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**The Africa Trade and the Bristol Gunpowder Industry**

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The Africa Trade and the Bristol Gunpowder Industry

By BRENDA J. BUCHANAN

On 10 January 1699 the Betty of Exon, a vessel of 80 tons with four guns, sailed from Bristol for Cape Verde, which with its islands formed a depot for the human cargo of the slave trade. The ship was the first to leave this outport engaged legitimately in the trade, for until the Act of 1698 the trade had been monopolized by the London-based Royal African Company. The cargo carried by the Betty of Exon provides an invaluable introduction to the range of commodities which were to become the standard barter goods, used to ‘purchase’ the human cargo of this trade.

The Betty of Exon carried: one hundred & fifty pound large and ‘ye twenty broad’ [cloth]; seven hundred pound large & four hundred [pound?] wrought iron; one hundred haberdash & fifty Guinea cloth @ 5s; five hundred [pound?] pewter; [undecipherable quantity] hundred [pound?] brass & copper manufactures; 1250 pound large perpetuanas; 400 [pound?] wrought iron; 800 [pounds, probably packed in 8 barrels] of gunpowder; one hogshead of aqua vitae; three trunks of glass beads 250 [pounds per trunk or in total?]; trunks of wearing apparel; and ‘32 pair old Choots [shoes?] for private use not for sale’. The ship’s master was Charles Ellard, and the merchandise was credited to John Ellard. These goods were designed to appeal to the African slave masters. The attraction of the heavy woollen broadcloth of Somerset and Wiltshire was not as unlikely as it first seems, given the cold inland nights, and there were also the lighter perpetuanas or sergees of Devon, together with trunks of wearing apparel. The metal goods served various purposes, with iron bars for currency, and brass, copper and pewter for domestic use and adornment. The glass beads would also be worn. Aqua vitae, the strong liquor, probably brandy, would have been for private consumption, but perhaps also for presentation. The old shoes seem an unlikely and probably unimportant element in this carefully compiled list and so far defy interpretation. The gunpowder however was of great significance. It is a neglected element in this equation, and one on which this paper will concentrate.

In this ship’s manifest of the end of the 17th century we see the rudiments of the network which was to help bring a century of prosperity to Bristol, from the opening up of the slave trade to its abolition in 1807. The requirements of what was to become known to contemporaries as the ‘Africa trade’, stimulated the local manufacture of goods, especially gunpowder, copper and brass, iron and glassware. When the growing demand could not be met locally, commodities were sought elsewhere in a national market of growing regional diversification. Guns from Birmingham were to become an example of this. When not even the national market could produce the goods required these were imported in bulk, like cottons from India and wrought-iron bars from Sweden, or picked up in agreed quantities at continental ports before the ships proceeded to the coast of Africa. Gunpowder is a prime example of the stimulus to both local industry and overseas trade. Its manufacture was of growing importance in Bristol and its hinterland in the 18th century, but it remained dependent throughout this period on the port of Bristol for the supply of two of its ingredients, saltpetre and sulphur, and the transport of much
of the finished product. The importance of the merchants of Bristol as sources of capital and credit must also be noted.\textsuperscript{5}

The presence of the *Betty of Exon* in Bristol was thus symbolic of the domestic network which was to develop in response to the international trade in slaves. The perpetuansas named in the manifest were the speciality serges of Devon and were perhaps already on board the ship when she put into Bristol. Indeed it may be speculated that the Exeter ship had made the difficult journey round Land's End in order to pick up essential items that were not then available in the south-western counties. Gunpowder would have been high on the list, for it was not produced in Cornwall and Devon until 1809\textsuperscript{6} and much of that used in mining during the 18th century was produced in the Bristol region and shipped coastwise.\textsuperscript{7}

The importance of Bristol gunpowder in the slave trade went beyond supplying the ships leaving the home port, for until the mid 18th century there was no comparable explosives industry in the port or hinterland of its great rival in the trade, Liverpool. Bristol had come to achieve an important but short-lived dominance in the slave trade following its opening up to the outports, overtaking the London interest in the 1720s and 1730s before itself being overtaken by the competition from Liverpool in the 1740s. The northern port however lacked the well-established manufacturing base of Bristol and its region. Powder mills were set up at Thelwall on the River Mersey in 1758 by John Stanton, Sir Ellis Cunliffe, Robert Cunliffe, and John Craven,\textsuperscript{8} but until then the Liverpool slave traders were dependent on supplies from Bristol and the London area. The records of the main Bristol firm show that in the 1750s its agents in Liverpool were Arthur and Benjamin Heywood, later to become bankers and bill brokers there.\textsuperscript{9}

The establishment of the powder mills at Thelwall, followed shortly by the restrictions on the movement of gunpowder during the Seven Years War (1756–63), must have had an adverse effect on trade, for in 1762 it was reported to the Bristol partners that there was ‘no present want of sending Powdr to Liverpool as our Stock there is not sold’. However the link remained sufficiently important for them to maintain a magazine in Liverpool until at least 1800 when its lease came up for renewal, and during war years, when licenses to carry the powder coastwise could not be obtained, they were willing to consider the daunting prospect of sending this dangerous commodity overland.\textsuperscript{10}

Evidence of the cargoes carried by these early vessels in the slave trade, and especially of the cost of the different items, is elusive, but the *Dispatch* provides a useful example for the 1720s.\textsuperscript{11} This brigantine of 40 tons left Bristol for Old Calabar on the west coast of Africa in October 1725. In papers which survive its cargo is not only listed but also valued, enabling the following items to be placed in declining order of monetary importance: a large quantity of cotton goods; 4,000 copper rods; 206 hundredweight [cwt.] iron bars; copper pans and similar goods; 180 ‘musquets’; 12 cwt. bugles [glass beads]; 10 barrels of gunpowder; 207 gallons [gals.] of brandy; fine and felt hats; 1 cask of cowries [sea shells used as money]; and 37 gals. cordial [gin]. William Barry the master was ordered by the owners, Isaac Hobhouse & Company, to procure 240 slaves. Two items of particular interest to this study are the 10 barrels of gunpowder worth 81s. 9d. each and the 180 muskets at 10s. 9d. each. The former comprised 3.1 per cent of the value of the cargo, some £1,330, and the latter 7.3 per cent. A second example, this time for the 1740s, is provided by the *Bristol Merchant*, a snow (the largest of the two-masted vessels) of 100 tons.\textsuperscript{12} Captain Shuttleworth Neale received his orders in March 1747, the previous captain having been delayed in London. The ship then sailed for Bonny in the Bite of Africa, but, although completing the second leg of this triangular trade by reaching Kingston, Jamaica, in August 1747, there is no record of its safe return to Bristol. The papers however survive in some detail, recording the presence of 41 barrels of gunpowder at 71s. 10d. a barrel, and 20 chests of muskets,
each containing 25 guns at 7s. 6d. a firearm. The former represented 7.7 per cent of the value of the cargo of some £1,893, the latter 9.9 per cent.

The importance of both gunpowder and guns in percentage terms seems low, though rising, but both items may be placed in perspective by comparison with the national position. Figures for all English exports to Africa in the 18th century compiled by H.A. Gemery and Jan Hogen-dorn in pounds sterling show that at the national level gunpowder represented 3.2 per cent of the total in the 1720s and 4.3 per cent in the 1740s. In contrast firearms, although important in solid numbers, were until the 1760s barely measurable as a proportion of all goods employed in the Africa trade. Furthermore, these percentages based on monetary value may be misleading for, as a result of the demand for guns and ammunition in West African society, the prices underwent a 'sea change'. J.E. Inikori has measured this difference in prices from those operating in the English economy in terms of the 'bars' in which exchanges were registered and has noted that whilst textiles invoiced in for example 1787 at 22s. 5d. a piece would trade on the coast at 4.5 bars each, firearms priced at 7s. 8d. would trade there at 5.38 bars a gun. The importance of guns and ammunition was thus greater than the invoice would suggest, and indeed their significance within the trade was long recognized by merchants who wrote in the mid 18th century of their being always 'a necessary part of the cargo of ships trading to Africa'.

Despite their listing in the examples given, the invoicing of guns elsewhere in the Bristol records studied is patchy. In the Bristol Presentments, a printed record of the movement of ships and their cargoes through the port for some but not all years from 1770 to the early 19th century, the recording of chests of guns on ships bound for the Africa trade presents a puzzling pattern. None are recorded until July 1775, when the Phoenix set sail for the Gold Coast with goods which included 10 chests of trading guns and 2 chests of blunderbusses. With the guns now beginning to be called 'musquets' and the chests sometimes including pistols, this pattern was followed into the next decade, although there is little information for most of the 1780s and only isolated examples in the early 1790s. Then from January 1793 these items appeared regularly for two years, varying in quantity from 4 chests of muskets in the Royal Charlotte which set sail for the coast of Africa in February 1793 to 75 chests of trading guns in the Catherine which departed similarly in June 1794. There were no entries for guns in 1795 or later. This irregularity in the presence or recording of firearms is in great contrast to the invoicing of gunpowder, which was itemised on almost all ships leaving Bristol in the Africa trade, as recorded in the Bristol Presentments. It was listed by the number of barrels (or very rarely half barrels) and the much smaller kegs. The keg might almost have been designed for the slave trade. The wooden-staved barrels or half barrels containing 100 or 50 pounds of powder continued to be the standard container for gunpowder going to the settled colonies of North America, but they would have been difficult to handle, and sub-divide, at the more volatile point of sale or barter in West Africa. The kegs would not only have been more manageable, they would also have been a much more discrete unit of 'currency', especially when forming a package with a specified number of guns. After some earlier uncertainties their contents were standardized by the Board of Ordnance in the second half of the 18th century at one sixteenth of a barrel or 6.25 lbs. It seems likely that this was adopted by English manufacturers since many of them served, or sought to serve, both the military and the commercial markets. The largest consignment of kegs of powder noted in the Bristol Presentments was 26,100 in the Hector, which sailed in May 1790 carrying also 131 chests of wrought-iron muskets. The Hector was a large ship of 540 tons, so the storage of these kegs and chests would not have presented the problem that would have been faced by smaller ships.

A curious anomaly with regard to these complementary cargoes of guns and powder concerns the Jupiter. When this vessel of 296 tons sailed in October 1792 it carried, according to the
Bristol Presentments, 12,000 kegs of gunpowder but no chests of guns. At Bonny on the west coast of Africa, then the most important slave exporting area, negotiations were entered into with African traders for the purchase of slaves. The detailed record of these transactions, surviving amongst the papers of the ship’s owners James Rogers & Co. of Bristol, has been analysed by Inikori to show the expenditure in guns and kegs of powder per individual, and the overall figures involved in the purchase of 379 slaves. The latter amounted to 10,514 kegs of powder and 1,942 guns.\textsuperscript{17} The kegs represent a substantial number of the 12,000 carried from Bristol, but the source of the guns is a mystery. It is known from contemporary correspondence that guns were then in short supply. In June of 1792, for example, the gunmaking firm of Samuel Galton & Co. of Birmingham wrote to their customers, the James Rogers & Co. of Bristol noted above, ‘… we are every day declining orders… We have offended some of our oldest friends at Liverpool by sparing the last guns to you’.\textsuperscript{18} But it seems that the guns ‘spared’ were not available for the Jupiter when she left Bristol, and supplies may have been picked up in a continental port. Ostend is a likely candidate, for in March 1792 an agent there wrote to tell James Rogers & Co. that ‘Considerable business is done from hence to Africa by vessels coming from England and loading here.’\textsuperscript{19}

The failure of the Bristol gunmaking industry to capitalise on this profitable market is surprising, especially as the directories for the city in the later decades of the 18th century list the names of several gunmakers.\textsuperscript{20} The contrast with the thriving gunpowder industry could not be greater, but it may be that this failure was due to the strong commercial links already established with the Birmingham firm of Samuel Galton & Co., which may in turn have been based on ties of family and friendship. The Galton family came from Yatton, a small village south-west of Bristol. In 1703 John Galton married into an established Quaker family and adopted that faith. He became an iron merchant in Bristol, importing that commodity. His son Samuel (1720–99) was a ‘haberdasher of small wares’ in Bristol until his marriage in 1746 to Mary Farmer, whose Quaker family had since the early 18th century worked as gunsmiths in Birmingham. The Galton and Farmer families had links with both towns, and it is possible that Samuel was born in Birmingham, although it was in Bristol that he served his apprenticeship to a linen draper. After his marriage he gradually assumed control of the Birmingham firm, known by his name after he became senior partner. It was said in 1780 that Galton’s could produce a gun a minute.\textsuperscript{21} Perhaps the small Bristol industry could not match this competition. It may also have suffered from the lack of alternative outlets such as mining, to cushion the effect of fluctuations in the Africa trade.

At the beginning of the 18th century the gunpowder markets of the New World were better established than those of Africa. The Betty of Exon’s departure for the coast of Africa in 1699 with 8 barrels of powder on board was, for example, followed the next year by that of the Bristol Merchant for Virginia with 20 barrels in the hold. Voyages to the New World and to Ireland continued over the years, as is suggested by the listing of Barbados, New York, Jamaica, Grenada, Virginia, Newfoundland, Philadelphia, Quebec, Dublin, South Carolina, Piscataqua, and Cork, as the first twelve destinations in the Bristol Presentments of 1773, the first year for which this evidence is available. The powder carried to these destinations could vary in quantity from one up to 75 barrels, but 20 barrels remained a regular cargo. In the last quarter of the 18th century the African market was the main outlet for Bristol gunpowder, although this generalization must be qualified. In 1773–5 the powder dispatched in the ships of the slave trade accounted for 88.5 per cent of all that exported from Bristol. In 1776–7 the figure had fallen to 59.8 per cent, and in 1778–80 it had dropped to 9 per cent, suggesting that the American War of Independence had had an adverse effect on the African trade that was greater than the expected check on the Atlantic trade. The first half of the 1790s saw a greater revival in the Africa gunpowder trade than in that of North America, so that in 1790–94 the powder dispatched in
the slave trade represented 96 per cent of that leaving the port of Bristol. The amount of Bristol powder used in mining, and in merchant ships and privateers, was not subject to the same listing in bills of lading as that exported and it therefore remains unquantifiable. It must have added substantially to that used for purposes other than slave trading, but the link between ‘The Africa Trade and the Bristol Gunpowder Industry’ remained strong and significant.

After a survey of the early craft-based gunpowder industry of Bristol, its transition to a capital- and trade-based industry in the 18th century, operating in the hinterland but under the control of merchants of the port of Bristol, will be discussed.

It is probable that gunpowder was first made in China in the 9th century, as a result of the search by alchemists for the elixir of life and the philosopher’s stone. Through Arab intermediaries this knowledge spread to western Europe, where it intrigued scholars like friar Roger Bacon who in the mid 13th century was the first to set down the recipe, albeit in a code which was not deciphered until the beginning of the 20th century. As the recipe became known from other sources, rulers sought to control the manufacture of a product that was both explosive and propellant. Production in England was at first undertaken in the security of the Tower of London and other royal strongholds. The availability of the ingredients, saltpetre, sulphur, and charcoal, was in any case a limiting factor. Of the three, only charcoal was easily available in this country, from coppiced woodlands with alder and hazel as the preferred choice. Some sulphur was available as a by-product of the copper industry, but the bulk of it came from abroad. In the case of Bristol this may have been in the first instance from Iceland, though the focus of its Iceland trade seems to have been fish whereas German traders sought supplies of sulphur as well as coarse cloth, hides, oil, falcons and eiderdown. It is likely that the English traders were edged out of this significant market by the ships of the Hanseatic League, for as late as the mid 18th century Iceland was described as having ‘brimstone in abundance... lumps of virgin sulphur as big as one’s fist, in marshy places...’. Nearly 300 tons of it was sent every year to Copenhagen, but it was noted that this trade was opposed by the Icelandic peasants as spoiling their employment as fishermen, for the sulphur on board the ships was reputed to drive away the fish.

For English traders the volcanic parts of the Mediterranean became the most common source of sulphur. In 1599, 27 tons of brimstone had been brought to Bristol from Venice, whilst records of the mid 18th century note the arrival of supplies from Ancona, on the east coast of Italy. As the trade developed, London became the depot through which supplies would be directed to Bristol.

Saltpetre posed the greatest problem. It is derived from decaying nitrogenous waste to which ashes and shells have been added. This mixture was set out in covered beds which excluded heavy rain and thus allowed the trickle of water and urine (especially of the drinkers of wine and strong beer) through the ‘black earth’ to be controlled. The resulting solution was collected and boiled to produce crystals of potassium nitrate. The skills required to produce good saltpetre were difficult to achieve, and much reliance was placed on that imported from mainland northern Europe until it became clear in the second half of the 16th century, especially around the time of the Armada, that such dependence was dangerous. Permission was then granted to saltpetremen to set up nitrate or saltpetre beds in the countryside where the surrounding ‘grounds’, especially farmyards, dovecots, and stables, could be dug for the organic waste accumulating there. This step was of great significance for it loosened the metropolitan control of powder making, and allowed rogue producers in the provinces, especially in Bristol, to embark upon the unauthorized manufacture of gunpowder.
The only known contemporary representation of a provincial saltpetre bed in this country appears on a deed of land granted to an Ipswich powder maker in 1593 (Fig. 1), but there were similar works in the Bristol region, at Thornbury for example to the north of the city. John Giffard, saltpetreman to the Lords of the Admiralty, had been appointed to dig manure-rich grounds in Bristol and an area ten miles around, but he encountered trouble with local farmers. He complained in December 1634 that they refused to let him have the droppings from their pigeon houses (preferring to take them to manure their lands) and to carry coal from the nearby pits to his boiling house in Thornbury. Giffard had earlier that year been involved in a boundary dispute with Thomas Thornhill, the saltpetreman for 'the greatest part of Co. Somerset', who objected to him setting up saltpetre works in Bath. It was ruled that Giffard should be allowed to continue there for the season, but that when the grounds were next rich enough for digging Thornhill should undertake the work.

Unlicensed powder makers in Bristol were able to secure illicit supplies of saltpetre from such sources. For example, Thomas Hilliard, the saltpetreman for north Wilshire, who in June 1631 had already figured in a Star Chamber case about digging 'for saltpetre under the beds of persons who were sick therein', was in September of that year charged with supplying two Bristol powder makers, William Baber and John Coslett. They had received sacks and barrels of His Majesty's saltpetre, conveyed secretly into the city at night, and had made gunpowder for their private profit. The investigation which followed showed that Baber had been a powder maker in Bristol since 1619, though never licensed, but that Coslett (or Corsley) had built a powder house in 1625 at a cost of £200 in response to the city gaining permission to make 400 or 500 barrels of powder yearly for its shipping. The fortunes of these early powder makers fluctuated, and John Corsley and William Baber, and others including Tom Randall, William Palmer, and Walter Parker, were alternately suppressed or encouraged as the Government clamped down on or tolerated manufacturing according to national need.

In the early phase of powder making in the city, manufacture would in any case have been relatively easy to conceal because of the domestic scale of operations. A drawing of about 1630 (Fig. 2) illustrates the point. With a mortar in his hands, one workman pounds and blends the three moistened ingredients in a pestle, in the process known as incorporation. The importance of the thorough mixing of the ingredients was emphasised in an account of the early 1660s, which explained that every grain produced must contain 'all the Materials in their just proportion' (Fig. 3). The task of the second workman was to produce pellets of powder by forcing the resulting cake through a sieve. These resembled grains of corn, which may be why the process came to be known as corning. The grains would then have been dried in open trays, perhaps set out on a table as shown in Fig. 2. The scales hanging on the wall indicate the need for careful measurement, and the second sieve may have been used to produce grains of a different size. The investment by John Corsley noted earlier may have indicated an attempt to increase the scale of production in the 1620s, but it was the outbreak of the Civil War in the 1640s that gave the city's powder makers their first real opportunities. Deprived of the mills near London which had been seized by the Parliamentary forces, and desperate for supplies of powder, the Royalists accepted help from those they had previously harried. William Baber, with some of his family and associates, went to Oxford and began the production of gunpowder there. Using amongst other facilities a converted fulling mill, gunpowder making proved so profitable that this military enterprise was taken over in February 1644 by the Ordnance Commissioners. Baber remained in Oxford for some time making saltpetre of good quality; that delivered to the magazine in New College in June 1644 was described as 'triple refyned'. He then returned to Bristol, held by the Royalists from July 1643 to September 1645, and resumed his powder-making activities there. It is likely that Baber continued this business in the
Fig. 1. Saltpetre works as illustrated on a 1593 deed of land granted to an Ipswich gunpowder maker. reproduced by courtesy of the Suffolk County Council Libraries & Heritage Department, ref. C3/8/4/31.
1670s, for his works are shown on Jacob Millerd’s plan of Bristol. They were on the eastern edge of the city, just south of Lawford’s Gate. In the version of the plan printed in 1671 they are shown in a simple form, distinguished from other houses by standing alone, but in that printed in 1673 they are represented more elaborately and named as ‘Baber’s Tower’ (Fig. 4). The warehouses for the imported raw materials of this industry were at the nearby Quaker’s Fryars, and a magazine was maintained at Tower Harris or Harratz, at the eastern end of the old southern Portwall of the city, near the river.32

There is still much to be discovered about the industry in the last quarter of the 17th century, but the importance of the initial urban phase of powder making in Bristol is clear. As the balance of economic activity in England began to tip away from trade and warfare in Europe towards a growing interest in westward expansion, the industry was well-placed to meet the new requirements. Gunpowder production was in the hands of experienced craftsmen, able to meet the growing demands of the developing commerce of the turn of the century, not only the Africa trade but also colonial settlements overseas and the merchant ships and privateers of the port. The use of blast powder in mining is outside the main focus of this account, but it must be mentioned as a further stimulus to the industry. After its first known use for this purpose in this country at the Ecton copper mines in Staffordshire in the 1660s, there is evidence that it was employed in Mendip lead mining by the mid 1680s. The shipping of blast powder and expertise
THE AFRICA TRADE AND THE BRISTOL GUNPOWDER INDUSTRY

ROYAL SOCIETY.

THE HISTORY

Of Making

GUNPOWDER.

"The materials of Gun-Powder are, Salt-Peter, Brimstone, and Coal; the Peter and Brim-
stone must be both refined if you mean to make a good Powder, and the Coal must be Withe and Al-
der equal parts; for Withe alone is counted too soft, and some do commend Hazle alone to be as
good as the other two.

The whole Secret of the Art consists in the propor-
tion of the Materials, the exact mixture of them,
that in every least part of Powder may be found all the Materials in their just proportion; then the Comming or making of it into Grains; and lastly the Drying and Dulling of it.

Fig. 3. Introductory page of Thomas Henshaw’s paper, ‘The History of Making Gun-

costwise through the port of Bristol may date from this decade, for in 1689 a miner from Chilcompton in north Somerset was killed at a mine in the Cornish parish of Breage, where he was teaching the art of ‘shooting the rocks’. Blast powder was also in use in north Somerset coal mines by 1719, but it did not come into use for this purpose elsewhere until the 1730s.33

There is as yet little evidence on the layout and form of power used at these urban works. The processes may have been mechanized by the application of horse power, which continued in use in some powder works well into the 19th century. Even wind power cannot be ruled out because when William Champion, the zinc manufacturer who had taken over Baber’s Tower (some time before 1742, when complaints were made about the nuisance created there), moved his works to Warmley in Gloucestershire, an inventory of 1761 showed them to include ‘One windmill with Stamps’ for crushing ore.34 The structure survives, known locally as ‘Babel’s Tower’, with a tradition that it was moved there from Bristol. The presence of stamps in the inventory does not invalidate an earlier connection with gunpowder making, for they mimicked
the action of the pestle and mortar and were widely adopted as an efficient method of incorporation. They were long advocated by the French and adopted by the Americans, and may have been used by Baber and other powder makers in Bristol as a way of speeding up production.

The pressures exerted by an encroaching town and complaining householders, and the lure of wooded valleys able to provide water power, charcoal, security and seclusion, must have made the possibility of a move to the countryside appear very attractive to Bristol’s gunpowder makers. The pattern had been seen centuries earlier in the woollen industry, as water-powered fulling mills were established in river valleys away from the restrictions of towns and guilds, and it was to be repeated, as in the example provided by the works at Warmley, by the brass and copper industries. The dispersal of the gunpowder industry may be illustrated from Day and Master’s map of 1782 (Fig. 5), which shows the main complexes created by this move. The first was at Woolley, north of Bath, where the mills were established in the 1720s. The second was at Littleton, in the Chew valley south of Bristol, where the main works were established in the 1740s. Another powder mill was set up near the Littleton works in the 1760s, and there was a powder mill to the south at Moreton, now under the Chew Valley Lake. The third was created
Fig. 5. Section of a map of Somerset drawn by William Day and Charles Harcourt Masters and published 1782. Powder mills are named at Woolley, north of Bath, and between Winford and Chew Magna, south of Bristol.
in the mid 18th century by the transfer of the main magazine from Tower Harratz to substantial new buildings at Shirehampton, down river and on an isolated bend of the Avon. The move was in part a response to the fears of Bristolians as the city expanded beyond its medieval confines, but security was also a concern, especially during the march south of Prince Charles Edward in 1745. After a temporary arrangement at Portishead Creek, the Bristol powder makers bought land in the parish of Westbury-on-Trym on the Gloucestershire bank of the river, where the magazine was established in 1749 (Fig. 6). This site was not only more secure but also more convenient than that in Bristol, for here outgoing ships could take on board cargoes of powder, relayed down from the main store to one nearer the water’s edge (Fig. 7), whilst incoming vessels could relinquish any they were still carrying. Accessibility was crucial to the dispersal of the industry. The new works were served by the improved systems of transport then becoming available through the Bath and Bristol turnpike roads and the Avon Navigation. The sites were

Fig. 6. The powder magazine at Shirehampton. William White’s ‘Plan of the River Avon from Kingroad to Rownham Ferry, 1792’, shows not only the main storage magazine, but also the outbuildings by the river bank where gunpowder was loaded and unloaded by crane. The plan was formerly held by Avon County Council Planning Department, reference 97467B.
secluded, an important asset in a dangerous industry, but also more accessible than would earlier have been the case. They served the gunpowder industry for a hundred years.

The new works built in the countryside were substantial and complex. An engraving of 1735 of the Waltham Abbey Powder Mills near London gives some idea of the plant involved (Fig. 8). It shows the features which would have been built or adapted from previous, often agricultural uses. These included the buildings and equipment required for the refining, pulverising, and weighing of the raw materials, and their incorporation, corning, and screening to remove dust. There would have been workshops with barrels containing lead in which the powder would be tumbled in order to consolidate and glaze the grains, and stoves by which it would be dried before being packed and sent on to customers.

No reference has been found to the Bager family taking part in the move to the countryside. Perhaps that dynasty had come to an end or was unable to finance such a move. Indeed, the capital costs and revenue requirements were such that a new type of 'powder maker' now entered the industry. These were in general successful Bristol merchants with funds at their disposal rather than struggling craftsmen. They formed partnerships with one of their number as a managing partner with an office in Bristol. The site manager provided the technical expertise. He was not necessarily a partner but may have become so. The re-formed industry thus had the
Fig. 8. Engraving of the Waltham Abbey Powder Mills, Essex, reproduced in John Farmer, History of Waltham (1735). It is very rare to have a key to such an illustration, especially one as detailed as this.
benefit of both worlds: it had the natural advantages of 'green-field' sites on which new technologies could be introduced, and it was supported by the capital, credit, experience, and trading contacts of the city and port of Bristol. An important example of this network relates to the adoption of water-powered vertical edge runners, first of stone and then of cast iron, for the process of incorporation. The use of edge runners would not have been exceptional in the second half of the 18th century (see Fig. 9), but their introduction and continuity of use at the Woolley works from the 1720s indicates that the practice here was ahead of its time. It may

Fig. 9. Edge runners and beds in a gunpowder incorporating mill: illustration from Denis Diderot, A Pictorial Encyclopedia of Trades and Industry, ed. by Charles Coulston Gillispie (Paris 1763; this edn. New York 1959), vol. 1, plate 157. These are of smooth stone but at a similar date, 1764, the Woolley works were receiving cast-iron ware from Coalbrookdale, composed of a bed of 4 tons and runners of 5 tons.
have been influenced by the familiarity of the new powder makers with Bristol’s port industries, for in the production of oils for soap and dyes for cloth manufacture, as well as in the local snuff, glass and sugar industries, vertical edge runners were used to crush raw materials. The introduction of cast-iron equipment at both Woolley and Liddington from the middle decades of the 18th century, especially edge runners and the beds around which they trundled, was a further novel step and well in advance of the general practice. These goods were all purchased from the Coalbrookdale works of Abraham Darby (a brilliant innovator whose own career had begun in Bristol), through Thomas Goldney, their resident agent in Bristol. Together with the cockle stoves used for drying (the evidence for which in the Bristol gunpowder industry from the mid 18th century pre-dates by 50 years their earliest known use elsewhere), these goods were brought down from Shropshire on the busy River Severn.

The four original partners of the Woolley works, founded in 1722, were all well-established in the Bristol merchant network, being members and officers of the Society of Merchant Venturers, shipowners, and traders in linen, iron, and sugar. Three of the four were also engaged in the slave trade: Abraham Hooke financed 23 voyages from the beginning of the century, and John Parkin and Edmund Baugh were involved in the trade in the years before the setting up of the mills at Woolley. The fourth, Harrington Gibb(e)s, had gained experience of the sugar plantations of Jamaica before returning home to be the agent of planters such as William Beckford.

The merchant network extended beyond Bristol to trade and government circles in London. The Woolley site was leased from the London merchant William Parkin, brother of John and himself a partner in the works in the 1730s. On the death of John Parkin in 1743, his share was divided between his two daughters, Elizabeth and Ann. Elizabeth, who never married, retained her interest until her death in the mid 1760s and Ann’s share passed, through her marriage to Hodges Stracey, to the north Somerset gentry family, which held it until the early 19th century. The Stracey family held property in Bristol from the 1720s, but their London connections were of greater importance to their powder-making partners. As a young man the later Sir Henry Stracey was already by 1762 lobbying for the partners and suffering ‘tongue and foot fatigue’ as a result. He became secretary to Robert Clive, and after returning with him from India held a parliamentary seat from 1770 to 1804. He served as the secretary to the Commission for Restoring Peace in America in 1774 and as assistant commissioner at the negotiations for peace with the American Colonies in 1783. For a time he was Keeper of His Majesty’s Stores, Ordnance, and Ammunition of War, and in 1794 he was appointed Master of the King’s Household. He was created a baronet in 1801, in recognition of these services. A similar network can be seen with the Dyer family. The Woolley partners held an account with the London merchant James Dyer from 1764 until the turn of the century, probably for saltpetre imported to London by the East India Company. Robert Dyer of Bristol became a partner in 1780 and took charge of the partnership’s accounts, and George Dyer, a London broker, provided insurance cover in the 1780s and became a partner in the 1790s.

William Wansey provides an example of an individual who built up his contacts through his own efforts rather than through his family. He served not only the Woolley partners (of whom he was one from 1753 to 1767), but also other Africa traders in Bristol. He was admitted to the Merchant Venturers in 1749 ‘in consideration of having given a long attendance in London about the Africa trade and done all in his power for the service of the trade’. He was himself a slave trader, involved in eight voyages between 1745 and 1763, and was named in the 1755 ‘List of Africa Traders’. Lastly, support was also forthcoming from local Members of Parliament such as Robert Nugent, later Earl Nugent, who represented Bristol from 1754 to 1774 and was very active in the interest of the Bristol Africa trade. In July 1756 for example he presented a petition to Parliament seeking to overturn a wartime ban on the export of gunpowder by
pointing out ‘That gunpowder and small arms of a cheap and ordinary kind and unfit for other purposes are so necessary in the African trade which is of very great consequence to this port that the same cannot be carried on without them’. Field Marshal Sir John Ligonier, later Lord Ligonier, who represented the borough of Bath from 1748 to 1763 as one of its two members of Parliament, was particularly well-placed to give advice. As the Lieutenant General of the Board of Ordnance from 1748 to 1757 and its Master General from 1759 to 1763, he was in charge of gunpowder supplies for much of the Seven Years War (1756–63). He was consulted by the Woolley partners through their Bristol office, and delegated his response to Sir Charles Frederick, the Surveyor General of the Board of Ordnance. Sir Charles shared his expertise with the partners, giving practical advice of a technological nature that was available from no other source.

For much of their existence the works at Woolley were managed by the Worgan family, in turn the father John until 1747 and the son Matthew until his death in the early 1790s. They were part of the Parkin family network. Matthew was a nephew of Elizabeth Parkin and inherited her share in the works on her death in the mid 1760s. He became a man of substance, making loans to the Woolley partnership totalling £3,500 by the early 1790s, and holding joint stock shares valued at £5,000 in the Bristol Brass Wire Company. In the manner of 18th-century industrialists, the Worgan family lived on the site at Woolley.

The general prosperity of Bristol, and the availability of capital for investment, is shown by other loans made to the Woolley partners. For example, a loan of £1,500 was provided by Onesiphorous Tyndall from 1751 until his death in 1757, at 4.5 per cent interest until 1755 and 4.0 per cent thereafter. Tyndall was a West Indian merchant and drysaltor, and as a major slaver he was involved in that trade, both as a shipowner and as a slave factor in partnership with Isaac Hobhouse and Richard Asheton. He became the senior founding partner in the Old Bank, set up in 1750 as the first Bristol bank under a proper deed of partnership. The career of Michael Miller, a wealthy merchant and a partner in the rival Miles Bank founded in 1752, followed a similar path. He loaned the Woolley partners £1,500 at 5.0 per cent interest between 1768 and 1772, by which time his son, also Michael, had joined the Woolley partnership after being involved in eight slaving voyages between 1760 and 1768. The banking connection continues, for John Vaughan the younger, a founding and managing partner of the Miles Bank, became a Woolley partner in the 1770s after he and his father had engaged in four slave voyages between 1759 and 1764. Of later partners, William Elton joined in 1778, some half dozen of his family, if not he himself, having had an interest in numerous slave voyages in the first half of the 18th century. James Jones, a substantial shipowner and slave trader, became a Woolley partner in the mid 1780s. At that time Jones had nine vessels on the coast of West Africa and at sea, capable of carrying 3,520 slaves.

A major concern for all the partners in the gunpowder works, especially in the closing years of the 18th century, was how the large dividends due to them were to be conveyed. In 1796 Henry Strachey was sent £513 in seven bills with a note that ‘it is a matter of the greatest difficulty to secure any sort of London paper here.’ In 1797 the problem grew worse, for ‘the very considerable sales of Gunpowder at Liverpool’ had been met by ‘Bills at a long date’ on which the proprietors were offered interest until they became due. The return on capital was then 30.6 per cent. In 1795 it had been even higher at 33.4 per cent and discretion was urged for ‘the dividend is so great that the utmost secrecy is necessary’. Strachey’s account was credited with £1,335 12s. 6d. since a letter was not trusted. Over a period of 60 years, the returns averaged 15 per cent. Here was a profitable cycle by which merchant capital, derived at least in part from the slave trade, was invested in a manufacturing concern that supplied various important
markets (especially the Africa trade but also general trade, shipping and mining), thereby enhancing those profits further.

It is not possible to study the Littleton works in the same detail because the documents are more scant, but the partners shared a similar background to those at Woolley. From the mid 18th century they included the following representatives of Bristol's mercantile, slave trade, and banking worlds: Jeremiah Ames, Levi Ames, Job Charlton, Thomas Deane, Isaac Elton, William Fowler, William Miles, Philip John Miles, William Miller, and Samuel Shute. The main works were established in 1748 on land owned by one of the founding partners, Isaac Elton. Ten years later the Bristol-based managing partners of the two enterprises (Isaac Baugh from Woolley and Jeremiah Ames from Littleton) formed a marketing partnership to handle the trading side of gunpowder production. It is an indication of the international importance of this industry in the Bristol region that from this time the business of gunpowder production and sale merited its own office in the Bristol Exchange (Fig. 10).

Gunpowder making has been presented in simple terms because its technology has not been the focus of this paper. It was of course more complicated than suggested and, although much of the success of the Bristol partners in the 18th century was due to the commercial network in which they operated, that achievement could not have been sustained without an innovative and practical approach to gunpowder making. Yet when in the early 1760s the Woolley partners tried to secure a contract with the Board of Ordnance, they failed to meet the tests set, although they received help and encouragement from the Board's sympathetic Sir Charles Frederick, already mentioned. Sir Charles's comments, made to the young Henry Strachey and conveyed
by him to the Bristol partners, are important in their own right for they provide the only review known so far of the best practice at the time together with an awareness of the need to experiment in order to perfect procedures. The partners adopted this experimental approach, increasing the saltpetre content of their recipe to make the powder 'stronger' and sending to London samples of identical composition which had been incorporated under the edge runners for five and six hours respectively. These also failed to meet the required standard of proof. This may have been because the testing procedures then in use were uncertain and faulty, but a comment made by a frustrated Bristol powder maker may suggest a more likely reason for the problem. On hearing of their rejection, Isaac Baugh, the managing partner in Bristol of the Woolley works, wrote that they had some 2,000 barrels in store which they wished was 'fit for the Governmts use we have no complaint from any other quarter our Privateers like it and so do the Merchants'. Thus, whilst the Board of Ordnance was looking for a fixed standard, with one set of proportions for the ingredients and one size of grain for the powder, the Bristol manufacturers were catering successfully for the commercial market in which powders of different quality were required by different customers for different uses. The provincial powder makers were more versatile than those in the London area, sustained by their military contracts, but the Board of Ordnance was looking for uniformity and reliability, rather than versatility.

It was not just the military but also men of science, like the Bath-born mathematician Benjamin Robins, who were critical of what they regarded as inferior commercial powders. In the 1740s Robins had written that 'these weaker powders are not worth Examination, as there is no established Standard for their Composition'. But the stronger powders, in which saltpetre made up some 75 per cent of the recipe (with sulphur contributing 10 per cent and charcoal 15 per cent), would have shattered rather than shaken the rocks when used in mining, and burst the guns sent out in the Africa trade. Knowing this, the Woolley partners advised in the 1740s that the proportion of saltpetre used at the works should be either 64 per cent or 66 per cent, with a suitable adjustment of the other ingredients in the recipe. When a check was made of the powder in store in July 1762 this distinction was maintained, and it was listed as Guinea (or Africa) powder or Merchant powder. The skills of the Bristol powder makers in relation to market requirements were similarly demonstrated with regard to grain size for, despite the military requirement for a uniform size already noted, there is evidence that the Woolley works from at least the 1740s produced grains of various sizes. Stocks were listed as F, FF, FFF, in increasing order of fineness and value, with a cheaper form designated F&M, possibly blasting or Guinea powder.

Given this proven finesse, and the ability of the partners to meet the needs of different markets, why did the industry decline to the extent that it has been almost lost to the historical memory of the region? The answer is a compound of factors — changing patterns of world trade; failure by those Bristol merchants who had profited so greatly to invest in and develop manufacture; and rationalization of firms within the industry. During the 18th century Bristol's trade had been generally disrupted in years of war, but for the powder makers this decline was usually offset by the propensity of the merchants of the port to turn to privateering at such times. In the 1740s there were about 50 Bristol privateers with some 20 guns each, and in the later 1750s there were over 60 privateers with up to 36 guns each. In the Independence War (1776–83) the Americans seized the advantage by preying on Britain's west coast, but, although these were such disastrous years for the city's trade and manufacture that there may have been few funds available for fitting out such ships, retaliation came from some 21 Bristol privateers.

The fundamental changes in the world economy that were to take place at the turn of the century, especially the abolition of the slave trade in 1807, were of more serious consequence
for the Bristol powder makers than intermittent warfare. Bristol had lost dominance of the slave trade to Liverpool after the early decades of the 18th century, but this was a relative matter and its overall importance within the Bristol economy continued. Indeed, the development of the slave trade by the Liverpool merchants benefited the Bristol gunpowder makers by providing them with an additional outlet for this commodity. By the end of the 18th century however, in conditions of war and in anticipation of what was seen as adverse legislation, the Africa trade was in decline. This had a serious effect on the gunpowder industry as was recognized by George Dyer, a Woolley partner, who in 1795 wrote, "We have lost our Africa trade. Therefore we are extending our Sales at home as much as possible". Perhaps by developing the home market the enterprise could have remained profitable, but there was a further blow to come from across the Atlantic with the establishment of new powder works in the United States of America such as those set up by the du Pont family in Delaware in 1802 to meet the needs of the new country. The days of a 'captive' colonial market for Bristol powder makers were over.

The Woolley partners began to discuss what they referred to as a 'consolidation' with the works at Littleton, the urgent need for which may be seen by comparing the current output with that of the 1740s. A memorandum of 1747 had shown that the works at Woolley were then capable of producing 2,000 to 4,000 barrels (each of 100 lbs.) a year. Now one of 1802 revealed that the Woolley and Littleton works together were only producing as much as, and possibly less than, was manufactured each year at Woolley some 50 years earlier. The memorandum of 1802 concluded that 'From the decrease in the demand for the Coast of Africa it is very evident that either of the works can make more than a sufficient quantity to supply their other Customers who for many years have taken from 1200 to 1500 Barls'. Unlike Littleton the Woolley works were leasehold, and so it was decided in 1803 to consolidate the two by closing the latter, although the mills were to be kept in a state of readiness, to meet any emergency and to make sure they did not fall into other hands.

After so many prosperous years the changing circumstances and ethics of world trade had left the powder works with a productive capacity greatly in excess of that required by their market. The later growth and diversification of the du Pont mills shows that there was no lack of potential in the industry, but it depended on an investment in new technology which was not forthcoming in the Bristol-funded mills after the early years. In the following decades the consolidated works were taken over by a large firm of powder makers from the London area, Curtis's & Harvey, and closed down in a further rationalization of capacity. Curtis's & Harvey were later themselves taken over by I.C.I. whose interests lay in other parts of the country, and so the prospect of a large chemical industry along the River Avon was averted. By the 1830s the manufacturing sites had reverted to an agricultural use, but their historical importance deserves to be recognized, not only because they were important in their own right but also because they can help to provide a broader perspective within which to view Bristol's industrial development in the 18th century. Located in the hinterland, these water-powered industries making not only gunpowder but also brass, copper and glass, were an active part of Bristol's mercantile and financial network despite earlier arguments that such capital investment was 'slight'. The goods produced for export were of prime importance in the development and maintenance of Bristol's Atlantic commerce, including the discredited slave trade, and helped to sustain Bristol's prosperity in the 18th century as much as the import-based consumer industries such as sugar, tobacco, cocoa and chocolate. Unlike the industries themselves, the personal wealth which they helped to create has in some cases had a more permanent legacy, through its investment in urban property and landed estates.
Notes and References

1. Public Record Office (P.R.O.), Port Books, Searcher, Xmas 1698–Xmas 1699, E190/1157/1, 10 January 1698. In this article the new year has been taken to begin on 1 January, placing the departure of the Betsey of Exon in 1699 and not 1698 as in David Richardson, Bristol, Africa and the Eighteenth-Century Slave Trade to America, vol. 1, The Years of Expansion 1698–1729 (Bristol Rec. Soc. 38, 1986), p. 1.

2. K.G. Davies, The Royal African Company (1957), p. 134: under the Act (9 & 10 Wm. III, c.26) the trade of West Africa was opened to all subjects of the Crown from 24 June 1698.

3. The African slave trade is a subject with its own moral, cultural, and historical debates. In all these cross-currents, the trade in gunpowder and the industry this stimulated have received almost no consideration.


7. Somerset Record Office (S.R.O.), DD/SH, Strachey Papers, Box 27. A letter from William Wansey to Henry Strachey the younger, 17 July 1762, notes that due to wartime restrictions 'we Cannot Supply our Orders for ye Mines in Wales & Cornwall'. The Strachey Papers dealing with the family interest in the gunpowder industry have been analysed in the thesis referred to above (n. 5), and are being prepared by this author for publication by the Somerset Record Society. Unless stated otherwise, the documents providing information on the gunpowder partnerships referred to in this article are in the Strachey Papers or in private hands.


10. S.R.O., letter from William Wansey to Henry Strachey the younger, 26 April 1762: 'We have Resolv'd on Beginning to Send of Land whch would cost at lest 10/- or 12/- pr barrel'.


12. Archives of the Univ. of Melbourne, Bright Family Papers, 'Snowe Bristoll Merchants Book'. The author is grateful to the archivist Frank Strahan for facilitating her study of these papers.


15. Inikori, 'Firearms into West Africa', pp. 339–40, quoting from a petition presented by the Liverpool merchant Henry Hardware in October 1756 (P.R.O., CO 267/6).

16. Bristol Central Library, Bristol Presentments. These printed lists provide information on the names, destinations and masters of the ships leaving Bristol, the goods they carried, and the merchants responsible for them. For the tonnage of the Hectar see David Richardson, Bristol, Africa and the Eighteenth-Century Slave Trade to America, vol. 4, The Final Years, 1770–1807 (Bristol Rec. Soc. 47, 1996), p. 213.

17. Inikori, 'Firearms into West Africa', pp. 362–5, Appendix I.
20. James Skettle, *Bristol Directory 1775* (Kingsmead Facsimile Reprint, 1971). The following are listed in this first Bristol directory: Annely's gun warehouse; Gabbatts & Co., gunmakers (also found in Matthew's *Bristol Directory* of the mid 1790s); William Heard, gunsmith (also in Matthew's); Richard Morgan, gunsmith and victuallers; — Verncomb, gunsmith of Lewins-mead; Hugh Verncomb of Clare-street; James Wilkinson, gunsmith (also in Matthew's). See also De Witt Bailey and Douglas A. Nie, *English Gunmakers, The Birmingham and Provincial Gun Trade in the Eighteenth and Nineteenth Century* (Arms & Armour Press, 1978). A list of 18 Bristol gunmakers may be drawn up from these sources, active at some time between 1775 and the abolition of the slave trade in 1807.
23. A selection of State Papers relating to the gunpowder industry has been calendared in a volume edited by E.A. Brayley Hodgetts, *The Rise and Progress of the British Explosives Industry* (1909). See the chapter entitled 'Chronology (1242–1700)', pp. 182–302. A 'Powderhous' at the Tower of London was first mentioned in 1641, and payment was recorded in 1512 for gunpowder made at Porchester Castle, ibid. pp. 183–4.
27. An analysis of the phases of gunpowder manufacture before the end of the 18th century was presented by the author at the Dibner Institute for the History of Science and Technology (M.I.T., Massachusetts) in April 1999. Entitled 'The Art and Mystery of Making Gunpowder': English Experience in the Seventeenth and Eighteenth Centuries', the paper is to be published by M.I.T. Press in a volume with the working title *Knowledge as Power: Technology and Science in Early Modern Warfare*.
29. Ibid. p. 272, 17 July 1634.
30. Ibid. p. 265, 14 June 1631; p. 266, 24 September 1631; pp. 266–7, 3 Dec. 1631; pp. 269–70, 19 April 1634. There were also complaints that Bristol powder makers were without authority buying saltpetre made in Wiltshire at Sherston Magna (p. 268, 16 November 1633); and in Somerset where Toby Atkins of Hazellburg (?Haselbury Plucknett near Crewkerne) worked the grounds 'all about Wells and Bridgewater' (p. 274, 7 Feb. 1635).
31. Gunpowder was made at the fulling mill at Osney on the edge of Oxford, probably by an adaptation of its machinery for the process of incorporation: see Buchanan, 'Art and Mystery' for a discussion of this technological development. A similarly innovative approach was shown in the Parliamentary cause by craftsmen in Gloucester: see David Evans, 'Gloucester's Civil War Trades and Industries', *Trans. B.G.A.S.* 110 (1992), pp. 137–47.
32. For Tower Harrant see Reg. Jackson, 'Archaeological Evaluation and Excavation at Quay Point, Temple Meads, Bristol' (1994), a report compiled for Bristol Development Corporation. The author is grateful to Mr. Jackson for providing her with a copy of this report.

35. For a detailed study of the Woolley works see B.J. Buchanan and M.T. Tucker, ‘The Manufacture of Gunpowder: a Study of the Documentary and Physical Evidence relating to the Woolley Powder Works near Bath’, *Industrial Archaeological Review* 5 (1981), pp. 185–202; for additional information and an illustration of the layout of the main Littleton works see Buchanan, ‘The Technology of Gunpowder Making’. The Moreton site was excavated before being flooded, but the opportunity to learn more about the gunpowder works was lost because it was decided that ‘the chief interest of the site lies in the plan of the mediaeval house’, P.A. Rahtz & E. Greenfield, *Excavations at Chew Valley Lake, Somerset* (1977), p. 114.

36. In 1745 the Bristol privateer Tryall brought in a Spanish prize containing gold and silver to the value of £6,000, arms, and 100 barrels of gunpowder, destined for the Prince: Latimer, *Bristol in the Eighteenth Century*, pp. 256–7. A vessel of this name is recorded by Richardson, *Bristol, Africa and the Eighteenth-Century Slave Trade to America*, vol. 2, *The Years of Ascendancy 1730–1745* (Bristol Rec. Soc. 39, 1987), p. 141, but this was reported seized and sold at Havana, May 1745. It was however later re-taken. The property at Westbury-on-Trym on which the new magazine was built is referred to in Littleton deeds, held in private hands.

37. The importance of a magazine where powder could be safely loaded and unloaded from a ship is shown by a report in the *Bath Journal* of 1 July 1745. The powder remaining at the end of the voyage had already been landed when a fire broke out in the Townsend, as loose grains in the powder room were being swept up. This slave ship (owned by Jacob Elton, Son & Co.: see Richardson, *Bristol, Africa and the Slave Trade*, vol. 2, p. 138) was in the ‘Great Dock by the new Crane at the lower End of the Key’.


40. Bristol merchants and sailors may also have seen edge runners used in gunpowder making overseas, for example in the Baltic countries from where gunpowder was occasionally imported. In 1586 goods lost to the Dutch by a Bristol ship returning from the Baltic included 25 barrels of powder: Vanes, *Overseas Trade of Bristol in the Sixteenth Century*, pp. 72–3.


44. The names of the Dyer family have not been found in the Bristol printed sources. They may have joined the Woolley partnership from a London and/or a professional rather than trading background.

45. The award of an honorary freedom of the city to William Wansey places him in the select company of distinguished visitors and members of the royal family, and suggests he was not a Bristolian by birth. He is not mentioned in McGrath’s *Merchant Venturers*, but is referred to in Minchinton’s *Trade of Bristol and Politics of Bristol* in relation to lobbying Parliament. For the 1755 List see P.D. Richardson, ‘The Bristol Slave Trade in the 18th Century’ (Manchester Univ. M.A. thesis, 1969), Appendix B.

46. Minchinton, *Politics of Bristol*, p. 85. Robert Nugent (1702–88) was unsuccessful in his interview with the Duke of Newcastle and in his approaches to the Board of Trade and Board of Ordnance.


48. The present Mill Farm at Woolley is thought to have been the home of the Worgan family. See Buchanan and Tucker, ‘The Manufacture of Gunpowder’, for a plan of the Woolley works.


55. Damer Powell, *Bristol Privateers*; Latimer, *Bristol in the Eighteenth Century*. The instructions from the owners of the *Soutbresil*, May 1746, are of particular interest. They provide advice on safety standards — ‘Let a constant strict Watch be kept over your Powder room and suffer no one to enter it with a lighted candle in Lanthorn or otherwise, whoever you intrust there, must go into it without shoes, and we farther direct that no iron tool be made use of in opening or fastening any Powder Casks but all to be done with Wood Mallets’. Damer Powell, *Bristol Privateers*, pp. 356–9. The owners included Thomas Deane, a partner in the Littleton works, and Cranfield Becher, an investor in those at Woolley.


58. See for example K. Morgan’s observation that investment in manufacturing by Bristolians in their landward hinterland was ‘limited’, *Bristol and the Atlantic Trade in the Eighteenth Century* (Cambridge Univ. Press, 1993), pp. 102–3.

59. An earlier version of this paper was presented at a conference on ‘The Atlantic Slave Trade and Provincial Britain’, April 1999, organized by the Regional History Centre, University of the West of England. It was held at Leigh Court, Abbots Leigh, former home of the Miles family — civic leaders, merchants and bankers of Bristol, with strong West Indian interests. Both William Miles (1729–1803) and his son Philip John Miles (1773–1845) were partners in the Littleton powder works. In Fig. 5, Leigh Court may be seen in the top left corner of the map.