller personal items, those deemed unnecessary or leading to what the authorities considered unproductive and licentious behaviour (liquor and to a lesser extent tobacco), were often left wholly or in part to other buyers to purchase or to import. Convicts, the military, and many former convicts and free settlers were victualled and clothed off the government stores. They were housed in structures built almost exclusively of local materials using convict as well as their own labour. The first ships brought out a limited range of materials, tools and equipment but these were often of poor quality and quickly used or worn out. Frequently there was considerable delay until new stock arrived, leading to a cycle of reducing rations and a culture of recycling and ingenious invention (Freeland 1968:11–12; Gillen 1988:128; Herman 1954:3–4, 21; Proudfoot et al. 1991:36–38; Trench 1789, 1793 (1996):157–158).

The diary of Judge-Advocate Collins described various transactions of goods that arrived irregularly in the colony, whether ordered or part of speculative cargo of enterprising ships’ masters. Most of the goods came in bulk, such as food, drink, and to a lesser extent tobacco, fabric and leather. Intermittently, smaller items, some of a more personal nature, were also recorded. Imported Virginia leaf or Brazil roll tobacco was commonly brought and sold along with that locally-grown within a few years of settlement. By April 1791 tobacco was being grown and sold at the Hawkesbury for 10 to 15 shillings per pound. Because men were known to have exchanged the bulk of their weekly subsistence rations for a small quantity of tobacco Governor Phillip had intended to prohibit its growth. In Sydney during 1796 Virginia leaf sold for 5 shillings per pound, Brazil roll 7 shillings per pound and a gross (144) of pipes was £1 10 shillings or 2½ pence per pipe. In the same year wages per day for a labourer were 3 shillings and for a carpenter 5 shillings. According to market prices recorded by Collins in 1792 and 1796 most imported goods were slightly more expensive in Parramatta than Sydney Cove, whereas locally-grown produce was often cheaper. This difference has been attributed largely to the cost of transport from the port or the farms (Collins 1798 (1):132, 179, 221, 414, 567 n6, see listings in the index under provisions, trade and commerce).

The first shop in Sydney Cove was opened by the master of the Lady Juliana (Second Fleet) in June 1790 but the exorbitant prices charged left many of the goods including groceries, glass, millinery, perfumery and stationery unsold. Tobacco was being offered at 8 shillings 4 pence pound. It was said that a lot of the unsold articles were later thrown overboard when the ship sailed for Canton. Trench also states that several of the other ships’ masters in the Second Fleet opened up their stores and made good sales at similar extortionate values. By 1796 the mark-up on goods brought into the colony and sold or traded by the military monopoly was at least 100 per cent and frequently 1000 per cent. Due to the common practice of purchasing settlers’ crops for spirits instead of necessary provisions or ready cash there was widespread indebtedness and dependence on liquor. Early settlers, particularly those in outer settlements who were struggling to become independent of the government stores, were also subject to erratic or inadequate supplies, labour shortages and general profiteering. Until local producers were stronger, shipping more reliable and government controls on trade tightened, those who were not wealthy or privileged would have had to make most new personal or recreational items from materials at hand, either from scratch or by recycling others (Collins 1798 (1):98, 104, 400–401, 554 n18; Trench 1789, 1793 (1996):122–125, 132, 151–158).

The settlers and many in the government, in particular Governor Hunter, had wanted to establish a retail shop that would limit profits to a reasonable 50 per cent, to cover transport, insurance and salary, long before permission was granted by the British Government in 1799. This shop would also promote local wares and produce (Collins 1798 (1):415, 416, 608 n16; Gillen 1988:129). At Parramatta Rev. Hassall’s store on High (George) Street (adjacent to the RTA site) was established by 1803 and thought to have closed by the time of his death in 1820. He had many goods for sale, including tobacco, snuff boxes, wine, and various teas but it is uncertain how regular his supplies were. This establishment may have eased the cost of certain goods for many local residents but this was tempered by the continual lack of copper coinage (small change) in the colony (Casey & Lowe 2006b (1):35; Knight and Frost 1983:xiv–xvii; Mira 1981).

The roof tiles, buttons and some of the tobacco pipes discussed below were the products of different levels of industry at early Parramatta and Sydney, whether run by the government or private enterprise. These artefacts reveal the diverse responses of their manufacturers to unfamiliar materials and conditions, as well as the changing demands of their clientele.

**ROOFING TILES**

By February 1788, within one month of settlement, sandstock clay roofing tiles were being made in wooden moulds at the government-run brickyards at Brickfield Hill (Haymarket) Sydney, and fired in clamp kilns, then later in Scotch kilns.
Although roof tiles and tile moulds are not listed separately from the 10,000 bricks and 12 brick moulds brought out on the First Fleet they may have been included in the total. In the first two decades of the colony rectangular thin roof tiles were made alongside the bricks and thick floor tiles, using similar methods but with a slightly finer clay mix. Traditionally they required more careful handling and at times additional shaping (Dobson 1850). By April 1790 the Sydney yards that supplied bricks and tiles for government structures also made pottery (Tench 1789, 1793 (1996):152; Collins 1798 (1):103, 113; Lawson 1971; Worgan 1978:39; Proudfoot et al. 1991:38, 47; Varman 1993:58–59, 65; Casey 1999).

Until recently, archaeological evidence for early brick or tile kilns in Sydney has been scant, with scattered features such as cut-back pits and hollows or blown kiln bricks and pottery wasters found in the Haymarket, at the foot of Brickfield Hill. Lately, this information has been supplemented by waster pits from pottery production by Thomas Ball c1800–c1823 which contained numerous fragments of roofing tile (Casey & Lowe 2008 excavations at 710–722 George Street, Sydney), as well as artefacts and kiln debris from pottery, clay pipe and brick production by Jonathan Leak c1820–c1839 (Graham Wilson 2008 ongoing excavation at Wentworth Street, once Market Lane, Sydney).

In order to speed construction of the new Parramatta settlement a brick and tile yard, with more than one kiln, was established in September 1790 (Collins 1798 (1):113; Tench 1789, 1793 (1996):157, both only mention brick production). It was located on the south side of the Parramatta River at the east end of the Crescent below government house and the early military redoubt; some 300 to 450 m west of the PJP and PCC sites (Figs 1, 2). The brickyard was overseen by the Sydney-based master brickmaker Samuel Wheeler but operated by James Becket, a convict who had experience in brickmaking in Birmingham, UK. By November 1790 Becket and his gang of 52 workers were turning out some 25,000 bricks and an unknown number of tiles per week. Brickmakers including Becket had moved by 1805 to a low-lying area to the north of the river where there were good clay beds beside a meandering creek. This area, known as the ‘Brickfields’, was in the vicinity of modern Brickfield Street, and mentioned in a letter of 1805 as well as noted on plans of 1822 and 1831. Becket is thought to have continued to operate from here until at least 1826, with industry leaving the area in the 1830s–1850s (Gemmell 1986:72; Jervis 1961:32–33; Kass, Liston and McClymont 1996:175; Varman 1993:59–62, and 85–133 for a gazetteer of early Parramatta brickmakers).

The contemporary Sydney Brickfield Hill brick and tile makers, such as John King and Samuel Wheeler, had previously worked in London. Wheeler had increased production by November 1790 to 40,000 bricks and tiles per month (Tench 1789, 1793 (1996):152–153). The manufacture of tiles was a more frustrating process than that of brickmaking, with one fifth of the 15,000 produced in 1793 from any one kiln commonly destroyed during firing. Other heavy losses occurred during transport. In December of the same year there was only one master tiler ‘at the place’ (Brickfield Hill), probably Wheeler, resulting in acute shortages of tiles for building works (Collins 1798 (1):277; Varman 1993:58–60).

Locally available materials such as thatch, shingles or bark were used as roofing by most of the population. In the first decades of the colony only government buildings and those of the wealthy were built of brick and tile. At Parramatta these included the 1790 Government House (and 1799 rebuild), storehouse and barracks, and the 1792 Parramatta convict hospital (PJP). It has been thought that the bricks made by Becket followed the Birmingham standard which was larger than that of London (Varman 1993:215–216). As sandstock

Figure 2: ‘A view of Government Farm at Rose Hill, New South Wales 1791’. By the Port Jackson Painter, 1791. Note kiln to the left of the bridge which was destroyed in a flood in January 1795. British Museum of Natural History Zoological Library, Image reference number: 12018.
bricks made prior to mechanisation show a high degree of variability in the clays, moulding and firing conditions, it is often difficult to equate the standard sizes given for unfired (green) with those of fired bricks. This is especially true when considering the shrinkage of slop-moulded bricks. On the whole, however, the bricks attributed to Becket from the 1792 hospital were larger in size than those made in Sydney (Stocks 2008).

By c1810 it appears that the sandstock roof tiles were no longer made, being replaced by timber shingles in better quality buildings until slate or terracotta became more cheaply available (Herman 1954:6, 10, 135, 138; Freeland 1968:13–15, 17, 193; Proudfoot et al. 1991:38, 45–47; Kass, Liston and McClymont 1996:15–16; Lewis 2008:6.01, 6.06). The high number of sandstock roof tiles found relating to the 1792 convict hospital at PJP, and a storage cellar at the adjacent PCC site, has led to the identification of seven varieties of tiles made with two distinct technologies. These have been given brief type names according to characteristics based on fabric and morphological differences (Figs 3, 4). The first group of tiles, with Single Lug 1 (SL1) technology, have been commonly found in Sydney, such as at First Government House site (FGH), Cumberland and Gloucester Streets, the Rocks (Pearson 1999; Barnes 1999) and 710–722 George Street, Sydney (Casey & Lowe 2008 excavations); whereas at Parramatta they formed a far smaller proportion, being only 361 or 29.4 per cent of a total of 1226 tiles (Table 1). Measurements of the tiles and their minimum number counts at each site in Parramatta are listed on Table 1, although no complete example of the Peg1, SL2 or any Ridge tiles has been found to date.

**SL1 (SYDNEY) TECHNOLOGY**

This group of tiles were made in a simple rectangular mould and then partly reshaped by hand before firing. They were made of poorly mixed and crushed clays, appearing to be folded in profile, and were low fired to

![Figure 3: Sandstock roof tile typology.](image)

Table 1: Sandstock roof tiles types from four Parramatta sites. Measurements in mm.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Type</th>
<th>Measurements</th>
<th>PJP</th>
<th>PCC</th>
<th>G&amp;C</th>
<th>RTA</th>
</tr>
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<tr>
<td>SL1</td>
<td>SL1</td>
<td>217x139–140x13–14; 250–266x135–146x12–17</td>
<td>138</td>
<td>11.3</td>
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<td>210</td>
<td>17.1</td>
<td>7</td>
<td>3.8</td>
<td>12</td>
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<td>0.7</td>
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<td>0.0</td>
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<td>530</td>
<td>43.2</td>
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<td>100</td>
<td>186</td>
<td>100</td>
<td>36</td>
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</tbody>
</table>
Figure 4: Types of sandstock roof tile from PJP, cm scale.

i: Peg 1 holes in stock and strike face.

ii: SL2.

iii: SL1 lug end with finger impressions on strike face.


v: DL1 strike face and lug end.

vi: DL2 with one lug not pushed down.

vii: Ridge 1 (left), Ridge 2 (right lower), Ridge 3 (upper right).

viii: Ridge 2 end.

ix: Ridge 3 end.
either pink and white or buff and white. The tiles were thin with sanded faces, the strike often with trimmed side margins. During use the tiles frequently split along interleaving sandy layers or sheared off at the base of the lug.

The most common type was Single Lug 1 (SL1) which had a concave lug or nib made by pinching one end between the thumb and fingers, leaving a hollow and occasionally finger impressions below on the strike face. Another type, Peg 1, was less common with two rectangular holes punched through the body near one end through which wooden pegs or metal nails were passed to fix them to the roofing battens. After being perforated, the area around the holes was trimmed flat before firing. Wooden pegs were made by convict women in Sydney to affix shingles to the first hospital and were possibly also used for clay tiles (Collins 1798 (1):23). This type of tile which had been made in Britain from Medieval times, had become uncommon in London by 1850 (Cherry 1991; Dobson 1850 Vol 1:42; Shopland 2005:140). During analysis it was impossible to separate the SL1 and Peg1 types unless the lug or holes were present, therefore the combined notation SL1/ Peg1 on Table 1. The third type was a ridging tile, Ridge 1, where the strike face formed the convex outer face. These tiles were bent to shape on a curved object or mould after being removed from the stock mould, the surface and edges showing signs of finger smoothing and trimming. As the number of ridge tiles used on a roof is far less than those on the sloping areas fewer have been found.

DL1 (PARRAMATTA) TECHNOLOGY

The Double Lug tiles were made to be more durable and were longer, wider and thicker, with a smoother, non-sanded strike face than SL1. They were slop-moulded in frames which for two of the types were specifically constructed to have lugs or nibs projecting from one end. The wet clays were well mixed and crushed, often with tiny or small white lumps within a red matrix, enabling a successful mould. The final colour and porosity of the tiles depended on how or where they were fired in the kiln, with colour ranging from buff to a more common light orange-pink, and an occasional bright orange. Although the clay was of a finer (sieved?) mix, it was otherwise similar to that used to make the slop-moulded 1792 bricks found at the sites of PJP and PCC. Production of this group of tiles and the use of slop moulding was common by 1850 in London (Dobson 1850 1:42, 105, 107–108, 111).

The most common type of this second group was Double Lug 1 (DL1) with two thick projecting lugs at one end. Once the tile was out of the mould and on a drying board the lugs were pressed up at right angles towards the smooth strike face, although some were done carelessly or not at all. In 1850s London this was done by the attendant boy on the way to the drying yard (Dobson 1850:107–108). Another slightly smaller, thinner and rarer type, Single Lug 2 (SL2), had only one angled lug. The curved ridging tile, Ridge 2, was made in a similar fashion to that described above for Ridge 1 but again the form was thicker and more regular using the DL1 clay mix. Ridge 3 is a variation on Ridge 2 with one end having an angled side ledge, probably for use on the outer corner of the roof.

REASONS FOR TILE TYPES

The reasons why the two groups of roof tiles were manufactured and used in the colony may be due to a combination of seven factors:

1. Chance: different local clays and random kiln variances between Sydney and Parramatta.
2. Background: tile makers learnt their trade in different regions in Britain and therefore were making tiles with differently prepared clays and different-sized moulds in Parramatta and Sydney.
3. Organisation: centralised government controlled who made the tiles in each location, who distributed them, and put them on the roof during initial construction and repair.
4. Function: the seven varieties were used to cover different parts of the roof with some buildings not needing all types, such as government buildings vs. private dwellings.
5. Time: traditional style and technology in Britain and the availability of materials may have altered during the period the different tile makers and kilns were operating.
6. Innovation: a desire or necessity to improve on the poor performance of the Sydney or earliest products by making tiles larger, thicker, with stronger lugs, and using a wetter clay that had been better prepared. The adaptability of individual master brick and tile makers influenced by the experience of changing convict personnel.
7. Recycling: whether planned or ad hoc.

The SL1 group of tiles is almost always the only type to have been found or identified at Sydney. The fabric and poor quality of the SL1 group equates well with Samuel Wheeler’s description in November 1790 as having ‘a rotten quality, and besides wants the advantage of being ground, in lieu of which they tread it.’ (Tench 1789, 1793 (1996):152–153). In the light of the Parramatta findings a re-examination of tiles from Sydney sites is perhaps needed, particularly as several fragments of SL2 type tile, ceramics and blown bricks from pottery manufacture have been found in fill for a 1830s drain on Brickfield Hill (Annable 1989 Vol 1:12–13, vol. 4: figs A1, A2; see also Lewis 2008:6.06.1.).

The SL1 and Peg 1 tile varieties and clay mix found at Parramatta are identical to those found in Sydney. As there are both SL1 and DL1 types at Parramatta, with the latter usually being more common, it is reasonable to infer that the DL1 type was made only there. In addition it seems likely that the SL1 group of tiles found at Parramatta were imported from Sydney or locally made before techniques improved there by 1792. The poor quality of Becket’s earliest bricks (and tiles?), described in November 1790, probably led to a quick change of clay source and manufacturing methods at Parramatta (Collins 1798 (1):117). Many of the workers at the Parramatta yard may have learnt useful lessons when working in Sydney. By 1792 a different source of clay was being mixed and crushed for slop moulding of fairly uniform bricks, floor tiles and roof tiles. The new location was almost certainly to have been in the vicinity of Brickfield Street in North Parramatta (Fig 1) which was known as an early clay source and manufacturing area by 1805 (Gemmell 1986:72; Jarvis 1961:32–33, 1859 map at front end paper). Other places such as Clay Cliff Creek or Beckett’s (A’Beckett’s) Creek on the opposite side of the river may have been used but there is no historical reference to these sites and others in central Parramatta before the 1850s (Kass, Liston and McClymont 1996:175–176, plans p. 11, 113, 155, fig. p.216).

The homogenous and better crushed clays, the thicker body and sturdier lugs of the DL1 group meant that the new
Parramatta tiles were more robust. In contrast this change did not occur at Sydney, perhaps there were no other suitable clay sources or the use of slop-moulding would have required new moulds and extra water to be carted in. The makers at Sydney might also have been happy with the quality of their bricks and resigned to the poor quality of the roof tiles which were made with different clay, especially when more convict labour was sent to establish Parramatta from September 1790 (Collins 1798 (1975) 1:113ff). The improvements to the tiles manufactured at Parramatta may have meant that they were utilised for a longer time as roofing material than those in Sydney. Interestingly the sandy surfaces of the SL1 tiles protected the fragments from deterioration in the extremely alkaline ground soils in the yard of the 1792 Hospital far better than those of the DL1 group.

Centralised administration’s control of planning and construction in the colony enabled the limited expertise, labour and materials to be moved from place to place in order to undertake building projects or fill temporary shortages. The changing numbers of workers needed at Sydney, Parramatta and other localities were recorded in the ‘Returns’ for government brickmakers until c1810 and various censuses (see Varman 1993:55–62). Private brickmakers’ traditional pattern of activity was to manufacture bricks in a single place and then distribute them from that location which is contrary to the shifting around of convict workers to suit government requirements. Although the movement of people would have fostered sharing of technical knowledge and innovation, this would have been tempered by the traditional conservatism of tradesmen and the limitations of project resources and timeframes.

The use of both groups of tile technology at Parramatta may have been necessary if the local product was either scarce or not being made for periods of time. The records show that structures in Parramatta and Sydney were being continually repaired, which would result in a mix of building materials and types being used (Collins 1798 (1):28, 79, 82, 117, 172, 217, 284, 326, 339, 358). The deposits relating to the 1792 convict hospital include fragments of SL1 group of tiles but the bulk, some 96 per cent in construction contexts, were the DL1 group. The SL1 group of tiles may have been leftover stock used in the 1792 build or perhaps during later roof repair. By 1813 it appears that the roof of the hospital was shingled, the remaining tiles stockpiled or laid flat to aid drainage and provide irregular paving in the southern yard where they were found during the excavation (Superintendent of Carpenters, Parramatta Lumber Yard Returns 11 September to 9 October 1813; Miskella 2005–06:116; Stocks 2008:48).

Recycling of unwanted, lower quality or broken objects of all kinds was common, enabling some of the government stockpiled bricks and tiles to make their way to the private sector. A much lower proportion of sandstock clay tiles were found at all the other non-government sites at Parramatta excavated by Casey & Lowe (PCC, G&C and RTA). Some were no doubt reused from earlier buildings after demolition or obtained as seconds or surplus stock. However, two structures from these sites were built by early leaseholders almost entirely of bricks and tiles identical to those used in the 1792 hospital (Stocks 2005b:33–36; Stocks 2007:62–63). One was the brick and tile cellar on lot 102 at PCC constructed by either the French prisoner-of-war Anthony Landrin (Antoine L’André) or the emancipated convict Samuel Larkin. These leaseholders held government positions in the first decades of the nineteenth century such as cooper, clerk and storekeeper and may have had authorised or unofficial access to materials and convict labour (Casey & Lowe 2006a 1:21–25). The second was a brick well with a barrel base found on lot 14 at G&C which had a number of unrecorded leaseholders before being occupied by the veteran soldier Hugh Owens and his family in 1823 (Casey & Lowe 2002:23–24).

**BONE BUTTONS**

Bone, horn and ivory working was a widespread practice with evidence for it being continually found on sites of many periods across the globe. Small items such as bone buttons, dice, dominos, brushes and combs were commonly made in Medieval and post-Medieval Britain (Anon 2004; Prudames 2004) as well as in locations occupied by the British during the eighteenth and nineteenth centuries. Debris includes sawn, turned, drilled and carved offcuts, blanks as well as broken and whole objects. Bone was a renewable and cheap resource to the early settlers in Australia, allowing small functional and decorative items to be made as an assigned task, for personal use or to be sold. Such a cottage industry could be done by men, women or children, either as a main activity or in idle hours, day or night.

Sawn bone offcuts, possibly from button making, were found at First Government House (FGH), Sydney from the 1790 Guard House area (observed during excavation in 1991). At Parramatta the best evidence for button manufacture was at PJP although roughly made bone buttons and a sawn ivory tusk were found at G&C, and scrimshaw from an 1840–1880 house at 134–140 Marsden Street (Howlett 2005). Buttons, blanks and offcuts at PJP were found mostly in the remnant disturbed topsoils in different parts of the site. Due to extensive sieving of these topsoils during the excavation, some 24 of the 35 recovered offcuts and blanks were found in an area directly above the remains of a Marsden Street convict and leaseholder hut. This hut, last occupied by Daniel Allen, was demolished at some stage between 1814–1818 to make way for the third convict hospital (built 1817–1818). Although the hut area was disturbed by various activities until at least 1890, the majority of the artefacts found in the remnant topsoil (5525) were made before 1850 or earlier, perhaps indicating that there was limited opportunity to disturb this area in the front entrance of the third convict hospital and directly off Marsden Street (Stocks 2008, 2009).

The various offcuts, blanks and buttons found at Parramatta have enabled us to understand the stages of manufacture of bone buttons, mostly of the simple 1-hole type but also of the larger varieties. At PJP 20 out of a total of 33, and at G&C four out of a total of nine 1-hole bone buttons appear roughly made or unfinished. The vast majority were of the smaller size, averaging 11–13 mm in diameter. Due to the action of the lathe or brace the negative cut-out holes in the source bone (offcuts) were 1–2 mm more in diameter (Table 2, Figs 5, 6). Sometimes used to fasten underwear, these buttons or discs were really blanks that were covered in cloth or thread, or were part of component buttons (Lindbergh 1999:51–52; Peacock 1978:56).

From personal observation and information in the published references these stages of manufacture were:

1. Selection of suitable tabular bone of cattle, such as rib and scapula, and possibly other animals not yet studied
bone buttons which included covered rougher types from drilled holes (Iacono 1999:45–47, fig. 5.2). Sawn and turned rocks, with the 3 and 5-hole buttons having asymmetrically were uncovered at Cumberland and Gloucester Streets, the most recent were made in the 1830s and buttons. Many of the other artefacts in the fill could be dated as well as six 1-hole, two 3-hole, three 4-hole and five 5-hole offcuts, a small carved bone stopper with a human fist finial, from c1790 but the most recent were made in the 1830s and 5-hole types dating prior to c1830, as several were unfinished.

Subsequent polishing did not usually occur on these blanks but can often be seen on 3, 4 and 5-hole buttons (Fig. 5). Some polishing may have also occurred during wear. Occasionally the bone is darker in colour and may have been stained. The larger buttons often have incised marks to aid in the centring of the lathe, similar to those have been stained. The larger buttons often have incised marks to aid in the centring of the lathe, similar to those found at Hyde Park Barracks, Sydney (observed during inspection in 2007).

Some of the larger and thicker-sized bone buttons found at PJP may also have been locally made, particularly the 3 and 5-hole types dating prior to c1830, as several were unfinished or irregular (Houart 1977:23; Olsen 1963:552, fig. 1J; Stanley South typology cited in Noël Hume 1969:90, fig. 23). Good examples were found in a pit at the south side of the second convict hospital. In the backfill (context 6367) were four bone offcuts, a small carved bone stopper with a human fist finial, as well as six 1-hole, two 3-hole, three 4-hole and five 5-hole buttons. Many of the other artefacts in the fill could be dated from c1790 but the most recent were made in the 1830s and early 1840s (Table 2). A similar range of bone-button types were uncovered at Cumberland and Gloucester Streets, the Rocks, with the 3 and 5-hole buttons having asymmetrically drilled holes (Iacono 1999:45–47, fig. 5.2). Sawn and turned bone buttons which included covered rougher types from 1770–1780 contexts were found sewn onto grave clothing at the African Burial Ground in New York, USA (Bianchi, Bianco and Mahoney 2006).

At the PJP site convicts, leaseholders or perhaps patients of the hospital may have made the buttons for personal use or they were intended for the convict women at Parramatta Female Factory who made fabric and clothing for the government. The factory was located on the upper floor of the gaol on the opposite side of the river from c1804 and then in a separate complex downstream from 1817–1848 (Kass, Liston and McClymont 1996:59, 61, 85). Slop clothing, buttons and other supplies that were issued to convicts in the early decades of the colony were shipped from Britain or India and distributed through the Commissariat Store. The Commissariat records for 1790 and 1792–1794 lists horn buttons amongst the items such as thread and needles with which the convicts were meant to repair their clothes. Once the Female Factory was established at Parramatta the women were issued with sewing equipment. Bulk issues of ‘dead-eye buttons’ in the 1830s and 1840s were used on slop clothing such as frocks, shirts, trousers and jackets. The Ordnance Store replaced the Commissariat in the 1840s and kept similar records that do not list buttons separately. Studies of catalogued convict clothing, made mostly in the mid to late nineteenth century, have shown that most were fastened (repaired?) either with brown-dyed (mostly 4-hole) bone or metal (often Japanned) buttons (Daniels 1998:14–15, 107–128; Manera 1997; Westmacott 1986).

Recent excavations indicate that in the late eighteenth and early nineteenth-century bone turning and carving was commonly done at isolated military establishments or prison hulks by convicts, prisoners-of-war or slaves, some of whom were able to exchange their objects for food and other necessities. This would have been most useful in the early colony of New South Wales when many people bartered for goods. The most comprehensive and comparable study on bone-button working in the literature to date has been that of bone or metal (often Japanned) buttons (Daniels 1998:14–15, 107–128; Manera 1997; Westmacott 1986).

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Figure 5i: Bone buttons, button blanks and offcuts from disturbed topsoil 5525 at PJP, cm scale.

Figure 5ii: Detail of snapped button blank, cm scale.

Figure 6: Range of turned bone buttons from Parramatta, cm scale.
ribs and scapulae, and turtle costal bones. The researchers concluded that these were made using a hand-held brace with a specially modified drill bit, known as a button bit in the eighteenth and nineteenth-century sources (Klippel and Schroedl 1999). Another contemporary military site at Ile de la Passe, Mauritius has recently found almost identical debris to that from PJP, as well as fragments from the manufacture of larger buttons, dice and dominoes dating to the 1810–1820s British occupation. The excavators do not identify who they think did this work, whether prisoners, soldiers or slaves (Summers 2005, 2006).

The site of the Dromedary convict hulk at the dock of Bermuda revealed an impressive array of turned and carved stone and bone artefacts as well as lengths of bone with the outlines of a series of different buttons in the first stages of production. These carved items included dice, small dominoes, brushes and human fists, many of which were also made by French and American prisoners-of-war at Melville (now Kavanaugh) Island off Halifax, Canada from 1780 to the 1820s (Addams and Davis 1998).

Similar carved bone dice and dominoes have been recently found at Brickfield Hill, Sydney (710–722 George Street, Casey & Lowe excavation 2008; 2–6a and 12 Cunningham Street, AustraL Archaeology excavation 2005, observed during artefact analysis, see Hickson forthcoming). At Parramatta one small dice was discovered at G&C cut-down from a locally-made clay marble (Stocks 2007:39). These items and the bone fist stopper from PJP could have been made by convicts, sailors or even the French prisoner-of-war and later government coopper Anthony Landrin (Antoine L’Andre). From 1801 to c1811, Landrin planted and tended his small orchard at the PCC site, adjacent to the convict hospital, on lot 102, fronting George Street. He made casks to store wine and other goods and is known to have traded timber buckets he made for goods at Rev. Rowland Hassall’s store at 109–113 George Street (Casey & Lowe 2006b:121).

**CLAY PIPES**

A group of unusual earthenware reed-stem tobacco pipes have been found at Parramatta (Fig. 7i). At PJP most were from disturbed topsoil deposits that were close to the second convict hospital (1792–1818) and the lot 98 leaseholder hut yard. One fragment was within the backfilled drain of the hospital and another deposited during early tree clearance (Table 3).

The faceted carved type found at Parramatta (Fig. 7i–iii) comprises 19 broken pipes, of which 12 were found at PJP, five at G&C, one at GSP (Higginbotham 1986: fig. 4.4, 1987:11) and one at 41–53 George Street (Carney 1996; G. Wilson 2008, pers. comm. 2 November). Their find locations at Parramatta

<table>
<thead>
<tr>
<th>Location</th>
<th>Type</th>
<th>Measurements</th>
<th>Site</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parramatta</td>
<td>Facetted carved (octagonal), tapered spur, flat bowl rim, flat stem end, very large bore</td>
<td>Total L=74&lt;br&gt;Bowl H=45&lt;br&gt;Bowl Dia=25&lt;br&gt;Spur H=5&lt;br&gt;Stem L=46&lt;br&gt;Stem Dia=15&lt;br&gt;Bore Dia=6.5</td>
<td>GSP (Higginbotham 1986)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>G &amp; C</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PJP</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>41–53 George St (Carney 1996)</td>
<td>1</td>
</tr>
<tr>
<td>Sydney Haymarket</td>
<td></td>
<td></td>
<td>710–722 George St (C &amp; L 2008)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cunningham St (Austral 2005)</td>
<td>2</td>
</tr>
<tr>
<td>Sydney the Rocks</td>
<td></td>
<td></td>
<td>Gloucester Tower between Gloucester and Cumberland Streets (AHMS 2008)</td>
<td>1</td>
</tr>
<tr>
<td>Total facetted</td>
<td></td>
<td></td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>carved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parramatta</td>
<td>Whittled fine facetted (almost smooth surface), thick, flaring to cut flat stem end. A blank, apprentice piece or copy of octagonal type?</td>
<td>Stem L=32+&lt;br&gt;Stem Dia=21–24&lt;br&gt;Bore Dia=7</td>
<td>PJP</td>
<td>1</td>
</tr>
<tr>
<td>Total whittled</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Parramatta</td>
<td>Elbow rolled, normal-sized bore with 2 holes into bowl base. USA import</td>
<td>Stem Dia=16&lt;br&gt;Bore Dia=2.5</td>
<td>PJP</td>
<td>1</td>
</tr>
<tr>
<td>Total elbow rolled</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>31</td>
<td></td>
</tr>
</tbody>
</table>
point to their being made before c1820 and definitely no later than 1825. The examples are so consistent in their fabric, size and morphology that they were probably produced as a single batch. They were made of earthenware and fired unevenly to an orange or dark grey colour. The clay and firing conditions are not dissimilar to those used to make the orange-bodied early unglazed and lead-glazed pottery and some handmade marbles found at Parramatta and Sydney. The pipes were probably formed using a rough mould or were possibly hand-rolled around a central cylindrical object. They have a long bowl with a flat rim, a tapered spur with a flattish base, a short thick stem with a flat end and a large bore (smaller through the bowl). When leather-hard they were carved with a knife into regular octagonal facets. The maker and carver had some level of skill as the pipes are remarkably uniform. A separate mouthpiece (reed) of wood, bamboo, bone or even ball clay pipe stems would have been inserted into the stem.

Although one reed-stem pipe with unknown morphology was found at Lilyvale, the Rocks (Gojak and Stuart 1999:39 note 14), no faceted carved reed-stem pipes had been recorded before 2008 from any site in Sydney Cove or Brickfield Hill. When the 17 pipes were discovered at Parramatta in 2002–

Figure 7: Earthenware reed-stem and elbow pipe forms from PJP.  i-iii: carved faceted.  iv-v: rolled and thick white whittled possible blank.  vi: stem ends of left whittled and right carved faceted.  Scale drawings by Franz Reidel, cm scale.
2006 and were combined with two others of identical shape that had been previously found in the immediate vicinity their cluster strongly suggested a local regional maker. However, recent excavations at the Rocks and Brickfield Hill, Sydney have uncovered eight more examples of this type of pipe. At the Gloucester Tower site between Gloucester and Cumberland Streets, the Rocks, a faceted carved pipe fragment with a flat stem end has been found in a partly processed deposit that may date before 1810 (AHMS excavation; G. Wilson 2008, pers. comm. 3–4 December). At Brickfield Hill fragments from seven slightly warped pipes have been discovered, five from one of several pits filled with c1800–1823 pottery wasters (710–722 George Street, Casey & Lowe excavation 2008); and two from allotments to the immediate northwest (2–6a and 12 Cunningham Street, Austral Archaeology excavation 2005, observed during artefact analysis, see Hickson forthcoming). Only one of the pipes from the 710–722 George Street had been used indicating that most had been altered and broken during firing. Two examples of identical marbles with lead glaze splashed onto them during kiln firing have also been found in the disturbed topsoil of lot 98 at the PJP site.

The potter Thomas Ball, who dumped much of his broken wares and kiln debris at 710–722 George Street, was a very inventive craftsman. He made a wide variety of pottery including those with glazed and applied plastic decoration, as well as marbles with lead glaze splashed onto them during kiln firing. It seems probable that the carved faceted pipes were also made at his pottery works but with production perhaps lasting only for a short time as they were only found in one of the waster pits. Analysis of this recently excavated material is ongoing.

Facetted pipes were made in Britain, Europe and America in the middle and late nineteenth century but these were generally made in moulds using white ball clay (Reckner and Dallal 2000:58; Humphrey 1969:30, fig. 42). The tradition of reed-stem pipes, bent in a curved or elbow shape and usually fully moulded, were initially made by Indigenous eastern tribes of North America and then by European settlers in the United States until the twentieth century. From 1740–1951 the Pamplin area of Virginia has had a continuing tradition of moulded reed-stem pipe making, several varieties with facetted designs but no spur (Hamilton and Hamilton 1972). Examples of reed-stem pipes have rarely been found in other countries, even neighbouring Canada (Walker 1983:40–41).

The way the faceted-carved pipes found at Parramatta and Sydney were made has close parallels to similarly finished one-piece pipes made in the seventeenth century in the Chesapeake Bay region of the eastern United States including the site of Jamestown (Association for the Preservation of Virginia Antiquities 1997, 1998). Extensive work has been done in Maryland and Virginia to locate and record early local earthenware pipe-making centres (Luckenbach and Kiser 2006: esp. fig. 22 the faceted pipes by ‘The Carver’ c1640 from Virginia). As these operations existed only for short periods of time, often being the product of a single maker, the output was relatively small and the distribution restricted. These inexpensive pipes, robust for frontier conditions, filled a gap in the local market at a time when many town-made or imported goods were rarely available in regional areas.

It is not inconceivable that the production of facetteed carved pipes represent a similar local response to a temporary need in the new colony of New South Wales. They appear to have been made over a short period of time and were perhaps not popular. Their style and morphology links the pipes to both America and Britain/Europe, the latter indicated in the shape of the bowl and in particular the spur. Although the maker clearly had knowledge of eastern American pipe traditions, it is unlikely that they were made in America or in Britain/Europe for the American market and sold here as part of ship’s cargo. Despite their higher occurrence at Parramatta the pipes appear to have been made at Brickfield Hill, Sydney by the potter Thomas Ball c1800–1823 and sold with pottery and clay marbles up river. The rarity of these pipes on excavation sites in Sydney may be due to small production numbers or perhaps competition with the main contemporary producer of ball clay pipes William Cluer, c1802–1846. It is possible that Ball took the opportunity to sell his pipes when Cluer died in 1821 leaving the business to be run by his wife Mary Morgan (Gojak and Stuart 1999:45).

The stems of two other unusual earthenware pipes that had been smoked and discarded were also found at PJP in early contexts and provide a useful comparison (Fig. 7vi–v, Table 3). Both were fragmentary with blackened (used) cores and were hand-rolled and finished rather than moulded. One was a coarse red clay curved elbow pipe, possibly with a separate mouthpiece, the other a conical reed-stem pipe with a large bore made of white clay with occasional red swirled crushed inclusions. The first example was found in disturbed topsoil above the Marsden Street hut and had been made in North America by a person with an Indigenous or European background (Walker 1983:40). Curved stem types, with or without decoration, have been made there by Europeans from the seventeenth century (Luckenbach and Kiser 2006: 4, pipes by Emmanuel Drue c1660 from Maryland, Chesapeake USA).

The other example had a very thick and rather impractical short stem that had been carefully whittled to a near smooth surface. The flat end of the stem where the separate mouthpiece had been inserted was similar to those on the faceted carved reed-stem pipes but had a larger diameter (Fig. 7vi). The pipe was found in a hole where a tree had been removed in the back yard of the lot 98 leaseholder hut fronting George Street. From before 1804 until 1821 the leaseholder was Timothy Hollister, an ex-convict. As the Government Overseer with two assigned convicts, he would have had access to a variety of goods being made at Parramatta or shipped up river from Sydney (Miskella 2006:8, 30–31). The backfill (6547) of the tree hole contained numerous early artefacts typical of the leaseholder period, such as a turned bone button, a white hand-rolled clay marble, local and imported ceramics, glassware, an agricultural slashing tool, and a gilt Royal Marines Officer button dating to 1802–1855. Approximately 26 broken ball clay pipes were also found, including two made in Sydney by William Cluer and one probably made in Britain marked WR.

The form of the whittled pipe suggests that it was made by someone who lived or worked in the hut in an attempt to copy the faceted carved reed-pipes. The clay used to make the pipe and the marble in the pit was similar to that used for some of the unglazed ceramics and sourced either in Parramatta or Sydney. Similar locally-made hand-rolled clay marbles have been found elsewhere at PJP and at other sites in the region (Baumann 1971; Opie 1997; Randall 1971). A few pipe makers are recorded as working beside potters and brickmakers at Sydney prior to an expansion of the industry in the 1820s and 1830s and this may have also occurred at Parramatta (Casey 1999:8; Gojak and Stuart 1999; Wilson 1999).
We can infer from the minimum count of 1148 pipes found at PJP that the residents as well as the hospital patients and guards smoked prodigiously from the earliest times. Many early ball clay pipes from the site, including 23 made by William Cluer, were badly stained (torrefied) by tobacco juices, the broken stems continually reused or modified as mouthpieces until they were mere awkward stubs beside the bowls. The few pipe moulds in the colony were being used so much that signs of wear were often visible on the surface of the pipes. As ball clay pipes were easily broken and there were limited new supplies it is likely that some experimentation with pipe-making was done by hand, using local Parramatta or Sydney clays during the early decades of settlement. Although a repetitive task, the thicker forms would have been less fiddly to make and trim by hand than recutting narrow moulds with tiny lettering or decorative elements. In addition the size and material of the handmade pipes enabled them to be more robust during handling, shipment and firing with other items in a general kiln.

CONCLUSIONS

These three categories of artefacts shed light on early manufacturing in Parramatta in a variety of ways. They show how the early residents and perhaps visitors from America, in times of acute shortages and deprivation, adapted skills and techniques to make items out of local materials, and at times improved upon the original products. The master tile (and brick) makers working for the government using unfamiliar clays and inexperienced workers strove to make sturdier and more user-friendly roofing, improving a flawed imported design in a very short space of time. As a consequence sandstock roof tiles may have been made for a longer time at Parramatta than at Brickfield Hill (Haymarket) Sydney.

Many of the techniques used to make smaller items of bone and ivory were commonly practiced by the seafaring community and others associated with European colonial occupation across the world. The button makers, possibly former convicts who honed their skills on convict hulks, working either for themselves or the government were able to make many small useful items with the aid of simple tools, a hand-driven machine and discarded bone. Those involved in pipe making, whether in Parramatta or Sydney, were willing to experiment with different clays and methods in order to fill a gap in the market and perhaps make a profit. Although there were many desperate smokers in Australia, there were perhaps not enough to make such businesses viable in the long term when pipes made of ball clay became more easily available and were imported by the thousands.

ACKNOWLEDGEMENTS

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ABBREVIATIONS

AGL Former Australian Gas Light Company, Haymarket
AMM Former African Medical Mission, Sydney
AYTO E.G. 1994 Clay tobacco pipes, Shire, Princes Risborough, England
CASEY & LOWE 2005a Excavation permit application, Parramatta Hospital Site, Marsden Street, Parramatta, unpublished report for NSW Department of Commerce, March 2005.
CASEY & LOWE 2005b Preliminary results archaeological excavation Stage 1, Parramatta Hospital Site, Marsden and George Streets, Parramatta, unpublished report for NSW Department of Commerce, August 2005.
CASEY & LOWE 2005c Preliminary excavation report, Stage 2b, Blood Bank, Parramatta Justice Precinct, former Parramatta Hospital Site, Marsden and George Streets, Parramatta, unpublished report for NSW Department of Commerce.
Commerce and NSW Attorney-General’s Department, December 2005.

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