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# Turkey Red Textile Dyeing in Glasgow: A Cross-Disciplinary Investigation into Scotland's Bygone Industry

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## Abstract

The history of Turkey red dyeing in Glasgow and the West of Scotland is a complex and multi-faceted story encompassing economics, social and working conditions, international trade, and the rapid rise in industrialisation during the nineteenth century. As part of a project at the University of Glasgow exploring the chemistry of Turkey red dyeing for conservation and reproduction purposes, this article outlines the historical, geographic, and social context for the textile dyeing and printing as well as recent publications and exhibitions about Turkey red to highlight its significance to Scottish cultural heritage.

## Introduction

The practice of Turkey red textile dyeing was done in the west of Scotland from the late eighteenth to early twentieth centuries (Peel 1952). The product was a vibrant red cotton cloth or yarn that had a remarkable resistance to fading and bleeding, making the labour- and time-intensive process worth the investment (Arthur et al. 2007). The product quality was such that it commanded three times the price of non-Turkey red prints—the 1875-76 Montgomery Ward (an American retailer) catalogue sold red prints at 9 ½ cents per yard and Turkey red prints at 27 ½ cents (Brackman 1989).

Despite the relatively recent demise of production, awareness of its existence has largely faded from public consciousness, although there has been a revival of interest within the last twenty years as evidenced by gallery exhibitions, research projects, and installations (Jacqué et al. 1995), (Arthur et al. 2007), (Karadag & Dolen 2007), (Boot et al. n.d.). The most significant of these is the Colouring the Nation project at National Museums Scotland (NMS), which studied 200 manufacturers' pattern books from the United Turkey Red Company (UTR) that had been in the NMS collection since the 1960s. The project explored, digitized, and published online a variety of print pattern samples as well as studying evidence from business papers, exhibition catalogues, and Board of Trade Design Registers (Nenadic & Tuckett n.d.), (Tuckett & Nenadic 2012). A book was also published in conjunction with the project that explored the Turkey red cotton industry in Scotland from 1840-1940 (Nenadic & Tuckett 2013).

There exists a large body of literature on the economic and industrial history of Turkey red. Some chemists and dyers contemporary with the industry explored the chemistry of the process and a few modern re-creations have been done, but as yet there is no comprehensive study on the product itself or definitive way to distinguish Turkey red from a visually identical imitation. This paper explains the history of Turkey red in Scotland and the aim of this cross-disciplinary doctoral project, which examines archival records and historical textile samples to understand what made the product of this technique so singular.

## What is Turkey red?

The exact definition of Turkey red is somewhat fluid; in general, it can be described as 'a colour lake formed with an oxidised fatty acid [...] in combination with aluminium oxide,

Alizarin, and calcium' (Peel 1952, 502). The aims of the research for this project are to establish the chemistry of Turkey red dyeing to be able to better understand its industrial history, and to develop a reliable way to authenticate textile artefacts in order to better preserve them. One of the challenges faced here is to work with what could be called a "lost" art, for there are no practitioners from the heyday of the industry still living. Another is the secretive nature of the process, described as 'a highly specialised craft that had been slowly evolved over generations by a host of contributors, and practically no up-to-date information about it was to be found in textbooks or in lectures on dyeing. [...] so little leaked out that it is not surprising that books on dyeing had little to tell aspiring entrants to the industry' (Peel 1952, 502).

Turkey red is a textile dyeing process that imparts to cotton cloth and yarn a vibrant red hue that 'was much in demand because of its brilliant colour and fastness against light and washing' (Hofenk de Graff et al. 2004, 95). It was particularly noteworthy for its resistance to typical bleaching processes and was used by Irish linen makers for embroidering their cloth and in Scotland to mark household linens and personal items because it was durable with repeated washings (Knecht et al. 1893), (Jacqué et al. 1995). Andrew Ure, the nineteenth-century Scottish scholar, doctor, and chemist, writes that it was 'the fastest colour which is known' (Ure 1844, 793).

The process and product are called by the same name. The final creation exists only in the form of a coloured textile, that is, one cannot find a bottle or vial of "Turkey red" and apply it directly to cotton; it must be created within the fibre by means of a series of treatments that together comprise the dyeing process. Imitations were rampant because of the price quality Turkey red could demand, and counterfeit bottles of "Turkey red dye" could be purchased (Arthur et al. 2007), (Brackman 1989). It is even possible today to purchase a modern fibre-reactive dye in a shade called "Turkey Red" (Anon n.d.).

The research for this project is conducted by examining various historical dyeing texts and treatises as well as archival records related to Turkey red. The Scottish Business Archive (SBA) at the University of Glasgow has in its collection a set of ten pattern sample books from United Turkey Red, eight of which contain printed pattern samples of Turkey red. These, in combination with the textiles in the NMS collection, provide a wealth of authentic samples. The SBA collection also contains a ledger of ingredients used in Turkey red dyeing, which does not provide information about the process but does give a picture of what was used, what changed, and what was consistent over nearly twenty years of dyeing (Anon 1873). More recently and outwith the time period on which this research focuses (1870-1900), documents from the early 1900s in the Coats archive at Paisley Library describe their industrial method for making Turkey red, which is much similar to those used twenty years earlier (Brennan et al. 1943), (Collin n.d.), (Straugh 1908), (Tannahill 1906). Evidence of other similarities with methods prior to the period of focus provide evidence of continuity in the manufacturing process throughout its nearly 150-year production.

## **A brief world history of Turkey red**

The origins of Turkey red, like most dyeing processes, exist far in the past and were not documented. Ure writes that 'this dye was discovered in India, and remained long a process peculiar to that country. It was afterwards practised in other parts of Asia and in Greece' (Ure 1844, 793). John James Hummel, a late nineteenth-century English industrial chemist and professor of dyeing at Yorkshire College, agreed that 'Turkey-red dyeing probably had its

origin in India. At an early date it was introduced into Turkey (hence its name)...’ (Hummel 1886, 427). The recurring French appellation *rouge des Indes* supports this conjecture, given the absence of records from India. It was also called *rouge turc* (Turkey red) and *rouge d’Andrinople* or *Adrianople red*, a Turkish city that is modern-day Edirne (Liles 1990).

In his comprehensive history on the madder trade in Europe, Robert Chenciner writes that Turkey red ‘was made in the East using a secret process...which yielded a brilliant and lasting shade of red. [...] In spite of their exorbitant prices, yarns dyed with Turkey red, mainly from Asia Minor and Greece, were sold in large quantities in Europe during the 17<sup>th</sup> and 18<sup>th</sup> centuries’(Chenciner 2000, 211). Because of the value of the product, processes were carefully protected by dyers, though Chenciner also notes that ‘even when no secrecy was intended, it is impossible to note down all the fine adjustments carried out almost subconsciously as the result of long experience’ (Chenciner 2000, 328). This made it difficult for Western European dyers to acquire the skills needed to produce Turkey red themselves, or as W.T. Johnston, a modern historian, puts it, ‘to dye a pure and fast red was a secret that eluded most European textile traders until well into the 18<sup>th</sup> century’ (Johnston 2010, 295). Once the trade was established, the tradition of secrecy persisted and new publications on dyeing processes were rare (Peel 1952). Robert Peel, a dyer for United Turkey Red and British Silk Dyers in the first half of the twentieth century, writes in his comprehensive study of the history of Turkey red that ‘processes were so carefully guarded in those days that few inside the works themselves knew anything more than the broad outline or general method. If a very special and new method was on trial, it was called a “secret work” and kept a secret’ (Peel 1952, 502).

Another challenge the dyers faced in appropriating the process were the climatological differences between Britain and Turkey or the south of France and the adaptations necessary to make the desired product (Schaefer 1941). As with the availability of publications not necessarily translating to a practical understanding of the dyeing, a comparative reading of late eighteenth-century French publications versus mid-nineteenth century British ones does not indicate any major contrast, implying that the modifications were subtle or kept tacit and left unpublished. J. N. Liles, a modern craft dyer, attributes the challenges to a lack of necessary heat and sunlight to chemically alter the oil as well as a misunderstanding about the importance of calcium salts in the dye bath (Liles 1990). No one could argue the obvious differences with respect to heavy precipitation and little heat or sunlight in Britain, and the work was mostly seasonal until the adoption of indoor drying in the 1830s (Peel 1952), (Tarrant 1987).

## **Turkey red in Western Europe**

In the mid-eighteenth century, two French industrialists named d’Haristoy and Goudard persuaded Greek dyers from Smyrna to bring the ability to make Turkey red to France, setting up works near Rouen and in Languedoc around 1746 (Cardon 2007). Similar operations soon cropped up in Normandy and around Marseilles. After the Greeks had taught their trade to the French they were dismissed, and moved on to Alsace to found more Turkey red works (Chenciner 2000).

The question remains, why was it so difficult to acquire the capability to produce authentic Turkey red? Dyers in Turkey and India had been making it for time immemorial, but the French were unable to make it until shown how to by the Greek dyers. Relative to the time it took to be established in France, the time taken to establish an even more successful industry

in Scotland is negligible. One theory behind this is that the ties of the Auld Alliance encouraged the technology transfer, though given the financial incentives and the already established Scottish textile industry, this is likely more a romantic fancy than fact (Peel 1952).

## Major figures in Scottish Turkey red

Prior to the discussion of the Turkey red industry in Scotland, a few personages will be introduced. William Stirling, whose father John Stirling was Glasgow Provost from 1728-1730, founded the firm of William Stirling & Sons in the mid-eighteenth century. He began by selling on commission Indian cottons printed in London and operated out of a shop in High Street opposite the Blackfriars Wynd. By 1750 he had established a print works at Dawsholm on the Kelvin, from which he took water for his operation. In the 1770s he was instrumental in establishing the textile industry in the Vale of Leven, which had an even better supply of water. He feued the Cordale works from Lord Stonefield and started a print field there (Eyre-Todd 1934). The Stirling family's money originally came from trade with the colonies in Virginia (Arthur et al. 2007).

George Macintosh (sometimes spelled Mackintosh) was born in Roskeenshire in 1739. He moved south to Glasgow as a young man and worked as a junior clerk at a tannery on the Molendinar, becoming the head of a rival enterprise by the age of thirty-four (Eyre-Todd 1934). In 1777 he founded a cudbear operation in Glasgow occupying 1 ½ acres and surrounded by a high wall to maintain secrecy. Cudbear, a dye derived from orcella or orseille lichens found in the Highlands, produces purple shades on wool and silk (Carment 1845). Macintosh was described in the *First Statistical Account of Scotland* as 'a gentleman whose spirited and successful exertions have been of the greatest benefit to the manufacturers of this country'; he died in 1807 (Burns 1794, 113), (Johnston 2010).

Charles Macintosh was the son of George and contributed his name to the garment made from cloth waterproofed via a process he developed using natural rubber—the Mackintosh. He was also involved in a number of chemical industries in the Glasgow area, which is discussed later in this article (Macfarlan 1845).

David Dale was also born in 1739, at Stewarton. Peel calls him a “maker” of Glasgow, and like many men of his era he had a diverse set of interests, skills, and occupations (Peel 1952). He started out as a herd, later apprenticing to a weaver in Kilmarnock and becoming a peddler of yarns and cloth in his early twenties, travelling the countryside buying up linen thread spun by farmers' wives. He started as clerk in a Glasgow drapery store in 1763, eventually importing yarn from Holland and running a shop above the Tollbooth in High Street (Eyre-Todd 1934). He was also instrumental in bringing the first branch of the Royal Bank of Scotland to Glasgow (McLaren 2012). David Dale was chosen as a magistrate of the city of Glasgow in 1794 (Eyre-Todd 1934).

The founding of the cotton industry in Glasgow can, in a way, be attributed to Rob Roy MacGregor. James Monteith was a small laird near Aberfoyle in Stirlingshire and was regularly beset upon by Highland reavers and refused to pay blackmail to Rob Roy. After repeated plundering and near ruination, he 'died of a broken heart' and his son Henry sold his land and moved to the village of Anderston near Glasgow, working as a market gardener. His son, James, became a handloom weaver. He was later the biggest importer French and Dutch

yarns as well as a cambric manufacturer, establishing a bleach field by his house located near what is the modern-day Anderston railway station. James's son John built a factory in Pollockshaws with two hundred power looms. His brother James became a cotton yarn dealer in Cambuslang and purchased the Blantyre mill from David Dale, narrowly escaping ruination after the outbreak of the French Revolution. He had been unable to sell his yarn, but was able to weave the cloth and sell it by public auction in London, amassing a fortune of £80,000 (about £4 million in 2005 currency) over five years (Anon n.d.). The third son of the weaver James, Henry, was the most successful of all. By the age of twenty he owned a weaving mill in Anderston, making himself very unpopular and the source of one of Glasgow's first industrial riots when he reduced wages in the face of economic competition. The twenty one-year old mill owner was assaulted by his employees, who smashed his warehouse windows and cut off his queue. He was later very successful in building the cotton industry in Glasgow and accumulated great wealth (Eyre-Todd 1934). Henry Monteith was Lord Provost of Glasgow from 1814-1816 and 1818-1820. He died in 1848 at the age of 84, wealthy from Turkey red (Peel 1952).

## Foundation of an industry

After the 1707 Act of Union, Glasgow was a major port for trade between British North American Colonies and Continental European ports, especially for tobacco. This allowed the city to prosper during the eighteenth century, until the American War of Independence (1775-1783) ended the tobacco trade. It was during the resulting economic slump that the textile industry began to take off. Schoeser argues that the trade networks and family connections that were the legacy of the tobacco trade made it easy to establish a textile economy in lieu (Arthur et al. 2007).

Interest in Britain for cotton textiles predates the post-tobacco slump, however. At the end of the seventeenth century, demand had increased for cheap cotton prints from India, Persia, and China, at a detriment to wool and silk manufacturers. Parliament passed an Act in 1700 prohibiting the importation and use of these prints at a fine of £200. The domestic trade was allowed to continue, as it was deemed not to interfere with wool and silk. In 1712, realising the value of this trade, an Excise duty of 3d. (about £1 in 2005 currency) was imposed 'on every square yard of calico printed, stained, painted, or dyed' and as no great objections were made it was doubled in 1714 (Anon n.d.). The wool and silk manufacturers began to suffer again and in 1720 Parliament passed another Act banning the wearing or use of any domestic or imported dyed or printed calicoes, excepting those that were dyed all blue. For sixteen years only linen could be printed, after which cloth of cotton and linen mix could be printed. The law against printing calico was repealed in 1774, the Excise duty not being removed until 1831 (Bremner 1869).

Textile printing was introduced into Scotland in 1738 according to Bremner and 1729 according to Arthur, who also says that the first print field in Glasgow was in Pollockshaws around 1742 (Bremner 1869), (Arthur et al. 2007). In 1775, Richard Arkwright, a barber at Bolton, invented the "spinning jenny" for the spinning of yarn, an invention born of an understanding of the nature of hair and therefore fibres as well. David Dale recognized the potential for this machine in terms of factory production and took advantage of Arkwright's 1783 trip to Glasgow. He invited Arkwright to the Falls of Clyde at Lanark to assess their suitability for water-powering a mill. A boggy level plot on the river was purchased from Lord Braxfield and the New Lanark Mills opened in March 1786. Arkwright, who was teased

back home for his beginnings as a barber, replied that ‘he had put a razor into the hands of a Scotsman who would shave them all.’ Dale went on to establish other mills at Catrine, Oban, and Stanley. His son-in-law, Robert Owen, ran New Lanark and became famous for his Utopian socialist ideals (Eyre-Todd 1934, 315).

Together with James Monteith (brother of Henry, Lord Provost), David Dale founded a mill at Blantyre in 1785 to spin a kind of cotton yarn called “water-twist”. A second mill was built six years later for “mule-twist”, both mills being powered by the flow of the Clyde (Anderson 1845). Burns writes in the *First Statistical Account of Scotland* that the mill did not begin work until 1787, though the difference is small enough to be negligible for the purposes of this research (Burns 1794). Monteith later bought out Dale’s share in 1792 (Eyre-Todd 1934). Ten years later Henry took over the factory at Blantyre (Peel 1952)

If David Dale can be considered the founder of the spinning industry in Glasgow, it is the Monteith family that founded the weaving industry (Eyre-Todd 1934). From the handlooms of his father and power looms of his brother, Henry Monteith went on to make a fortune in cotton. He had commercial ties with the Bogle family, who in turn had ties to the tobacco trade as well as another export from the American South—cotton. The Bogle family had also helped fund George Macintosh’s cudbear works (Arthur et al. 2007).

By the mid-nineteenth century there were ‘now many splendid spinning establishments in and around Glasgow’ including New Lanark and James Finlay and Company. The latter company’s operations at Catrine, Deanston, and Ballindalloch were ‘the most extensive ones in the whole kingdom’ and employed about 2400 people in spinning, weaving, and bleaching (Macfarlan 1845, 148).

## Turkey red in Scotland

The ability to make the profitable Turkey red was coveted by the British textile industry. In this paper, Britain refers to the entirety of the island comprising of England, Scotland, and Wales, with the countries being named separately. The “Society for Encouraging the Dying of Mather Red” was granted a charter in 1759 by the Town Council of Glasgow (Anon n.d.). They imported madder from Holland and logwood from America and the West Indies (Eyre-Todd 1934). The Society had the dual interest in the promotion of madder dyeing and making charitable donations to women and children in need. The minutes book from the 1730s and 1740s appears to involve more about charitable collections and distributions than madder dyeing, but evidently the interest was present (Anon n.d.).

According to Tarrant, ‘Britain had the opportunity of learning the secret of Turkey red dyeing in 1751 when the British minister in Copenhagen forwarded a petition to the Secretary of State from a Dane who said he knew the process’ (Tarrant 1987, 38). Nothing must have come of this, for Turkey red was not established in Britain until much later and it is not mentioned anywhere else. John Wilson was a dresser, bleacher, and dyer of cloth and piece goods in Ainsworth, near Bolton (Aikin 1795). In 1753 he sent an envoy to Turkey to stay with a Richard Dobs who was a merchant in Smyrna. Dobs introduced the envoy to dye houses where he learned how to make Turkey red, returning to England with bales of the madder root needed for the process. Wilson was disappointed with the process, which he found tedious and time-consuming in addition to being ill suited to his work dyed piece goods and cotton velvets. He did not pursue the process further (Wilson 1786). Aside from

the dramatic irony of Wilson's choice and the lost economic success that could have resulted, it took more than thirty years after this for Turkey red to be produced in Britain.

In 1764, Simon Spurret of Isleworth received £100 from the Society of Arts for allegedly dyeing Turkey red, though the processes used to make the samples submitted to the competition were in fact only those for ordinary madder reds (Tarrant 1987). In 1795, the French government published a method for dyeing Turkey red, making public, in theory at least, the process, and illustrating the difficulty had in replicating the process from a text alone (Hummel 1886), (Anon 1765).

The British House of Commons offered a prize of £2500 for the successful dyeing of Turkey red, which was claimed by two Frenchmen. Louis and Abraham Henry Borelle (the French spelling, alternately given as Borell) came to Britain from Rouen, where thirty-odd years earlier some of the first Turkey red had been dyed in France (Cardon 2007). Louis Borelle said later that he had come to Britain in 1781 to show the process to a friend, William Morton Pitt, who was a member of the House. Pitt had been abroad and advised Borelle to wait until his return, then taking longer than expected before coming back to Britain. The Borelles submitted their samples in the winter of 1784 to the Manchester Committee of Trade, showing them to the House Committee in February of 1785. Before awarding them the prize in 1786, the Committee observed the Borelles during the entirety of the process and then replicated it without them, testing the product for quality and fastness (Great Britain House of Commons 1803). Louis Borelle later established an operation in Manchester (Bremner 1869).

Another dyer from Rouen, Pierre Jacques Papillon, was also instrumental in the establishment of Turkey red in Britain (Cardon 2007). Papillon had submitted samples to the House of Commons under the name Cigale in February 1785, and although they were deemed to be of quality he was turned down because the Borelles had preceded him (Great Britain House of Commons 1803). It is here that the Scottish connection begins, for that same year George Macintosh was in London and met Papillon. Realising his potential, he brought Papillon back to Glasgow and with David Dale the three set up the first Turkey red dye works in Scotland on the banks of the Clyde (Burns 1794). The works, named Dalmarnock, were situated between what is today French Street and the Clyde (Peel 1952).

Papillon must not have been easy to get along with, however, because the partnership lasted only two years. A letter from George Macintosh to his son Charles in January of 1787 reads 'Papillon has now left us entirely! We could not manage his unhappy temper. I have made a great improvement in his process. I dye in twenty days what he took twenty-five to do, and the colour better. We paid him his salary up to October, so as to be quite clear of him' (Johnston 2010, 296). In the *First Statistical Account of Scotland*, published in 1794, Burns writes about Dalmarnock and 'another dyehouse, equally extensive, lately erected for the same purpose, in the neighbourhood of this one, also in the barony parish, under the management of Mr. Papillon, who is now connected with another Company. At both places the Turkey red colours are now made in great perfection' (Burns 1794, 114). Johnston writes that Papillon set up his own works in 1787 and petitioned the Board of Manufactures for a grant to keep his business going. Not wanting to support him for nothing, the Board agreed after much back-and-forth to provide funding if Papillon gave them his process. It was written out and examined by Dr Joseph Black, professor of chemistry, before being sealed for twelve years (Johnston 2010). In 1804 the method was published in a few places, one being the *Philosophical Magazine* (Anon 1804).



Although Turkey red was first dyed in England, it was in Scotland where the industry was established first and most successful, making Glasgow famous for its production (Bremner 1869). Burns writes that ‘the business was first established here’ and Peel that ‘Scots have a better idea of the properties of Turkey Red than Englishmen, because Scotland introduced Turkey Red dyeing to these islands: she was successful in the very earliest stages of the process’ (Burns 1794, 114), (Peel 1952, 496). In *The Second Statistical Account of Scotland*, Macfarlan writes ‘the process for dyeing Turkey or Adrianople red, was first introduced into Britain by Mr George Macintosh, at a dye-house which he established in Glasgow. The immense importance since attained by this branch of commerce in Britain owes its origin entirely to this circumstance’ (Macfarlan 1845, 165).

The seat of the Turkey red industry was eventually to become the Vale of Leven west of the city. This exodus began with William Stirling & Sons and the details are discussed in a later section (Eyre-Todd 1934). By the end of the eighteenth century Turkey red dyeing in the west of Scotland had been expanded and refined, producing various effects on yarn and cloth and producing in mass quantities (Arthur et al. 2007).

## The Industry in Scotland

The success of the textile industry in Scotland was largely due to the availability of requisite resources, namely an abundant supply of soft water and a workforce. Print works were situated on or near sources of water and on occasion reservoirs were built to optimize flow. Arthur says ‘what can be said with certainty is that Glasgow as a merchant city was a focal point for an industry physically dispersed over a wide area. Some firms became large-scale producers, dependent on export markets, and using mass-production techniques’ (Arthur et al. 2007, 11).

The Turkey red industry in Scotland was a largely seasonal operation prior to 1835 because of the inability to effectively dry the cotton indoors. Work was done in fields surrounded by beech hedges and narrow canals (Arthur et al. 2007). Earlier innovations include the invention of cylinder printing in 1785 by William Bell of Glasgow (Bremner 1869). The discharge printing process is widely acknowledged to have been developed by Daniel Koechlin of Mulhouse in 1811, though, Arthur says that Robert Henry is credited as having developed a method at least seven years earlier and that George Roger is credited as having discharge printed and sold the first bandana in Britain in 1802 (Arthur et al. 2007).

Henry Monteith & Co. built a large manufacturing operation on banana printing, employing presses with lead plates that applied 320 tons of pressure and produced 224 finished handkerchiefs every ten minutes, processing 19,200 yards of cloth every ten hours (Ure 1824). The firm was described by Ure as ‘celebrated in the commercial world, for the excellence and beauty of its cotton fabrics. The madder-reds rival, in brilliancy and solidity, any ever produced at Adrianople; and the white figures distributed over the cloth surpass in purity, elegance, and precision of outline, the original Bandana designs’ (Ure 1824, 7). The success of the Scottish manufacture was such that the original industry that made bandanas in India was ‘forced into terminal decline’ (Arthur et al. 2007, 22). These bandanas are the those associated with the iconic red-and-white cowboy bandanas of the American West, and Turkey red calico was closely associated with the frontier, evidenced by references in Laura Ingalls Wilder’s books based on her childhood and the short story *Turkey Red* published 1920 (Wilder 1932), (Wood 1920).

In the mid-1840s, Macfarlan gave figures for the increase in raw cotton consumed by the Scottish textile industry. He quotes figures from an 1834 Parliamentary Factory Commissioner that in Scotland there were 134 cotton mills and that ‘with the exception of some large establishments of Aberdeen, and one at Stanley, near Perth, the cotton manufacture is almost entirely confined to Glasgow, and the country immediately adjoining’; Lanarkshire had 74, Renfrewshire 41, Dumbartonshire 4, Buteshire 2, and Argyllshire and Perthshire each 1. The increase from about 46,000 bales in 1818 to about 95,000 in 1834 indicates the rapid rise of textiles in the Glasgow area (Macfarlan 1845).

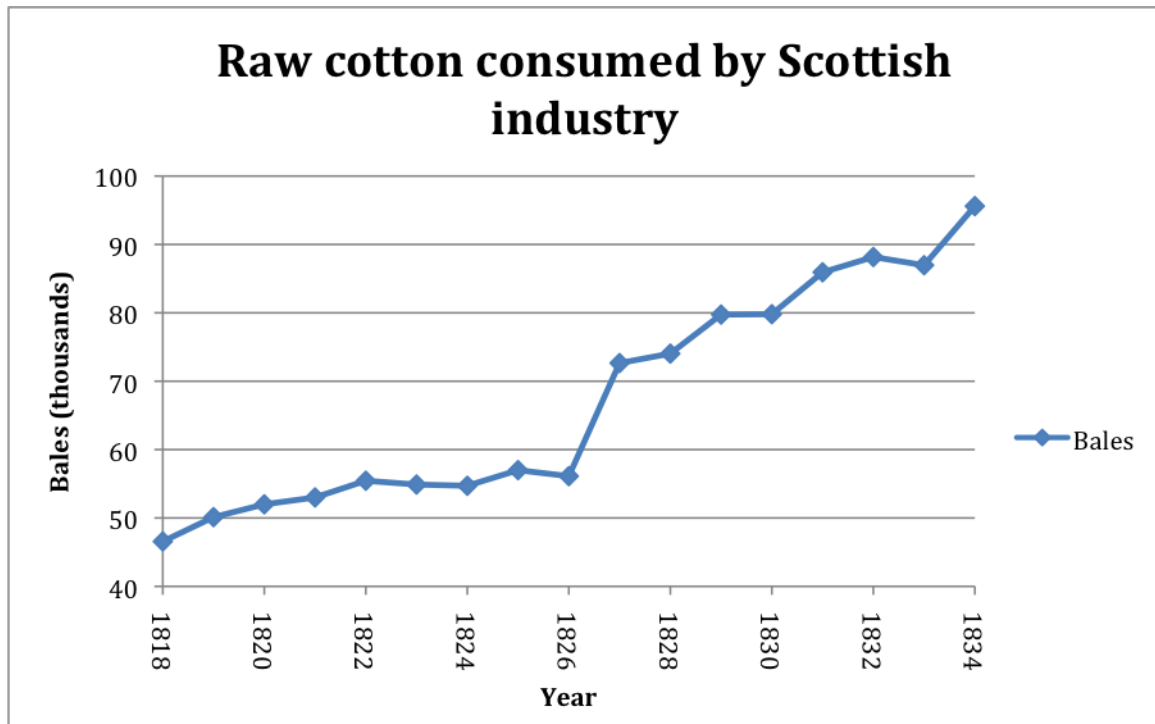


Figure 1 Data from *The Second Statistical Account of Scotland*

The process of Turkey red dyeing was adopted by William Stirling & Sons at their Cordale works in the Vale of Leven in 1816, making it the earliest Turkey red production in the Vale. The firm had been struggling after the slump following the Napoleonic wars but Turkey red turned things around and helped Stirling prosper until after World War I (Eyre-Todd 1934). The Stirling firm also made bandanas and between them and Monteith, Glasgow had ‘almost a monopoly of the trade’ (Bremner 1869, 303). The cloth and yarn dyed and printed by Stirling & Sons was spun and woven in Glasgow and Manchester (Bremner 1869).

Bremner writes that ‘it would be impossible to have such an establishment in a locality where there was not an abundance of pure water; for the quantity consumed at Dalquhurn would be sufficient to supply every man, woman, and child in the city of Edinburgh with ten gallons a day’ (Bremner 1869, 301). He estimated that ‘upwards of 12,000 persons are employed in the print and dye works’ in 1869 (Bremner 1869, 297).

## Markets

Most of the Turkey red produced in Scotland was exported, though some was for the local market as furnishing or dress fabric; Arthur writes ‘the industry thus helped to create a colour and design-conscious society, and one where quality mattered.’ Dyed yarn was supplied to Manchester weaving firms and the Glasgow firms Mann Byers, Steward & McDonald and Scottish Co-op Warehouse dealt in Turkey red twill, damask, cambric, and chintz (Arthur et al. 2007, 12).

Many of the bandanas were exported to Continental Europe and North America where they were called ‘Monteiths’. In North America, Turkey red was sent from Greenock and Port Glasgow to Boston, New York, Maryland, Virginia, South and North Carolina, St Kitts, St Vincent, Jamaica, and Barbados (Arthur et al. 2007).

Turkey red from the west of Scotland was also exported to India, Indonesia, China, Central and South America, and the West Indies. Design consideration was important and manufacturers tailored them to the appropriate market. Taylor writes that ‘local, cultural and religious traditions had to be respected in the selection of suitable imagery. [...] dancing women were a popular motif among Hindu customers, whereas Muslims favoured non-representational geometric patterns. Peacocks were ubiquitous, as well as being decorative [...]’ (Arthur et al. 2007, 23). Bremner writes about the industry that ‘as most of the goods are for the Indian market, the colours are somewhat “loud” and the designs peculiar. [...] None of the designs of these Indian garments would find admirers in this country; and as the artists are bound down by certain conventional rules, they have no scope for the creation of original patterns’ (Bremner 1869, 302).

## Supporting industries

The industry in the west of Scotland produced a significant amount of textile product, and consequently the proportional quantity of raw materials. Raw cotton was imported from the American South, madder from France and Holland, and olive oil from France and Italy, to name a few. An assortment of chemical industries grew up in the Glasgow area on the heels of Turkey red manufacture. One of the first was Charles Macintosh, son of George, who began making sugar of lead, or lead (II) acetate, which was used in textile printing and was cheaper than imported Dutch product (Burns 1794).

Macintosh also set up a chemical factory at St Rollox, northeast of modern central Glasgow, with Charles Tennant, which became the largest of its kind in Europe. Tennant was the fourth son of an Ayrshire farmer and started out as a weaver and opened a bleach field south of Glasgow. He applied the research done by Berthollet on the principles of bleaching with chlorine to develop a bleaching liquor using calcium chloride that vastly improved the time taken to bleach fabric (Eyre-Todd 1934). In 1795 Tennant opened Scotland’s first alum works in Hurler, Renfrewshire, and later two others at Campsie and in Baldernock, Stirlingshire. In 1799 he began preparing calcium chloride, or bleaching powder (Macfarlan 1845). Macfarlan writes in *The Second Statistical Account of Scotland* that ‘in 1800, Messrs Tennant, Knox, and Company, established a chemical work at St Rollox; now carried on under the firm of Charles Tennant and Company, for the manufacture of sulphuric acid, chloride of lime, soda, and soap. This manufactory, the most extensive of any of the kind in Europe, covers ten acres of ground’ (Macfarlan 1845, 163).

Other industries in the area made mordants and other ancillary ingredients. In addition to alum, copperas was made at Hurler and Lennoxton and lead, tin, and iron acetates were made in the Vale of Leven and the east end. Chrome mordants were made in Rutherglen, several works made bleaching powder and sulfuric acid, and natural ingredients like bullock's blood and dung were traded locally as well (Arthur et al. 2007). A soda works run by Charles Todd and Co. was located at Dalmuir Shore which made about 30 tons of sulfuric acid per week as well as producing bleaching powder (Barclay 1845). The Milburn Pyroligneous Works in Bonhill were established in 1806, employing 15 men and producing pyroligneous acid, pyroxylic spirit (methanol), creosote, and Prussian blue pigment (Gregor 1845). The works were opened by the Turnbull family who had migrated to the Vale in 1770 following William Stirling & Sons; they reputedly were successful in dyeing Turkey red at Croftengea Works in Alexandria in 1827 (Peel 1952).

## Workers

The textile workers in the west of Scotland were vital to the success of the industry. Despite mechanisation with inventions like Arkwright's spinning jenny, workers were still needed to operate the equipment provide quality control. Stevenson writes of Blantyre in *The First Statistical Account of Scotland* that 'the employment at cotton mills, has, in general, been accounted unfavourable to health; and yet, what is singular, in the present case, is, that out of a great number, employed at work within the mill, only two have died since it was erected' (Stevenson 1792, 217). Many of the first workers were Highlanders coming south to making a living, encouraged by George Macintosh (Carment 1845). Population accounting for Bonhill parish indicates that in 1755, 901 people lived there and by 1791 there were 2310, 562 under the age of ten (Gregor 1845). In the last decade of the eighteenth century, two print fields were established in Rutherglen and Shawfield, employing about 200 workers. By the middle of the nineteenth century there was a cotton mill and a Turkey red dye works as well as 500 handloom weavers in the parish (Brown 1845).

The rapid increase in the number of paid workers as a result of the growth of cotton spinning, weaving, a dyeing created a shortage of currency with which to pay wages. From 1780-1830, cotton mills at Deanston and Catrine, Blantyre works, and other Glasgow businesses counter struck Spanish American silver 'pieces of eight' coins for their own purposes (Arthur et al. 2007).



Lead press operator, Maryhill Burgh Halls, Glasgow, c. 1878 © Culture and Sport Glasgow, Glasgow City Council

**This worker is operating a lead plate press, which would have been used for printing Turkey red cloth.**

The 1845 *Second Statistical Account* provides a wealth of information on numbers of workers in factories, wages, and working arrangements. In Old Kilpatrick, Cockney Field employed 70 persons—32 men, 18 women, 8 teenage girls and 12 teenage boys. Employees worked from six in the morning to seven at night with two one-hour meal breaks. Men were paid about 12s. per week, women about 6s., and the young people about 3s. The bleach and print works owned by Patrick Mitchell at Milton Field employed 400 to 500 workers ‘in full operation’. They worked six days per week for ten hours a day, excepting Saturdays where most worked ‘only eight hours’. Men could earn from £1 per week but women averaged about 6s. and children around 4s (Barclay 1845, 28).

Workers at Blantyre were described as ‘in general as healthy as their neighbours in other parts of the parish, many of them attaining a great age. [...] Many workers are now employed who have been upwards of forty years in the service of the company. As a class, it must be confessed that they are much more healthy than the mill-workers in large towns’ (Anderson 1845, 322).



Calico print workers, Maryhill Burgh Halls, Glasgow c. 1878 © Culture and Sport Glasgow, Glasgow City Council

**These women are described as calico printers in one of only two windows depicting female workers. Both windows portray women in textile work.**

In the Vale the Cordale print works of William Stirling & Sons covered five acres of ground and employed about 500 men, women, and children. Machine printers earned about 40s. per week, small block printers about 28s. per week, large block printers about 35s. and small boys used as aides around 5s. per week (Bremner 1869). The firm's Dalquhurn operation employed nearly a thousand, many of them Irish women. Bremner writes 'a more healthy-looking class of women than those employed in bleaching is not to be found, though the labour in the winter time is somewhat trying' (Bremner 1869, 301).

Unsurprisingly, one of the problems facing owners and operators of the textile mills was theft of product by the workers. Many newspapers from the late eighteenth and early nineteenth centuries refer to thefts and subsequent punishments. Arthur cites an example, Catherine Veer, who stole printed cotton shawls from a bleach field east of Dumbarton and was banished for fourteen years. More severe punishment could be transportation to His Majesty's plantations (Arthur et al. 2007).

Workers in the twentieth century were equally influenced by the presence of the textile industry. United Turkey Red was a significant presence for residents of the Vale from the 1920s through World War II. It was the largest single employer and owned much of the local property, providing skilled and unskilled work. Artists designed patterns that were sent to zinc cutters who cut a plate for each colour of the design. Pantographers reduced the design to actual size and engraved it on a roller, which was then passed on to an etcher. They processed the design in a bath of potassium cyanide before passing the now-etched copper cylinder to an engraver, who hand-corrected any irregularities before sending it to the printers (Fryer 1995).

## The Vale of Leven

The River Leven flows out of Loch Lomond at Balloch and into the Clyde at Dumbarton, about seven miles in length. In the early eighteenth century the area was rural and agrarian, but by the end of the nineteenth century many parts had become industrialised. During this time period, the population increased from 340 to about 20,000 (MacKay 2011).

Glasgow manufacturers were sending textiles to be bleached on the banks of the Leven and Loch Lomond as early as 1728 and Dalquhurn bleach field was established in the area in 1715 (Peel 1952). The first print field on the Leven began operation around 1768 with two more following within twenty-five years (Stewart 1792). William Stirling & Sons moved operations to the Vale in 1770 when they purchased Cordale (Peel 1952).

The area was ideal of textile dyeing, printing, and bleaching because of the abundance of space and soft, clean water that flowed out of Loch Lomond and down to the Clyde (Arthur et al. 2007). Peel says “‘The Vale’, as it is fondly known to exiles all over the world, witnessed the rise and fall of Turkey red in Scotland’ (Peel 1952, 499). The importance of the industry in the area carried into the twentieth century. An interview with the wife of a printer for United Turkey Red who worked there around the Second World War says ‘really every family had somebody that worked there.’ At this time, the Croftengea works where the printer was employed had a railway link from the factory to the main line (Fryer 1995).

In an account of his childhood on the Leven in the 1930s, Tom Gallacher describes playing on the river: ‘We jumped back from the odd jets of steam which spurted from its banks and were drawn to the gaping sluice gates which took giant gulps of fresh water and spat it out—blood red. Actually, it was “Turkey red”—the preferred colour of dye for saris exported to India’ (Gallacher 1993). Today, none of the dye works still stand. A self-guided walking tour put together by the West Dumbartonshire Council highlights the sites of the former works of the United Turkey Red and other Vale industries (Anon n.d.).

## Dye works

### Dalmarnock/Barrowfield

The Dalmarnock Turkey red works founded by David Dale and George Macintosh with the assistance of Papillon were the first of their kind in Scotland. They sold the site to Henry Monteith, Bogle & Co. in 1805 (Jacqué et al. 1995). Monteith renamed the works Barrowfield and production continued until the retirement of his son Robert in 1873, when they were demolished (Peel 1952). This ended Turkey red production in Glasgow city and left the industry to the Vale of Leven. Monteith’s production of bandanas, described earlier, made the firm a fortune and the Barrowfield works were ‘probably unequalled in the kingdom’ (Macfarlan 1845, 163). A more detailed description of the works’ operations can be read in the 1824 firsthand account in Andrew Ure’s *Description of the Great Bandana Gallery* (Ure 1824).



## Blantyre

When Henry Monteith took over Blantyre from his brother James in 1802, he began Turkey red dyeing there (Peel 1952). Between the *First* and *Second Statistical Account*, the population of Blantyre parish grew from 1040 to 3000, credit for this going to the Monteith firm providing jobs. Workers in the mill, of which there were around 550, worked a twelve-hour day five days a week and a nine-hour day on Saturdays. The Blantyre works were the second Turkey red dyeing operation in Scotland after Dalmarnock, though the site also spun and wove cotton (Anderson 1845). Operations continued at Blantyre until 1904 (Arthur et al. 2007). The works were condemned, and in 1925 the Livingstone Scottish National Memorial was built on the site, where Livingstone was born and had worked for much of his youth (Peel 1952).

## Dalquhurn

Dalquhurn was founded as a bleach field in 1715 and purchased by William Stirling & Sons in 1791. The firm began Turkey red dyeing there in 1816 but was not consistently successful until 1828 (Peel 1952). By the mid-nineteenth century the grounds of the works covered seventy acres with buildings covering ten (Bremner 1869). The works used steam from 14 boilers and consumed 25,000 to 30,000 tons of coal per year. Around 18.5 million yards of cloth and about 700,000 pounds of yarn were dyed annually. Of the cloth, more than one half was exported as plain red and the rest was sent to Cordale (Bremner 1869).



Stained glass window, Maryhill Burgh Halls, Glasgow c. 1878 © Culture and Sport Glasgow, Glasgow City Council

This window shows women bleaching linen, another aspect of the textile industry. Bleaching was the original textile trade in the Vale of Leven before the expansion of dyeing and printing.



## **Cordale**

Cordale works were built by William Stirling & Sons in 1770 (Peel 1952). By the mid-nineteenth century it was 'one of the most extensive works of the kind in the country' and only Turkey red printing was done (Bremner 1869, 298). The grounds covered five acres and employed around 500 (MacKay 2011).

## **Croftengea/Alexandria**

Croftengea was established in 1790 as a bleach field by William Stirling & Sons (MacKay 2011). Turkey red yarn dyeing there began in 1827 by S. Turnbull, Arthur & Co (Jacqué et al. 1995). In 1835 the works were leased to John Orr Ewing, who eventually purchased them and surrounding land, becoming Alexandria Works.

## **Dalmonach**

The print field of Dalmonach was established in 1786 by the Kibble family (MacKay 2011). At the end of the nineteenth century Dalmonach had branch rail lines from North British and Caledonian Railway Companies into the works along with 28 print machines, two which could print up to 16 colours. The works finished more than 25 million yards of fabric per year and dyed more than one million pounds of yarn (Arthur et al. 2007).

## **Dye firms**

### **John Orr Ewing**

John Orr Ewing the one of two brothers who became giants in the Vale of Leven Turkey red production in the mid-nineteenth century. Orr Ewing acquired Croftengea in 1840 and turned it into the extensive Alexandria works. He also bought Levenfield, the first print field founded in the Vale in 1768, in 1850 (MacKay 2011). He was an astute businessman and hired a qualified chemist, John Christie, in 1859, who in addition to being an expert Turkey red dyer was instrumental in the founding of United Turkey Red (Peel 1952).

### **Archibald Orr Ewing**

The second brother, Archibald Orr Ewing, leased Levenbank works in 1845 and bought them in 1853. He purchased Milton bleach field in 1850 and the Dillichip print works in 1866 (MacKay 2011).

## **United Turkey Red**

Rising import tariffs imposed by the Indian government at the end of the nineteenth century incited change in the Turkey red industry of the west of Scotland. In 1898, William Stirling & Sons, Archibald Orr Ewing, and John Orr Ewing amalgamated to form United Turkey Red, later joined by yarn dyers Alexander Reid of Milngavie. Each firm continued to market under their own brand and mark, but the umbrella association allowed for some protection in the market (Arthur et al. 2007). John Christie, the chemist engaged by John Orr Ewing, became

first Chairman of the firm (MacKay 2011). The works involved were Levenbank, Dillichip, and Milton from the Archibald Orr Ewing firm; Dalquhurn and Cordale from William Stirling & Sons; and Alexandria of John Orr Ewing, plus the Reid operation (Peel 1952).



**Textile bale label from United Turkey Red**

**Bale lable used to designate brand of textile for foreign markets. UGD 13/7/4 © Archive Services, University of Glasgow**

United Turkey Red was a Scottish firm, though several smaller companies joined the English Calico Printers Association, headquartered in Manchester (Arthur et al. 2007). Production of Turkey red declined following World War I and was by 1936 replaced completely by synthetic red naphthol dyes of acceptable fastness (Peel 1952). United Turkey Red continued production of other textile products and was bought out by the Calico Printers Association in 1960 (MacKay 2011).

## Conclusion

The history of textile manufacturing in the west of Scotland is rich and varied. Much can be said about wool, linen, and cotton processing and its growth during the industrial era. Some works like Blantyre were more vertically integrated in that they spun, wove, and dyed on the same site. Other operations, like Stirling & Sons, dyed at one site and printed at another. Peripheral industries like chemical manufacturing are also part of the story, as are foreign markets growing cotton and other ingredients. Outwith Turkey red, local agrarian economies producing wool and flax make up another aspect of Scottish textiles.

There is a fairly strong body of literature outlining the history of United Turkey Red and the history of Turkey red dyeing in Britain and in Scotland. While this project does not aim to uncover much more, it is without a doubt important to establish the social and economic context in which such a remarkable and significant textile product was produced for nearly

150 years. Further reading in *The First and Second Statistical Account of Scotland*, MacKay's *Bleachfields, Printfields and Turkey Red*, and *Colouring the Nation: The Turkey Red Printed Cotton Industry in Scotland c. 1840-1940* provide a more detailed account of the major characters, facilities, workers, and production surrounding Turkey red.

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