

## Techniques and Innovations

### Order and Industrialization

François Gonin's Endeavors to Improve the Cotton-Dyeing Industry in France

J'ai l'honneur de vous envoyer un mémoire des maîtres teinturiers en fil, laine, et coton de la ville de Lyon par lequel ils exposent que le Sr. Gonin père ayant communiqué aux teinturiers de la ville de Rouen des secrets de teinture en bonteint et en différentes couleurs, qui ont eu le plus grand succès, il en résulte que la plupart des fabriques de Lyon qui employent ces matières, ou en font le commerce, les tirent par préférence de la ville de Rouen; ce qui porte un préjudice considérable à l'état des teinturiers de Lyon. Ils demandent en conséquence que le Sr Gonin père se transporte dans cette ville, et leur communique ces mêmes secrets.

Trudaine to de Flesselles, 24 May 1777, AN/F/12/1332.

In 1777, François Gonin sent a *mémoire* to Jean-Charles Trudaine de Montigny, the French minister of finance, summarizing his work to benefit French manufactures.<sup>1</sup> Since 1750, Gonin's interests and discoveries had led to engagements at manufacturing communities in Rouen, Lyon, Limoges, and elsewhere. He was the author of a series of treatises describing clothmaking processes, from the initial degreasing of wool to the ultimate finishing operations for cottons. He discovered a *bon teint* crimson for silk, a way to dye black in a cold vat, and a technique to give wool cloth a different color on each side. In the year of this *mémoire*, the master dyers of Lyon petitioned to have Gonin instruct them, as he had taught the dyers of Rouen some years earlier. Lyonnais factors had come to prefer the cloths that were the result of Gonin's new processes, and the local dyers believed they needed this information, too.<sup>2</sup> In 1764, while assigned to Limoges for a two-year stint to improve the local dye industry, Gonin had participated in a survey of regional papermaking manufactures. An outcome of that experience was his own experiments to make paper that might rival or surpass that from Holland.<sup>3</sup> That effort in turn, combined with his knowledge of the textile industry, led him to the secret of calendering cloth in the English manner. It involved a way to make a heavy paper card, used to wrap the cylinders, that contributed to the smooth and shiny surface to the finished goods. Gonin later established a mill to produce these and other papers; some of his *mémoires* carry his own watermark.

Eighteenth-century archives are full of information about inventive polymaths, but the personal history that Gonin's *mémoire* and related documents suggest is no less striking. Given our understanding of French administrative, corporate, and social cultures, it may seem odd to us that one man was commissioned to undertake so many different tasks in so many different towns in France over such a long period of time. Gonin's work is especially unusual because he never held an official position, never had a title, and was not a prominent member of any scientific or artistic community. He remained detached from administrative and academic domains in Paris and in the provinces through all his years of effort to

improve French manufactures. Furthermore, he had no position within any guild or community of dyers, papermakers, or merchants. It was not until 1766, long after his first successes and after some of his students in Rouen had been received as master dyers there, that Gonin asked for a mastership in that community.<sup>4</sup> His interest in being named a master dyer, he noted, was to secure protection for his son Gilbert, whose dyehouse had been subjected to harassment from the community.

Verifiable details of Gonin's life and training are scarce. He was born at the end of the seventeenth century, probably in Lyon, where the family name Gonin was a common one. Records from the late seventeenth and eighteenth centuries show men and women of that name affiliated with a variety of merchant endeavors, including the dye and textile trades. Which branch was his, and how his early years were spent, are uncertain.

However he acquired his expertise and his reputation, in the mid-1750s François Gonin was in Normandy at the behest of the French government, demonstrating improvements to cotton dyeing. An account of this activity was published in 1756.<sup>5</sup> This suggests that the project was planned as a model, or to encourage other districts, as it is unlikely that formal publication would have been necessary for a local procedural manual. But, just as there is no clear indication why or how Gonin was chosen to lead the demonstration, there is no information available, not even an introduction, that explains the purpose of the publication. This demonstration and publication venture, while perhaps typical, is a unique example for us of the confluence of techniques of information exchange. It is an exchange based in the information that objects can offer, its objective being the creation of these dyed yarns, but also the dissemination of new methods to dye them. We can consider Gonin's presentation a form of lecture demonstration, as it involved the exhibition of a process of experiences. And it exists still, in a printed format that, while lacking commentary, increases our understanding of the event and its sequences.

The published report, the only one of Gonin's treatises to survive, presents his colormaking recipes as well as the organizational structure of his operations. As is evident in the case of Jean-Baptiste Pont and with other descriptions of processes, the recipes and the techniques to use them with success were closely connected. Gonin's plan describes an ordered and interconnected series of steps that would yield more than thirty different colors from the five basic, or matrix, colors.

### **Gonin's Manual on Cotton Dyeing**

The report of Gonin's activities, *Procès-verbal des opérations de teintures . . .*, notes activities from Gonin's arrival in Yvetôt to the testing and approval of all the colors made—a period of one month. There were eighteen days of work, with no

work on Sundays or religious holidays and no activity recorded for six of the final eight working days.

Gonin's plan called for an integration of coloring processes and this, rather than his new recipes, is the significant part of his system. The success of the project depended on preparation of a greater quantity of yarn and coloring material than in traditional practice, where only one or a few colors might be prepared together. He was, in the rhetoric of science and technology, simplifying techniques, taking advantage of the nature of materials he used to improve an essential industry.

### Gonin's Dyeing Program

#### Colors produced during Gonin's visit to Yvetôt 13 May to 15 June 1756

King's blue  
 Turkish blue  
 Sky blue  
 Yellow-wood yellow  
 India-wood yellow  
 Jonquil yellow  
 Lemon yellow  
 Reddish cinnamon  
 Cinnamon  
 Light chestnut  
 Dark chestnut  
 Coffee  
 Brown  
 Violet  
 Mallard green  
 Glade green  
 Emerald green  
 Parrot green  
 Greenish olive  
 Ordinary or common olive  
 Light olive  
*gris de Maure*  
 Iron gray  
 Slate gray  
*gris d'Epine*  
 Agate  
 Pearl gray  
 Black  
 Musc

Source: *Procès-Verbal des opérations de teintures* (Rouen, 1756).

Gonin advocated a routine in which work on as many as sixteen different colors might take place during one day, with similar tasks performed for several different colors at one time. The first task, on 13 May (a Thursday), was to prepare all the cotton to be dyed. Next was preparation of an indigo vat, which required several days' fermentation. The following week began with preparation of the *tonne au noir*, the alum and gall mordants, and a dyebath of weld (for yellows), all in sufficient quantities for every color that would require them. Preparation of the madder baths for red colors followed. Blue cotton for the purples and greens were dyed simultaneously, and chestnut and purple colors

might be colored with madder on the same or subsequent days, depending on the depth of red shade required.

The book further suggests that Gonin found that some colors were not good enough at the end of their respective coloring process. He, or perhaps the inspectors, decided the musc-colored cotton, given its final brightening and softening treatments on 2 June, was not dark enough. Two days later it was returned to the gall bath in an effort to improve the color. Probably for a similar reason the olive cotton was treated with vitriol after, rather than before, it was brightened; the treatise notes that this was an irregular practice. The inclusion of strategies to repair common faults would be an advantage to the overall plan, and it may be that the extra days at the end of the month were set aside to correct other problems. It may also be that this period, when no activity was recorded, was set aside for the colors to dry or cure.

### Understanding Gonin's System

To understand the implications of Gonin's plan and its publication for textile production, and more broadly for colormaking, we need to revisit the traditional characterizations of the eighteenth-century dye industry in France. One of the best-known features of the French textile industry in the later seventeenth and eighteenth century was its code of regulations, which included instructions about dyeing. Between their establishment in 1670 and abandonment slightly more than a century later, the rules established by Jean-Baptiste Colbert supplied a structure for the dye industry in France. Categorization was linked to quality and price of the finished goods and to the markets in which they might be sold. To many, especially those on the periphery of the industry, the separation seemed to be a critical aspect of the success of the French dye industry.

These remarkable rules, while effective in many ways, occasionally created new problems as they attempted to solve some old ones. Rigid adherence to the system of divisions was impractical when a local dye industry was small, for example. Under such circumstances, all dyers might make all needed colors, or the whole community might specialize in one color or technique. The outcome of these adjustments, when they came to the attention of others, was, on occasion, panic. In 1743, Jean Hellot sent to Le Mans a Parisian *grand teint* dyer named Pierre Potier.<sup>6</sup> Potier was charged with the improvement of local black dyeing techniques, specifically the introduction of a "cold black" dye process. This technique had the advantage of being less expensive, as it required considerably less fuel, but it was also less destructive to the cloths. (There is no established connection between Potier's technique and the one Gonin claimed to have invented.) Work was stalled for several weeks while members of the local dyers' community, various officials of the Council of Commerce in Paris, and Hellot discussed the category to which the new products belonged. Should the new

blacks be *grand teint*, the specialty of the instructor? Should they be classed as *petit teint* colors, as local traditions preferred? Only after this question was resolved could work commence.

Another problem, directly related to François Gonin's undertakings in Yvetôt, was that the code focused on wool and silk goods, the mainstays of French production and export. Regulations were less clear about cotton goods, a fiber not native to Europe and for which much legal manufacture did not begin until the eighteenth century.<sup>7</sup> Successful manipulation of color onto cotton required new procedures; dyestuffs that produced bright and lively colors on wool might yield ones that were much less lively on cotton. Although historians have paid more attention to the cotton-printing techniques that began to develop in the late seventeenth century and continued through the nineteenth, woven colored patterns and solid-colored cottons were also produced in this period. Where, in general, printing on textiles used techniques related to paper printing and painting, the cotton-dye processes, including good resist-printing developed more slowly.

### Coloring Materials

#### Coloring sources mentioned in Gonin's treatise

Alum  
 Gall  
 India wood  
 Indigo  
 Madder  
 Oak bark  
 Sumac  
*Tonne au noir*  
 Verdigris  
 Vitriol  
 Weld  
 Yellow wood

Source: *Procès-Verbal des opérations de teintures* (Rouen, 1756).

The coloring materials Gonin employed were included in both the *grand* and *petit teint* categories, according to the traditional wool-based schemes. Their combined use here, in the presence of commissioners from the industry and the national administration, suggests a willingness to ignore or suspend the rules for the sake of improvements bearing economic and artistic significance. The calculation of the cost to create each color and of the savings brought by this system (almost 40 percent for the colors using the blue vat), combined with the technique of grouping similar tasks for several different colors, to support this goal of improvement to an industry that, by 1756, was well-established but still clearly in disarray. The small number of coloring materials used—there were only five, plus assistants—also suggests that this was an effort to simplify processes through simplification of types of materials as well as of techniques in which they were used.

## The Benefits of Reorganization

Who would benefit from this reorganization in the cotton-dyeing industry? Most clearly, it would be the manufacturers or entrepreneurs who commissioned weavers to create cotton textiles with woven patterns—stripes, checks, dimities used for garments and furnishing fabrics. As with so many innovations, even those touted to the public through the periodical press and other publications, the benefits to individual consumers—brighter, less expensive, more-durable colored cotton cloths—are clear but less important. Nevertheless, Gonin's instructions, and the interest they generated in Yvetôt, Rouen, Lyon, and elsewhere, may be allied with the constant effort to claim more of the higher-priced markets for cotton goods and to earn more from them, rather than a response to the deficient capabilities of the dyers in Yvetôt. The goal of the project was to provide a technique to improve through the application of a simplified ordering system.

Nous Pierre Godinot, Inspecteur principal des Manufactures de Toiles & Toileries de la Ville & Généralité de Rouen, nous sommes transporté le 12 Mai 1756, au Bourg d'Yvetot, sur les Ordres du Conseil & de M. de Brou, Intendant desdites Ville & Généralité, avec le Sieur François Gonin, pour y suivre les opérations de teintures qu'il est chargé d'y faire, en présence des Sieurs Commissaires nommés par l'Ordonnance renduë par M. l'Intendant le 11 de ce même mois; & après y avoir choisi de concert un Atelier propre a ces opérations dans la Maison du Sieur Pierre Vieillot, Fabricant au dit Bourg, & l'un desdits Commissaires, nous leur avons fait lecture de cette Ordonnance, & mis sous les yeux un Enchantillon de chacune des vingt-sept couleurs faites par ledit Sieur Gonin l'année dernière, en présence de Messieurs les Commissaires de la Chambre de Commerce de Normandie, & des Sieurs Passementiers, Toiliers, & Teinturiers de Rouen, chaque Echantillon revêtu du Cachet de ladite Chambre de Commerce; & après que ces Enchantillons en été reconnus par lesdits Sieurs Commissaires aux Teintures à fatiere actuellement audit Bourg d'Yvetot, & par ledit Sieur Gonin, elles ont été par lieu & en leur présence commencées, avec les Cotons & Ingrédients choisis précédemment à Rouen, par ledit Sieur Gonin, suivies & constatées dans l'ordre détaillé ci après . . .

*Procès-Verbal des opérations de teintures. . . (Rouen, 1756), 1–2.*

Gonin's attempts to improve manufactures—despite crossing some traditional boundaries—was possible for several reasons. First, although cotton production was well-enough established in France that Rouen was an acknowledged center of the industry, cotton was still less closely-tied to French administrative officialdom. This may also be why administrators were willing to support Gonin as he presented his information to masters and other members of the dyers community, acknowledged experts in the techniques as then practiced. A. R. J. Turgot remarked to Trudaine de Montigny that Gonin's situation, his knowledge of dye processes and his lack of clear ties to either the academy or the guild, meant that he was less likely to waste time with projects that would turn out to be common knowledge.<sup>8</sup> Independent of the constraints or misunderstandings of either institution, he could move forward the work of both.

Another reason why Gonin's presence and his suggestions may have been successful has to do with the state of the techniques themselves. In modern terms, the chemistry and morphology of cotton make dyeing and printing more

complicated than it is for wool or silk; while not expressed in this way, this difference was well known in the eighteenth century. Dyed linens, which can be more difficult to create than dyed cottons, were known, but printed or bleached (white) linens were much more common. In fact, the relative ease of coloring cotton as opposed to linen was probably a factor in the popularity of the former, at any price.

What does this episode suggest about visions of color systems in the textile industry? Gonin's work is focused on the economic advantages of the five-color system mentioned in so many practice-based recommendations. His system of production exploits this concept to a degree that rarely reaches print forms. The compression of Gonin's demonstration into a one-month period further suggests understanding of relationships among the colors he created. It is tempting to think that Gonin's work was possible only because he worked with cotton, a material that was less tightly bound into the traditions of the dye industry, a substrate for which the requirements of making good color were less rigidly established. That explanation, while true, like the assumption that concerns about the innovative nature of British technology were at the heart of many efforts to improve or innovate in French industry, still falls short of a complete explanation for why ordering systems were considered as important to eighteenth-century colormakers as they were to eighteenth-century mathematicians, natural philosophers or other theorists. Quemiset's project at Gobelins confirms the concern for a more thorough explanation in all aspects of colormaking; Quemiset's own interest was exclusively wool dyeing. It is clear that better organization was desired throughout the dye industry, as it was throughout the color industry more generally. Separating the desired result into constituent colors shifted conceptualization of dyeing away from from the result. It combined new acceptance of relationships between colors with old understanding of techniques. The new order for the creation of color in objects was a reflection, at least in part, of the turn toward classification and order in natural history and philosophical understanding.

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### Notes:

**Note 1:** François Gonin to Trudaine de Montigny, [1777] in folder marked "François Gonin, de Rouen, teinture et papeterie [chemise 2]," AN F/12/1330; "Mémoire de Sieur Gonin," 28 March 1766, in "Sieur Gonin cartons à l'anglaise pour apprêt," 28 March 1766, AN F/12/2415. See also materials in the folder marked "François Gonin, de Rouen, teinture et papeterie," AN F/12/1330.

**Note 2:** [Trudaine de Montigny] to de Flesselles [draft], 24 April 1777, AN F/12/1332.

**Note 3:** Gonin to Trudaine de Montigny. 22 February 1765; and Trudaine to Jean-Baptiste de la Michodière. 2 March 1765, in "Gonin, papeterie" AN F/12/1478A/IV. See also the folder "Sieur Gonin cartons à l'anglaise pour apprêt" AN F/12/2415.

**Note 4:** [Trudaine de Montigny] to M. de Crosse, "Mémoire" [draft], 22 January 1771, in folder "François Gonin, de Rouen teinture et papeterie," AN F/12/1330.

**Note 5:** *Procès-verbal des opérations de teintures faites à Yvetot, par le sieur François Gonin, sur les ordres du conseil, en présence des Sieurs Commissaires nommés par ordonnance de M. l'indendant de la ville et généralité de Rouen du 11 Mai 1756, et sous l'inspection du sieur Godinet, inspecteur principal des manufactures de toiles et toileries de ladite généralité, et commis par le Conseil à cet effet* (Rouen, 1756).

**Note 6:** Dossier of sieur Potier, January–June 1744, AN F/12/2259.

**Note 7:** Florence Montgomery "John Holker's Mid-Eighteenth-Century *Livre d'Echantillons*," in *Studies in Textile History in Memory of Harold B. Burnham*, ed. Veronika Gervers (Toronto, 1977), 214–31; J. R. Harris, *Industrial Espionage and Technology Transfer: Britain and France in the Eighteenth Century* (Aldershot, Hants., U.K., 1998): esp. 47–50; Stanley Chapman and Serge Chassagne. *European Textile Printers in the Eighteenth Century: A Study of Peel and Oberkampf* (London, 1981).

**Note 8:** A. R. J. Turgot to Trudaine de Montigny, 14 May 1767, in folder marked "François Gonin, de Rouen teinture et papeterie [chemise 2]," AN F/12/1330.

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