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An Unknown 18th-Century Flemish Dyers Manuscript from Antwerp (1778–1802)

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Abstract: This paper presents a historical analysis of a rare dyer's manuscript, preserved within the Museum of Industry in Ghent, Belgium. The manuscript, originating from a dyer in late 18th-century Antwerp, includes an extensive collection of recipes. The study will enable researchers to better grasp the practices of traditional dyeing techniques and materials in the region during that time. The manuscript focuses primarily on the dyeing of woolen fabrics. Approximately 90 of the 132 recipes utilize red dyes. Recipes for dying orange, brown, black, blue, and green colors are also described. The document mentions the use of madder, brazilwood, redwood, and cochineal. To create a variety of red shades, the dyer describes how fabrics were treated with different mordanting compounds, with alum and tin as the main ingredients, and how the dyeing solutions were prepared. The resulting colors include 'madder red', 'formal red', 'crimson', 'scarlet', 'Turkish red', 'fire color' and 'flesh color'. In addition to the dyeing recipes, the manuscript contains various accounting documents and correspondences between the dyer, customers, and suppliers. Lastly, over 100 original, colored samples are attached to the described recipes. In this paper, the artifact's contents will be disclosed, comprising recipes with attached samples and correspondence. Findings resulting from archive research will be included, contextualizing and placing the dyer in their urban and social context. The paper concludes by discussing its potential limitations and provides avenues for possible future research.

Keywords: dyer's recipe book; 18th century; natural dyes; Antwerp; wool; color terminology

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1. Introduction

This anonymous 18th-century manual was recently donated to the Museum of Industry in Ghent[1] and offers a rare and valuable glimpse into the dyeing practices of the time. A local school of textile design[2] donated it as part of a broader collection composed mainly of late 19th-century documents. This manuscript differentiates itself from the rest of the collection by being the only one from Antwerp and from the last quarter of the 18th century. It reports dyeing formulae, samples dyed with the described recipes, first-hand notes, and correspondences related to commercial activities. Within the museum, the manuscript was digitalized and introduced as part of the collection, but no further research or in-depth analysis of the contents was conducted. The discovery of an 18th-century dyer's manual containing practical dyeing instructions, matching samples, and a conspicuous amount of information related to the business is a rare and relevant finding. Artifacts of this kind are exceptionally rare, and only a small number are available to us today [1]. A manuscript of this sort offers us an original perspective on the world of dyeing at the time, shedding new light on these practices, which often were kept as secrets of the trade [2]. Furthermore, it is known that the Low Countries, and, specifically Antwerp, were renowned for the quality and variety of dyed textiles. Nevertheless, direct sources from the Low Countries are scarce, and even though, in the last decade, more have come to light and been analyzed, the general panorama remains largely unexplored and in need of detailed research [3].

Through a first evaluation and translation from the 18th-century Dutch, the relevance of this discovery becomes clear, offering an in-depth insight into the dyeing practices and activities of a dyer within the walls of Antwerp in the 18th century. This finding is relevant for an understanding of local know-how and the working of society at that time, as well as in the broader context of research in the practical art of dyers. This paper seeks to provide a detailed overview of the contents of the manuscript, including recipes (Figure 1), accounting notes (Figure 2), and correspondences. Furthermore, by analyzing the contents and conducting research within the Antwerp archives[3], we were able to trace and further contextualize the dyer, placing the business in the reality of its time and granting us a broad view of the workings of such an enterprise. Through this contribution, we aim to begin addressing the gap in the existing knowledge regarding dyeing practices within the Lowlands and further expand the actual knowledge base.

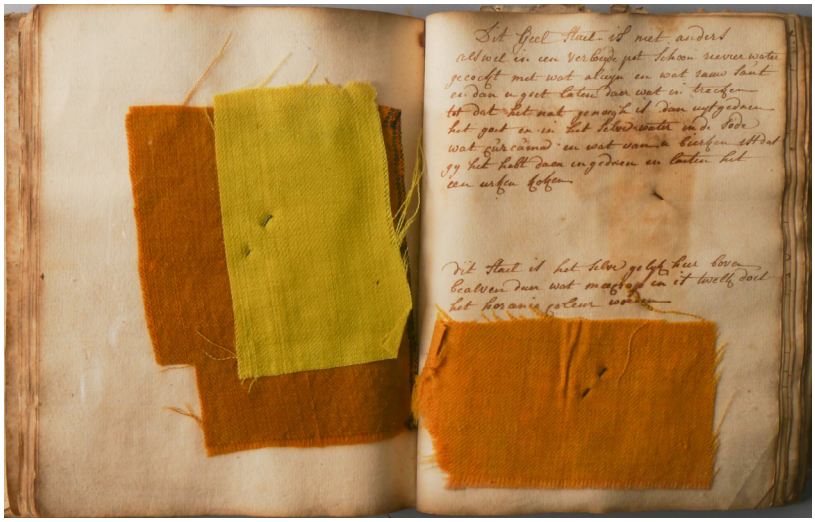

Figure 1. To dye Orange with madder and turmeric. pp. 35–36.

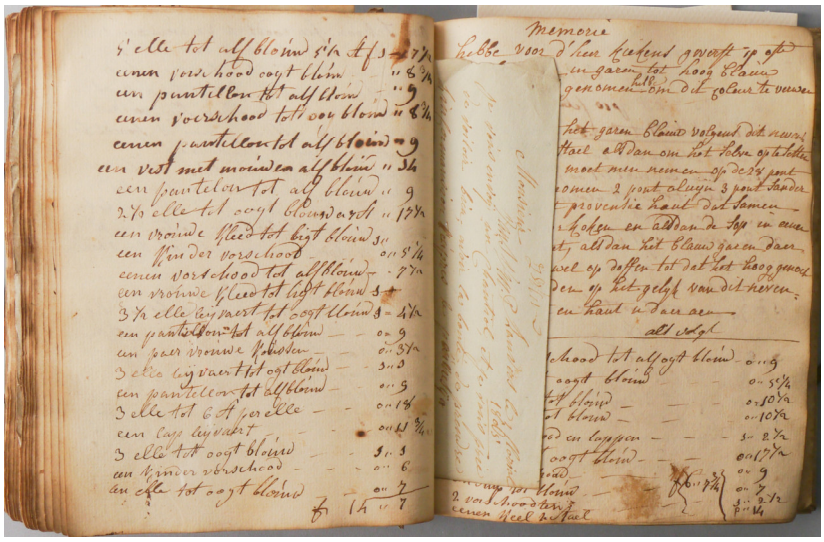

Figure 2. Example of recipes and pricing of product pp. 105–106.

2. Discussion

2.1. Historic Placement

The manuscript was donated in 2020 to the Museum of Industry in Ghent by a local textile school, without any contextual information. It was part of the collection preserved within the institution, but it lacked links to the rest of the artifacts, especially when it came

to relevant elements for our research. The manuscript itself had no clear indications about the manufacturer it belonged to or who the compiler might have been. Despite this absence, an examination of the artifact's contents yielded very valuable information.

The geographical provenance was quickly determined as Antwerp, primarily through the addresses found in the correspondences. Another pivotal component in the identification process was a small map (Figure 3) contained within the manuscript, depicting the presumed location of the manufactory in the cityscape. Several features surrounding the building were named, the most pertinent reference being the indication of the 'Oude Leeuwen Rui', which persists as an existing road in today's city network and allowed us to considerably narrow the geographical scope.

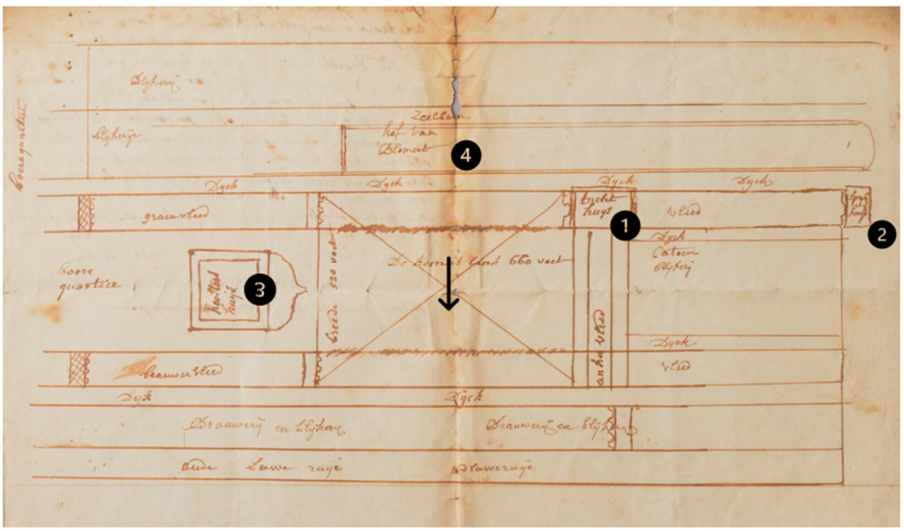

Figure 3. The map contained within the dyer's manuscript. (1) Tuchthuis (Penal structure), (2) Unnamed property, (3) Hanseatish huis (Hanseatic house), (4) Blommaert's property.

Another crucial element is presented in (Figure 4)[4], conserved in one of the city archives, containing a segment of the systematic land registers for the year 1800. This map facilitated the correlation of the remaining locations outlined in the manuscript's drawn map, including Tucht-huis (Penal structure), Ankervliet, Oude Leeuwenrui, Hanseatisch huis (House of the Hansa), and others.

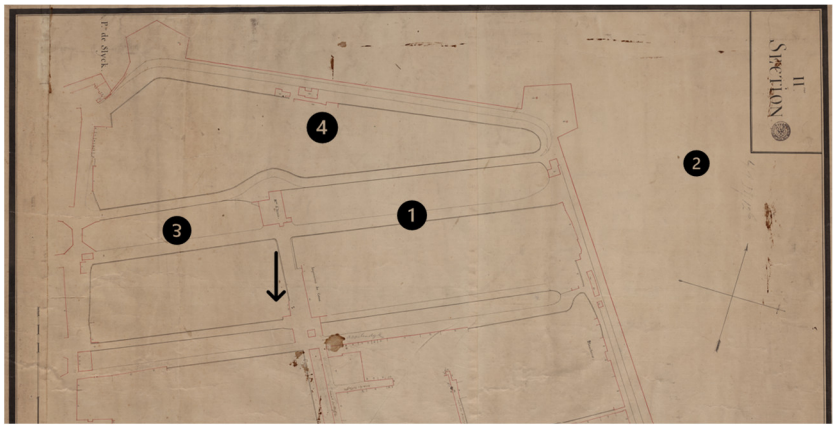

Figure 4. Section 2 of the map of Antwerp in ca.1800. (1) Tuchthuis (Penal structure), (2) Unnamed property, (3) Hanseatish huis (Hanseatic house), (4) Blommaert's property.

As a result, the dyer's establishment could be precisely located within the old city. Further validation arose as the name indicated on the manuscript's map for the domain north of the dyer (Blomaert) aligns with the one documented in the 'Gevelplan', associated

with it (Figure 4). This 'Gevelplan', detailed the names of the owners of various buildings and domains within the city walls. However, despite these confirmations, the name of the manufacturer remained elusive, as this building is listed as the property of 'La Commune', signifying the city itself.

Subsequent research revealed that it was common practice for city magistrates to stipulate long-term rental agreements or grant permission for manufacturers to use public or city-owned buildings, particularly for activities or industries they sought to promote. [4] Dyeing, unlike spinning and weaving, posed a series of challenges when looking for a suitable location. The specialized and heavy equipment required, including large kettles and furnaces, often necessitated their integration into the building's structure, making relocation impractical or impossible without substantial investment. Consequently, buildings housing dyeing operations were less likely to undergo repurposing between multiple rental contracts or companies [4].

Further evidence of the dyer's presence is documented in the 'Wijkboeken' (Figure 5), also preserved within the Felix Archief [5]. These books contain records of legal acts about buildings in specific neighborhoods, organized by period. Numerous dyers are mentioned throughout the books and pages (e.g., De Blauwe Hand, Ververij de Schaapskooi). However, it remains challenging to determine which of these is the manufacturer in question [6].

Figure 5. Pages from the 'Wijkboeken', holding account for the neighborhood of the manufacturer.

Also interesting is the proximity of the dyer to a penal institution. Although seemingly unrelated, the so-called tucht- or rasp-huizen (grind-houses), were common correctional institutions in which criminals were engaged in labor [7]. Often, these structures provided manpower for tasks related to the textile/dyeing industry, such as the chipping of dyewoods, for example, redwood and brazilwood [8]. While historical records attest to this practice, specific details regarding this particular instance were not found.

2.2. Historic Context

Although the exact name of the dyer remains undetermined, the timeframe (1778–1802) and location, situated at the corner between the 'Ankervliet' and 'Tuchthuis' are clear. These buildings were situated in a segment of the north-eastern city expansion initiated in the 15th century along the Schelde River [4]. Over time, this area evolved into the renowned 'Verversrui' or 'Dyer's Canal', owing to the concentration of many dyeing-related enterprises. Key factors driving this evolution were the availability of clean water and the central position within the city [4].

2.3. Socio-Economic Context

During the 18th century, Antwerp and the rest of the Austrian Netherlands witnessed important political and economic evolutions [9]. The first half of the century had been a period of stagnation, marked by instability and limited growth which also affected

the local textile industry. Small textile manufacturers had become outdated through lacking investments. Moreover, they were often outcompeted by large, modern, and more complex companies in the Northern Dutch Republic and other cities in the empire. In these competing organizations, all activities were centralized within company-owned buildings, which were systematically monitored and sealed from the outside world for daily operations. This allowed these foreign enterprises to efficiently increase their output, making it impossible for the smaller companies of the south to survive [10].

Nevertheless, in the second half of the century, the economy of the southern region benefitted from a stable political climate and economic growth. In combination with some state-driven measures and private investment, this led to a period of flourishing for the local textile industry [11]. Conspicuous investments were set directly into the creation of new companies, and the old, small-scale local enterprises were replaced by modern industries that could produce at the same pace and price as their competitors. One of the first companies established by these investments was 'Compagnie Beerenbroek', a textile printing enterprise. The company was founded in 1753 and obtained a 25-year-long exclusive patent on production from the Hapsburgian Empress. Once this first company had set the pace, multiple similar initiatives within different sectors of textile production grew in the city. The period between 1770 and 1795 witnessed important growth, with new companies hiring hundreds of people every year in Antwerp alone [12].

Despite being a large port city, the main outputs of Antwerp's production were inland, towards the central cities of the empire. This was mainly due to the blockade of the estuary of the Schelde River, which had been imposed since 1578 by the forces of the northern Netherlands [13].

The era of growth in the southern Netherlands came to abrupt end in the late years of the century with the entry of French revolutionary armies into the region. The ensuing battles and eventual integration into the French Empire in 1796 marked a period of socio-political instability, leading to the return of economic challenges for local enterprises [14]. Despite the removal of the blockade of the Schelde River, which in the first instance seemed to re-open possibilities for the city's exports, assimilation to France introduced unfamiliar contexts and limited the established trade towards the Hapsburg Empire. Unable to rapidly adapt to the new context and competition, local enterprises again faced economic struggles throughout the first half of the 19th century [15].

The manuscript discussed in this research serves as a business-related report and lacks explicit details about the impact of the political situation on everyday operations. The sole visible related detail is the use of the French revolutionary month name 'Le Floréal' (20th or 21st of April to the 19th or 20th of May) in one of the French-written delivery notes (Figure 6) [16]. The manuscript's last dated page is in 1802, with a few blank pages preceding the closing cover. The absence of a clear ending and the organic structure of the book's contents, including recipes, accounts, and letters, make it challenging to establish if the manuscript was concluded due to historical events or spatial constraints. Nevertheless, through this socio-economic analysis, we were able to better understand the conditions in which this business developed, and most likely came to an end.

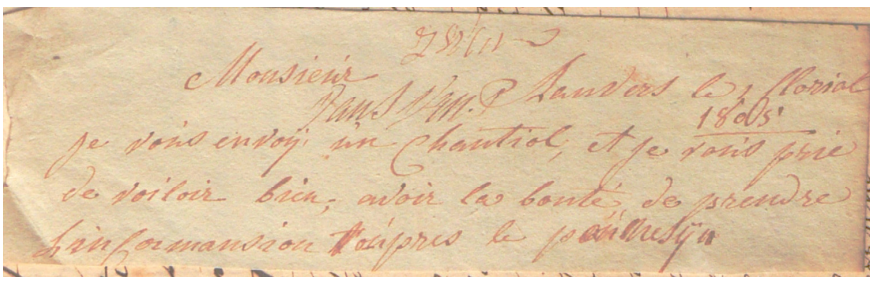

Figure 6. Delivery note, 'Monsieur, Anvers le Florial 1800, Je vous envoy mon chantiol et je vous prie de vouloir bien avoir la bonte de prendre. . .' ('Antwerp, Floréal 1800, with this I send you my chantiol and I kindly ask you to accept. . .').

2.4. Contents of the Manuscript

To fully grasp the relevance of the manuscript in its complexity, we opted for a broad approach. Rather than exclusively focus on the dyeing practices, our analysis extended also to social and historical contexts. This approach led us to interesting hypotheses and conclusions, which will be presented in the subsequent section.

The manuscript, featuring its original binding, is the work of a single main author. Of the 160 pages, about 110 are physically part of the book and exhibit the same regular, vertical indentations due to the mold used to produce them. The remaining 50 are loose pages with irregular patterns, written on different papers and then added to the manuscript [17]. This second group of pages also appears to be written mostly by the same hand and forms the main cluster composing the accounting section of the manuscript.

Content-wise, the manuscript can be broadly categorized into three groups, although these are not strictly delineated:

1. Recipes and dyeing tips exemplified by dyed fabric;
2. Accounting notes related to the acquisition and sale of goods;
3. Correspondences of different sorts.

Distributed across 160 pages, the main and predominant section of the manuscript comprises the 132 recipes and dyeing tips. Additionally, we find about 25 notes forming the accounting section related to the business operations (Figure 7). As mentioned, these notes are often external additions, either pinned or inserted within the pages. Most likely, they represent only a fraction of the total accounting documents produced by the dyer and were also likely added to the manuscript as reminders (of materials and quantities thereof) concerning the described recipe.

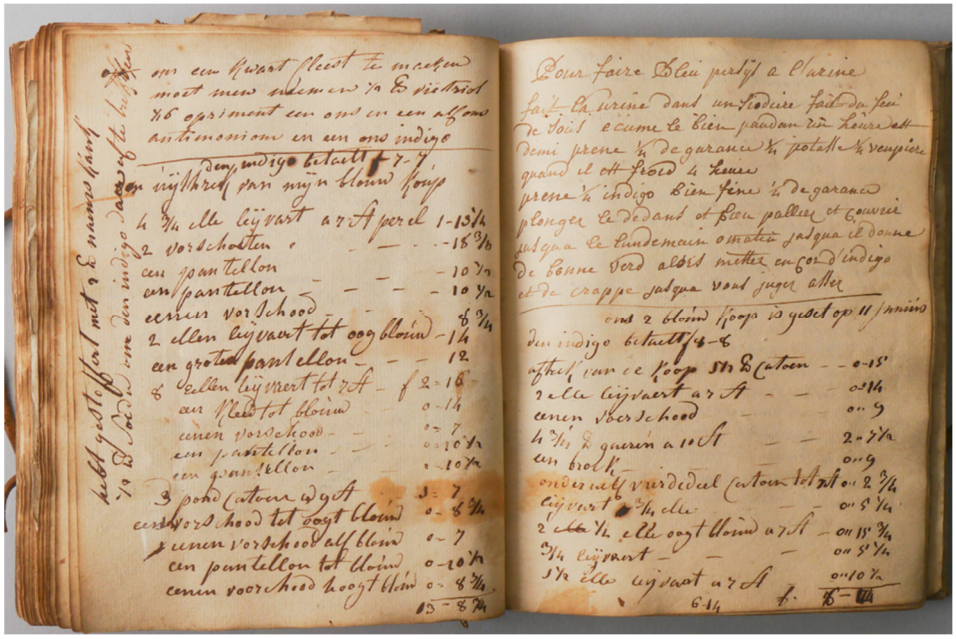

Figure 7. Summary of wares dyed with an indigo vat with an associated value, pp. 101–102.

The third section consists of six examples of correspondence between the dyer and the customers (Figure 8). Despite this being the smallest section of the manuscript, these letters offer us interesting and relevant insights into daily matters such as payment requests, deliveries, and legal matters. Finally, it is important to mention the 104 colored fabric samples, which are included in the manuscript and pinned to the recipe they were supposedly produced with. This addition even further increases the rarity and the value of the manuscript, as these well-preserved samples are a direct testament to the practices of the dyer and are a precious reference with which to further study the recipes.

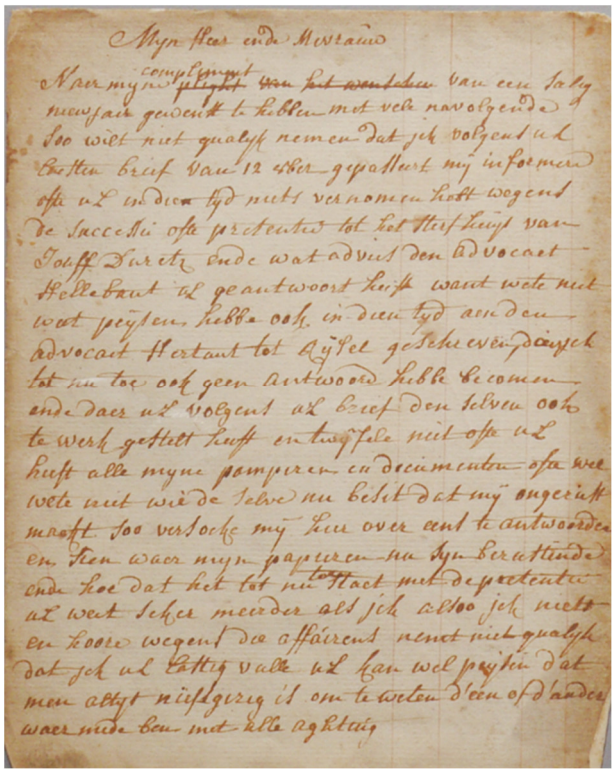

Figure 8. Example of correspondence related to legal matters.

2.5. Wool and Cotton Substrates, a Middle-Class Dyer

Examining the Antwerp Manuscript, it is possible to hypothesize that the dyer's production was destined for a broad middle-class public, offering recipes suitable for 'the poor' as well as expensive ones for a wealthier range of customers. The manuscript concentrates on wool dyeing, with exceptions made for three recipes specifically destined for cotton. Confirming this, nearly all the available fabric swatches are woolen, with some exceptions being cotton.

Historical sources indicate that the finest quality of wool was used to produce long and fine broadcloth. Especially proficient in this field were some of the dyers of the Languedoc, located in the south of France, of which a collection of documents has remained preserved and analyzed [18]. Additionally, the South of England also historically served as a significant hub for the production and trade of high-quality wool in Europe [19], but not much is known about the Low Countries.

The manuscript also provides indications regarding the type and quality of cloth being dyed. While the general term used is 'goet' ('wares'), specific textile-related terminology such as 'bayes' (a plain, woven, napped woolen fabric, generally coarse depending on quality) and 'sayes' (a light, twilled form of wool) [20] is mentioned in about 30 between recipes and accounting notes. Other references to dyed textiles include 'garens' (yarns), cited six times, and 'kerseys', (a coarser, thinner, woolen product with a distinct, visible weave pattern) [20,21] cited eight times. Bayes and sayes (Figure 9) are consistently mentioned together, reflecting their similarities and frequent production by the same clothiers [19]. These types of cloth were primarily intended for the middle class, sold as products of medium quality, and were less refined than broadcloth [22].

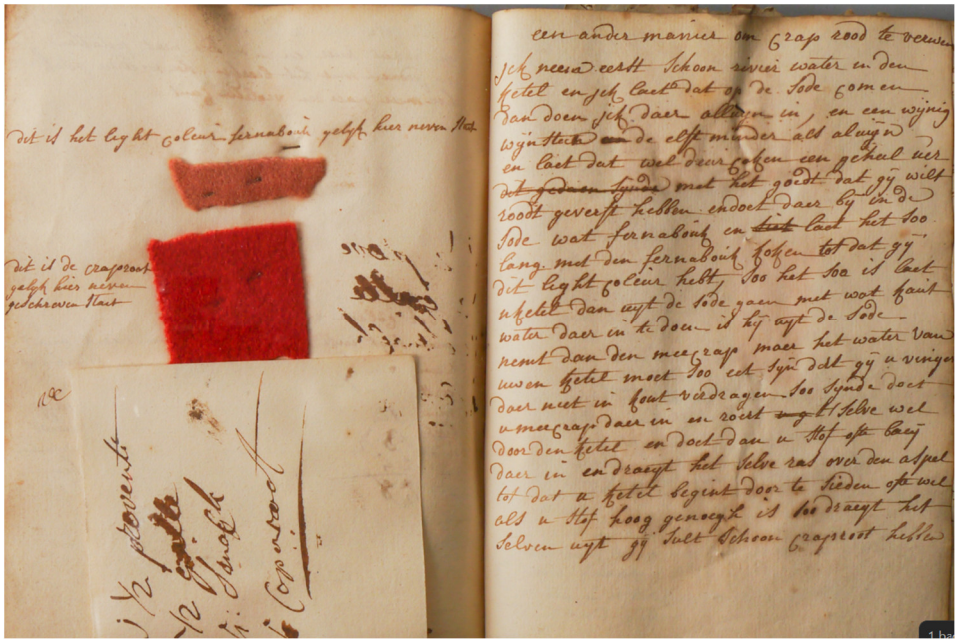

Figure 9. Recipe to dye madder red on bayes or other wares pp. 41–42.

Historical sources attest to the widespread production of these fabrics across multiple European hubs. Venice, renowned for its high-quality textile production, excelled in the production of sayes. This form of textile was then exported, especially to markets in the East, where demand was high [23]. Notably, Venetian sayes and bayes were so popular that they were not only bought and sold, but also imitated by producers in other regions, who hoped to pick up a share of this profitable market. Some of the locations we have information about include the Languedoc in France and the Low Countires [23].

The production of sayes and bayes in Flanders and Brabant predates the 16th century, but with time, knowledge from there and Italy traveled to England, especially to the Colchester area, where sayes and bayes were termed 'The new Draperies' [24]. Proximity to the sources of raw materials and important trading hubs facilitated the rapid establishment of a sizeable production there, leading to a growth in exports toward the continent [19]. These practices are examples of intense competition within the cloth market, which, by the 17th century, had turned into an immense theater of economic operations. This included the borrowing or sometimes the smuggling of technologies, patterns, and designs, as well as materials. The entire production process, from raw materials to finished products, developed on a massive scale, exemplifying the complexity and the interconnectedness of European cloth trading [21]. Knowledge in textile production spread across Europe through the hands of different actors, determining a diversification of the quality of the same product. These variations then depended on the quality of raw materials and the skill, infrastructure, and effort invested in the production process. Sayes and bayes, being versatile products, presented an ample spectrum of qualities and ranged from semi-luxurious products, especially high-end Venetian ones [18], to more affordable ones, such as those used in the clothing of monks and nuns and produced, for instance, in the northern Netherlands and England [19].

The quality and price of the product were then also determined by the choice of the dyestuff. Cheaper dyes were used for more economical products [25]. In this case, for sayes and bayes, dyestuffs like sappan and brazilwood fell into this category. In contrast, expensive dyes like cochineal, were mostly reserved for the production of high-end products, reflecting the correlation between the choice of dyestuff and the value of the finished product [22].

As the microscopical and technical analysis (HPLC, XRF, and color measurement) of the textile samples within the Antwerp manuscript is currently pending, it is premature to

provide a definitive statement regarding the overall quality of the production. However, based on the translated text and the range of employed dyes, it can be reasonably stated that the dyer worked with a range of different qualities of textiles.

Within the recipes, the prevalence of brazilwood and redwood, is potentially indicative of lower-quality products. On the other sid, the abundant presence of cochineal points towards a more refined range of goods (Figure 10) [18].

Figure 10. Recipe and samples of Cramoise and Fire color, dyed with cochineal pp. 55–56.

Moreover, the inclusion of colored yarn production in the manuscript, along with the mention of kersey, adds another layer to the diversity of the dyer's production. Kerseys, being cheaper than sayes and bayes, likely supplied less wealthy markets. Notably, these were dyed exclusively with lesser-quality dyes or recycled color baths from previous dyeing processes. Historical sources mention the practice of dyeing kerseys and yarns in Antwerp already during the 16th century. Despite this, this specific kind of production did not gain significant importance in the city [4].

Dyeing yarns before weaving ensures a better color penetration within the fibers and results in more vibrant hues afterward. This process was mainly applied when brilliant hues were necessary, for example, in the production of expensive multi-colored fabrics such as tapestries. However, despite this, it was rarely done, and Antwerp was not an exception in this regard. Dyeing the finished piece, or after the weaving process, remained the more prevalent practice. One key advantage of dyeing with this method was the minimization of waste, as both the dye and textile were used efficiently in the coloring stage [4]. The result is that, even though dyeing yarn yielded the best result, dyers still retained the habit of first coloring the finished pieces, and only after that, the yarns. Consequently, the latter were always dyed in partially exhausted dyeing vats, rendering the results less appealing [4].

The manuscript also documents this practice of recycling dye vats, with a noteworthy illustration found in the recipe (Figure 11). This particular recipe refers to the brown dyeing process applied to three kerseys directly addressed to be 'For the poor'. In this instance, the dyer utilized a vat containing residual dyes from prior black and red coloring procedures. These residual dyes were mixed and reheated, resulting in deep, dark brown hues on the fabric.

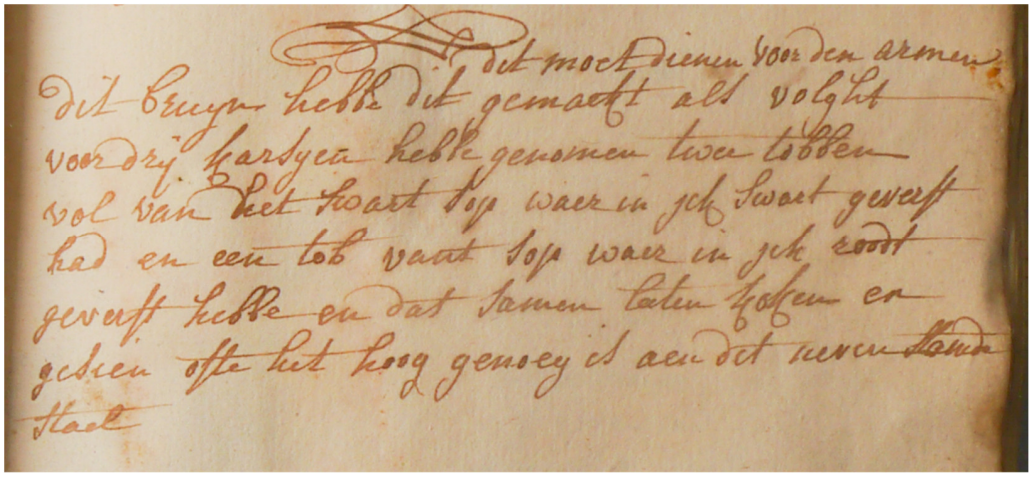

Figure 11. 'Dit moet dienen voor den armen' (this is to be used for the poor)—a recipe recycling a red and a black vat to dye three kerseys brown. p. 90.

From this analysis, it can be concluded that the dyer opted for a versatile production approach, supplying a diverse clientele. The selection of textile and dye qualities was tied to the audience for whom the final product was intended. This audience spanned from the lower middle class, as seen in the aforementioned recipe (Figure 11), to the higher middle class, as shown in the recipe that presents a meticulous procedure for dyeing intense scarlet through a double cochineal bath (Figure 10).

Wool emerged as the central focus of production, with cotton playing a secondary role, mentioned in the manuscript on three occasions. The primary emphasis on sayes and bayes suggests that these forms of textiles were the core of the production within the enterprise, as well as the highest-quality products within the capabilities of the dyer. Utilizing leftovers from these higher-end products and employing less stable and economical dyes, the dyer then produced mainly kerseys, a more affordable form of wool. Furthermore, hybrid recipes, blending both inexpensive and premium dyes, were likely aimed at creating an intermediate range of products to accommodate varying consumer preferences.

2.6. Small-Sized Enterprise

Closely tied to the previous paragraph is a hypothesis about the possible size of the enterprise that generated this document. The central deduction that led us to this consideration is mostly found in the accounting notes and in some of the recipes, more specifically, the ones carrying references to specific orders that included the quantity of material that was dyed.

One example (Figure 12) describes the most sizeable order in the document and reports on the production of 12 woolen kerseys. On page 133 of the document, (Figure 13) a single kersey is reported to weigh about 30 pounds (about 13.5 kg), thus 12 kerseys is equivalent to an order of roughly 360 pounds (about 160kg) of dyed goods [26]. To compare the order with other available sources, the industrial-sized production of the dye master Antoine Janot in Saint-Chinian, Languedoc, would export woolen fabric in bales weighing in at about 200 kg each [27]. Consequently, the largest order we have an account of is smaller than the average unit an industrial-sized dyer would export.

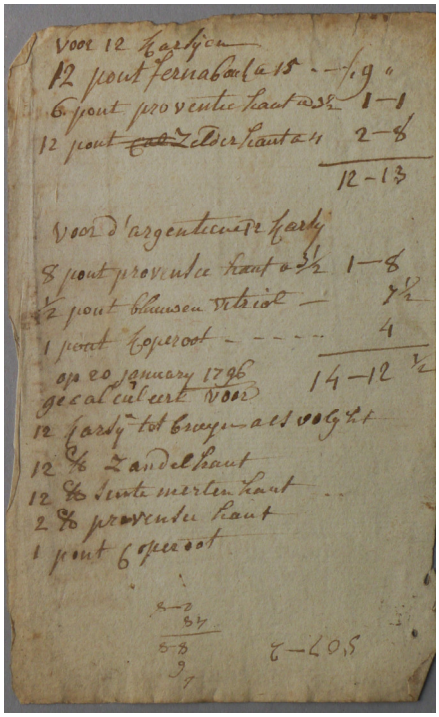

Figure 12. Materials used to dye an order of 12 kerseys p. 158.

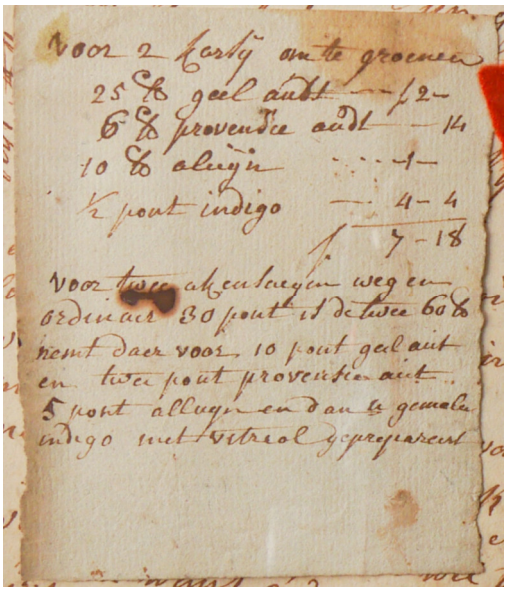

Figure 13. Order with reference to the weight of a saye p. 113. 'Voor twee Akensaeyen wegen ordinair 30 pont is de twee 60 pont, neem daer voor 10 pont geel aut. . .' (For two, as akensaeys weigh usually 30 pounds, the two of them weigh 60 pounds, for that, take 10 pounds of–yellow wood. . .).

Another indicative measure of the scale of the enterprise was deduced through a comparison with the Crutchley Archive's cashbook, which mirrors similar accounts to those found in the Antwerp manuscript, including transactions and tabs. The financial records in the Crutchley Archive extend up to GBP 2586 (equivalent to over EUR 345,000 today) for a single order. In contrast, the Antwerp dyer's accounts (Figure 14) document tabs up to 643 fl. (approximately EUR 5000 based on contemporary currency conversion rates) [28].

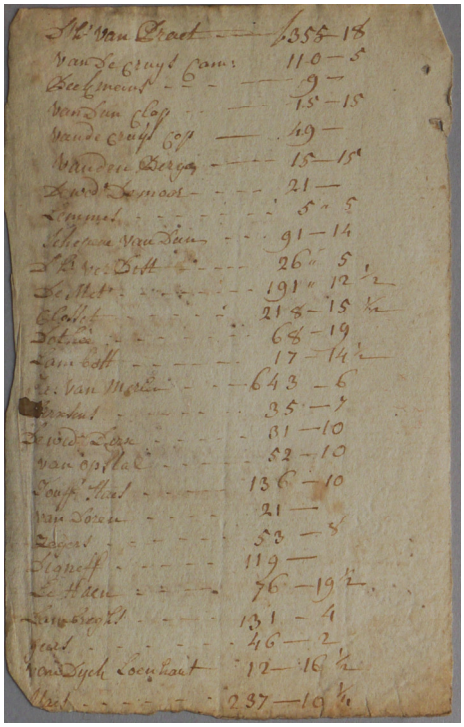

Figure 14. Tabs from the Antwerp manuscript, p. 159.

A similar juxtaposition can be traced between the size and timeframe of the two accounts. the Crutchleys produced a total of 15 books in 28 years [22], whilst we only have one book covering the whole timespan between 23 years (1779–1802) for the Antwerp dyer. The final element contributing to the proposition regarding the scale of the enterprise is the range of cities referenced in the manuscript, including Brussels, Liege, Dendermonde, and Louvain. These cities seem to sketch the boundaries of a network that was limited to the borders of today's Belgium. Within the manuscript, accounts are only given in the Flemish pound and the north-Netherlandic gulden, further indicating the local nature of the business. Lastly, also within the material orders, there are no indications of long-range business activities.

While acknowledging that this comparison may not offer an exhaustive conclusion due to the potential lack of complete accounts of the Antwerp company, which is limited to one single manuscript, it nonetheless provides consistent indicators supporting our hypothesis. Altogether, these clues suggest the profile of a local enterprise, primarily serving regional customers and retailers in line with a market orientation focused on the middle and lower-middle classes.

3. Dyeing Recipes

Given that the manuscript primarily serves as a record of practical instructions for textile dyeing, this initial section comprises about 70% of the totality of the document. The recipes within this section show important diversity, ranging from brief (Figure 15) to very extensive descriptions. This second category is frequently associated with specific orders, wherein the quantities utilized are meticulously outlined, providing a step-by-step breakdown of the dyeing process (Figure 16). A third category of recipes within this section involves extensive and complex dyeing procedures, which different to the previous category, focus uniquely on the sequence of procedures to achieve specific shades of color, without references to quantities (Figure 17).

Example of a short exemplifying recipe:

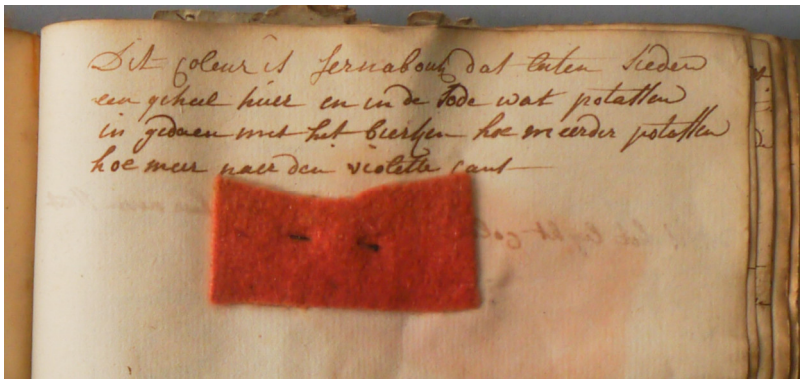

Figure 15. Dyeing red with brazilwood pp. 40. 'Dit coleur is fernanbouk dat laten sieden een geheel huer en in de sode wat potassen in gedaen met het bierken, hoe meerder potassen hoe meer naer de violette kant'. (This color is brazilwood which is cooked for an hour, and in the solution, I put some potash with some of the 'small beer'. The more potash you add the more purple it turns.).

Example of a 'production' recipe:

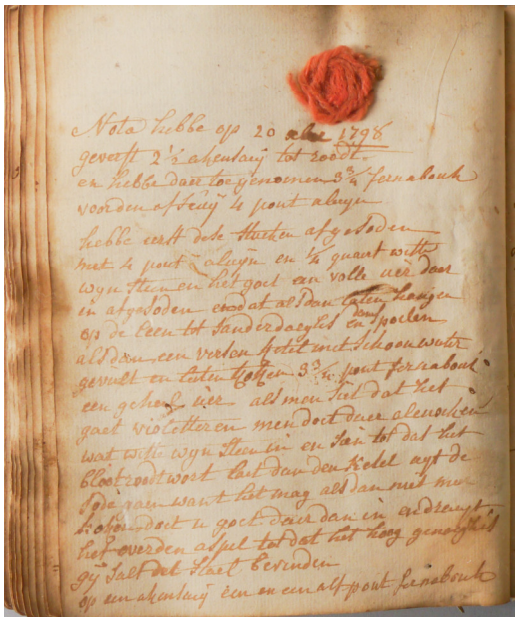

Figure 16. Dyeing of two 'akensaey' in red 1798 pp. 83. 'Nota hebbe op 20 . . . 1798, geverft twee en half akensaey tot rood en hebbe daer toe genomen drie en drie kwart fernanbouk. . . vier pont aluyn. . . een kwart witte wijnsteen. . .' (Nota this was dyed. . . 1798, two and a half akensaey in red. I took three and three-quarters of brazilwood. . . four pounds of alum. . . one-quarter of cream of tartar. . .).

Example of a procedural recipe:

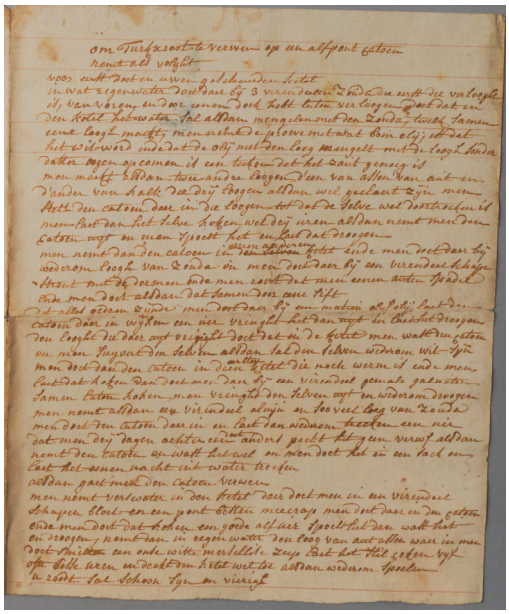

Figure 17. To dye Turkish red P.134. Om Turks root te verwen op en alfpont catoen nemt als volgt. Voor eerst doet in uwen geschuurden ketel in wat regen water, doet dan daer bij drie vierendeelen souda die verloghen is van voren. . .' (To dye Turkish red on half a pound of cotton do as follows. First, fill your clean kettle with rain water, add up to three-quarters of soda which has already been dissolved. . .).

3.1. Dyestuff and Mordants

Within the manuscript, various dye sources are mentioned, exhibiting similarities to those commonly employed in analogous works [22]. The primary focus of the manuscript centers on red hues, with brazilwood (fernanbouk), madder, redwood, and cochineal as prevalent sources of dyestuffs. Additional utilized dyestuffs include indigo, logwood, turmeric, old fustic, weld, sumac, gallnuts, and sandalwood. Selection of the dyestuffs was based on different criteria, including the desired color and its quality, cost considerations, and the intended public for the final product. Accordingly, the mordants with which the textile was prepared were chosen and applied.

The manuscript describes a diverse range of mordants in the fabric preparation for the dyeing process. Within these, we find the most commonly used substances in the 18th-century (wool) dyeing industry [29]. Alum and cream of tartar are the predominant mordants, featured in nearly every red dye recipe, whether involving madder, brazilwood, or cochineal.

An interesting addition, particularly in cochineal dyeing, is the use of the 'Bierken' or 'little beer', twice described in the manual. This mixture consists of a mixture of water, strong water derived from fermenting bran over several days or weeks, combined with ground English tin. Interestingly, the 'bierken' is used differently than conventional mordants as it is not utilized in the initial fabric preparation stage but rather during the coloring process, serving as a 'middle mordant' to enhance color quality [30]. A comparable compound appears in the dyeing instructions of the Crutchley archive, where a 'spirit' is formulated using similar ingredients: water, nitric acid or aqua fortis (sour water) produced through bran fermentation, and tin [22]. Furthermore, the manuscript describes, next to tannins, the use of various other metallic salts, such as iron oxides, 'antimonium', and orpiment, further broadening the spectrum of mordants employed in the dyeing recipes.

The practice of dyeing has given us insights into the essential steps for achieving optimal results in textile coloring. Certain key elements, such as meticulous mordanting, precise temperature control, or the consistent movement of textiles during the procedure, play key roles in assuring even absorption of the dyestuff. Upon analysis of the recipes, it

becomes clear that some of these crucial steps are either briefly summarized, implied or occasionally omitted. For instance, keeping the textile in motion is explicitly mentioned only in a few of the recipes, as illustrated in (Figure 18), the same indication is absent in the majority of the other recipes.

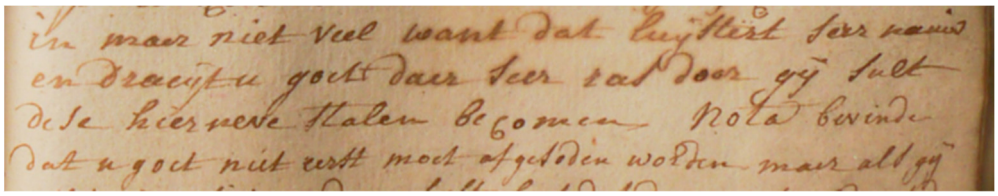

Figure 18. Fragment from (Figure 10), to dye fire red p. 56. 'Doet uw curcuma daer in. . . en draeyt u goed daer seer ras door, gy sult dese hier neve stalen becomen. . .' (Add the turmeric. . . and stir consistently, then you will obtain the same as the sample attached next to this recipe. . .).

Similarly, mordanting is also often implied unless specific additives, like cream of tartar or the previously mentioned 'bierken' were required. Analogous situations can be observed in other manuscripts, such as those in the Crutchley archive, indicating that these recipes were primarily intended for internal use within the company or for transmission to another skilled craftsman. Consequently, certain procedures may not have been explicitly documented as they were considered to be common knowledge.

Additionally, an examination of the recipes also seems to reveal that this manuscript was not only a compendium of practical recipes but rather an instrument for daily use. Many recipes show signs of corrections, adjustments, and in some cases, markings denoting their non-validity (Figure 19). This suggests that the manuscript is not only a replication or a compilation of recipes, but rather a dynamic, developing collection that was regularly updated to document new recipes and underwent regular refinement through time.

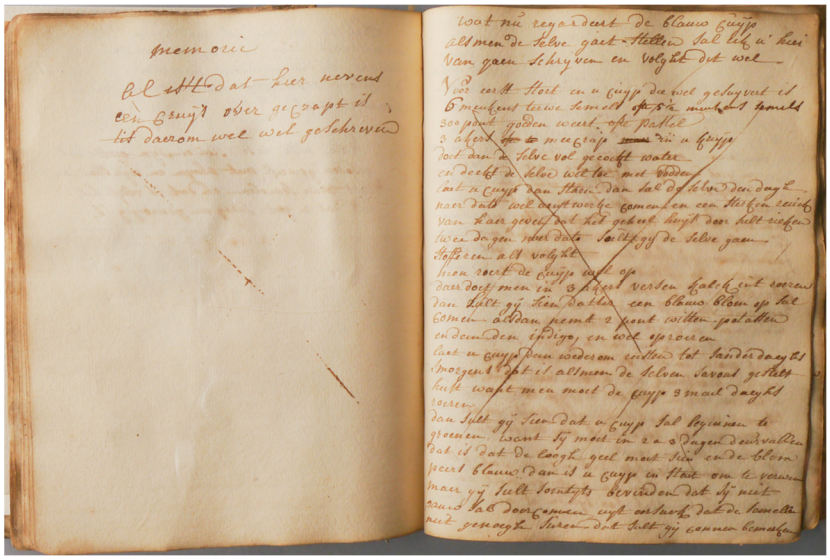

Figure 19. Setting up an indigo vat pp. 23–24. Left page: 'Memoire, Al staat dat hier neven en cruis over gecrapt is t'is daarom wel geschreven' (Reminder, even if there is a stripe on the next recipe, do not mind that as it is still well written).

3.2. Color Terminology

Another topic taken into consideration during our research is the color terminology utilized in the manuscript to specify the different hues derived from the use of the recipes. In dyeing, specific terminology seemed to be of great relevance, as it was used as a means of precise description and communication between dyers. One definition would identify one specific hue of color, and one color could have many hues. This use of terminology seems

to be consistent across hubs all over Europe, and this practice is documented in multiple manuals, like the ones produced by Paul Gout's enterprise and referenced by Dominique Cardon [18,29].

The degree of specificity in the terminology also seems to be dependent on the specialization of the analyzed dyer. The Antwerp dyer, being mostly specialized in the production of red hues, has, in that segment, a higher degree of specificity in terminology, while for other colors, definitions are scanter. Among the sixty recipes for red, twelve different definitions are utilized for a single color, while the remaining seventy recipes in the book utilize eight total definitions to describe green, blue, and gray colors (Table 1). However, to validate this hypothesis, especially concerning the international conformity of definitions, further research is necessary.

Table 1. Chart of all color definitions contained within the manuscript.

Red		**Green**	
Manuscript definition	Translation	Manuscript definition	Translation
Suijver crap rood	Pure madder red	Licht oliyf	Light olive
Formeel crap rood	Formal madder red	Saksisch groen	Saxon green
Crap rood	Madder red	Verdebouteille	Bottle green
Scharlaek	Scarlet	Pissgroen	Piss green
Cramoise	Crimson	**Blue**	
Bloed rood	Blood red	Manuscript definition	Translation
Gloeiend rood	Glowing red	Celadon	Celadon
Vuur kleur	Fire color	Piss blauw	Piss blue
Turks rood	Turkish red	Saksisch blauw	Saxon blue
Carnaet	Flesh color	**Gray**	
Vals rood	Fake red	Manuscript definition	Translation
Carmosyn	Carmine (dark red)	Argentien	Argentine

These color definitions present an interesting avenue for further research in the domain of textile color and trade. Interestingly, distinct definitions (Figure 20) found in the Antwerp Manuscript have been found in other manuals, as exemplified in the analysis conducted by Dominique Cardon. A comparative study could shed light on whether colors produced under the same definition in different hubs aligned, potentially establishing a standard within the market, possibly even on an international scale [31].

Figure 20. How to make pissblue and pissgreen.

We know that samples circulated widely within the Low Countries; many archives still bear traces of this trade [32]. Consequently, some level of standardization is to be expected. Whether these standards were then extended on an international level is at the moment uncertain. Additionally, by studying these definitions throughout time, it could be possible to trace the movement of knowledge between production and trading hubs.

4. Conclusions

To conclude, this 18th-century Flemish dyer's manuscript from Antwerp is a rare and relevant finding in the study of textile-bound practices. This unique artifact contains valuable first-hand insights not only into the dyeing procedures, but also into the accounting practices, and relations with customers. Directly, and indirectly, through our analysis, we were able to develop insights into the socio-historical context and the daily practices of the dyer, and further understand the development of knowledge across the 25 years covered by the manuscript. Lastly, the presence of more than 100 colored samples even further enriches the manuscript, granting tangible proof of the dyer's skill and providing a reference as to how materials like cochineal, madder, brazilwood, redwood, indigo, and other dyestuffs were utilized. These processes were then translated into products for the customers of the enterprise, which, through analysis, we were able to identify as a broad middle class.

Beyond the practical aspects of dyeing, the manuscript also contains a section consisting of accounting notes, detailing transactions and materials orders for and from customers. Correspondences in French and Dutch inform us of the legal and practical matters of the dyer's business in its historical context. Both sections allowed us to better understand the development of the commercial operations and the day-to-day practices of the company.

Tracing of the manuscript within the city of Antwerp and ascertaining its timeframe were achieved through archival research. Even though this task proved arduous due to the apparent lack of sources, we were able to retrieve information, and through the elements described in the previous paragraphs, partially reconstruct its context. The dyer was located within the famous dyer's district of the city, in the key years of the transition from the Austrian–Hapsburgian influence to the French revolutionary and Napoleonic one. These years also correspond with the transition from a period of economic growth to one of economic stagnation and recession. This section of the research could further be developed by delving within the city archives, determining the specific name and owner of the enterprise, and developing that avenue.

The contents of the manuscript also reveal a broad range of textile products, with a general focus on wool and occasional references to cotton. The dyer's customer base seemed to range from the middle class to the middle-low class, producing a range of products varying from the relatively high-end woolen sayes and bayes to the more coarse and cheap kerseys. The choice of dyestuffs also supports this statement, ranging from expensive cochenille to cheaper sappanwood. The use of this range of dyes is also a testament to the skill of the dyer and their adaptability to the needs of the market.

The size of the enterprise is mainly derived from the accounting pages, which include orders and delivery notes. These seem to trace the footprint of a local enterprise, with a network of customers limited to the cities of today's Belgium. Also confirming this hypothesis is a comparison with the similar manuscripts of Antoine Janot in France and Crutchley's in England, which were exporting goods worldwide and had accounts that were almost a hundred times larger than those detailed in this manuscript.

The extensive compound of dyeing recipes grants us a broad insight into the know-how as well as the dyeing-related activities of the dyer. Notably, within the manuscript, recipes are often adjusted, updated, or even invalidated, suggesting the use of the manuscript as a practical working document and not solely a theoretical collection of recipes. Furthermore, the analysis of the color terminology utilized in the manuscript offers us the opportunity for further research on color and practice standardization throughout production and trading hubs.

In summary, through the study of this manuscript, this paper aims to contribute to a more ample understanding of the dyeing practices of the 18th century in Antwerp and Europe, further adding to the pool of existing knowledge. Our approach aims to develop an overall understanding of the manuscript, focusing, in addition to the dyeing practices, on the socio-historical context of the manuscript.

Lastly, avenues for potential future research are also presented. Through microscopical observation, practical reproduction, HPLC, XRF, and color measurement, future research will evaluate the quality of the dyer's finished products, as well as confirm the matching between the samples and the recipes of the book. Different possible avenues include direct comparisons of this manual with the other available ones, in order to trace similarities and common trends between countries and production hubs. By sharing our research, we would like to add a valuable element to the panorama of existing knowledge, hopefully fostering interdisciplinary research.

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Notes

[1] Museum of Industry. Entry no. V37828-001. Museum of Industry Collection, Minnemeers 10, Ghent, Belgium

[2] Hogeschool Ghent, ex Hoger Rijksinstituut voor Textiel en Kunststoffen collection, Voskenslaan 364, Ghent, Belgium

[3] Felix archive–city archive Antwerp, Oudeleeuwenrui 29, 2000 Antwerp

[4] Wijk 2, BE SA 209546, inventory N. 12#4263, Felix-Archief Antwerp. Ca. 1800

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