

Seri-Technics

Historical Silk Technologies

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Seri-Technics
Historical Silk Technologies

Dagmar Schäfer, Giorgio Riello, and Luca Molà (eds.)

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Chapter 1

Introduction. *Seri-Technics: Historical Silk Technologies*

Dagmar Schäfer, Giorgio Riello, and Luca Molà

Textile production is, as historian of technology and philosopher Lewis Mumford observed in his 1934 *Technics and Civilisation*—alongside mining—the sector that historically generated “the greatest number of improvements.”¹ Silk holds a particularly visible place in this history: as a luxury item coveted by elites and rulers since early times, silk inspired “creative minds throughout its history.”² This fiber and the wide variety of eponymous cloth were for hundreds of years at the center of scholarly discussions on nature, technical innovation, commercial interests, and consumers’ concerns. Observing the worm, the Song-Chinese politician Shen Gua 沈括 (1031–95), for instance, pondered nature’s transformative powers, while the Italian painter Leonardo da Vinci (1452–1519) discussed the mechanics of silk throwing machines. Aside from basic spinning and weaving techniques, this sector’s technical changes and innovative power can also be found in more subtle features ranging from the patterning of cloth to the checking of the tensile and dimension qualities of the yarn. The sophistication of products created through supplementary wefts or the production of exquisite shimmering effects through the addition of precious metal yarns are often apparent only through complex analyses of historical silk artefacts.

This volume presents historical case studies that, sampled from diverse cultural regions, exemplify major technological processes and practices of silk textile production. Based on the growing research on silk’s cultural, social, economic, and intellectual implications, we suggest that it is time to return our view to technology and provide a fresh look at the way in which technical processes have been historically shaped to define the identity of silk. While many insects produce silken thread, and varying technical set-ups can be used to create cloth, historically silk is produced through distinct sets of technological attributes, sociocultural practice and “principles of action.” We suggest calling this technical system that generated ideas about silk a form of textile *seri-technics* following Francesca Bray’s reinterpretation of Lewis Mumford’s concept. Bray used technics as a heuristic in the study of societies and technical change to unfold how a technical system produced social categories of gender and “hierarchical relations in general.”³

When Lewis Mumford originally introduced the term *technics*, his aim was mainly to shift the 1930s debate from “machines” and “mechanization” to the “forces and impulses” that generated and used such machinery. Historians of his era had often considered technical nexus to be a given rather than a point of discourse. Mumford argued that economic, social and political events had to be taken into account and that attention had to also be paid to art, skills and dexterity. Mumford’s call took effect slowly. In his seminal study on the Chinese

¹ Mumford 1934.

² Schoeser 2007, 15.

³ Bray 1997, 4.

history of sericulture, published in 1984 in Joseph Needham's monumental project *Science and Civilisation*, Dieter Kuhn thus expanded the view to practices and cultural change, but at the same time equally adhered to the history of technology's most sacred paradigms: "there are many ways to write about textile technology. One could concentrate on the function of devices and machinery, or discuss the subject in strict chronological order or focus on the influence of inventions and innovations on society."⁴ It took Francesca Bray's contribution in 1997 to make apparent the inextricable linkage between society and technology by suggesting that technics were also "a creative way of looking at how societies give material form to their ideas."⁵

The academic attention that silk has received as a socio-technical and cultural artefact since the 1990s "cultural turn" and the 2000s "material turn" is remarkable.⁶ Textile historians, conservators, museum curators, anthropologists as well as practitioners of the various strands of history (art, science, technology, and many others) have explored in great detail the varied cultural and social histories of silk and shed light on the relation between silk-making and what Mumford called the "wishes, habits, ideals, and goals" of individuals and societies across the world.⁷ The focus has shifted from implements and technical analysis (that is, the tracing of production logics and logistics) to social practices, intellectual and economic ideals, and everyday skills in craftsmanship and labor. Global history, for instance, no longer considers traders and travelers merely as those who brought explicit technical descriptions and implements, but instead sees them as information brokers who also conveyed information about customs, habits, and desires, thus making a comprehensive impact.⁸ Another contribution of global and textile historians is the highlighting of the role of markets, money, and aesthetics which has revealed the idiosyncrasies of local and global consumption patterns that, as historian of technology Ruth Cowan Schwartz suggests, critically influenced the developmental direction of technologies.⁹ The social, financial, and political histories that make up "silk" has thus substantially diversified.

At this time when the social and cultural importance of silk in the pre-modern global world is increasingly evident, we suggest returning for a moment to the issue of "technology" and inquiring into the ways in which actors determined the nature of silk by deploying, selecting, or pursuing certain sets of technics, practices, or ideals (while dismissing or ignoring others). This approach pays attention to the subtle nexus that actors identify between "conditions" or "postulates" on the one hand, and the possible variables in technological efforts on the other. Throughout history actors deliberately or unconsciously accepted, limited, or expanded the material parameters—geology, climate, geography, economy, social structure—of silk technologies. While they often adapted operational sequences, that is: combinations of tools, agents, knowledge, and skills to produce silk—to make them work in different localities, they also, often simultaneously, insisted on the continuation of certain

⁴ Kuhn 1988, xxx.

⁵ We acknowledge our debt to Francesca Bray's concept of "gyno-technics" which she defined as "sets of technologies that produce ideas about women and gender, as a creative way of looking at how societies give material form to their ideas." Bray 1997, 380.

⁶ For a historiographical analysis of the material and cultural turn, see for instance Hicks 2010, 25–98.

⁷ The literature on this topic is huge and quite region specific. Partnering with this project, is a book that brings together the role of silk in the premodern world. Schäfer, Riello, and Molà 2018. For exemplary cases reflecting the varied nature of studies on silk, see: Kuhn 2012; Molà 2000; Atasoy 2001.

⁸ Ma 2005, 1–32.

⁹ Cowan 2012, 253–72.

practices and technics as a way to maintain the very nature and quality of silk technology. Among the many possible technological choices, “some solutions were retained, others rejected.”¹⁰ For instance, to produce a workable thread people mainly use a handful of domesticated caterpillars even though varied insect larvae, including silkworms, honeybees, fleas, and flies produced silken threads. Similarly, only some mulberry trees are used to provide the fodder for the caterpillar during its various processes of transformation. This agricultural process—called moriculture—precedes sericulture, the husbandry of the worm until the caterpillar cocoons itself in silken thread, and is then killed and harvested before it can hatch as a moth. In a final step the cocoon is unreeled and the threads are re-reeled—twisted or not—for weaving. Choices are thus made throughout each step that encompasses *seri-technics*, beginning with mori- and sericulture, the reeling, winding, doubling, throwing, boiling, dyeing, cleansing, and warping of the yarn, and finishing with the weaving of the cloth as well as its further processing through waulking (cleaning), milling, embroidery, or tailoring. What people hence historically understood and nowadays understand as silk has come to epitomize an intricate, yet not necessarily technically inevitable logic that brings forth a highly durable and long fibre used for weaving fabrics of high quality and pliability.

The contributions in this volume tackle six technical attributes and principles of action that have come to make-up historical *seri-technics*: (1) Claudio Zanier discusses the role of customs as a force on technical developments while (2) Daryl Hafter takes up the baton of social hierarchy and shows how gender continued to impact expertise and labor; (3) Mau Chuan-hui illustrates how raw material choices are used by various actors for the definition of a technically exclusive system; (4) Vijaya Ramaswamy’s paper highlights the importance of studying oral communication and community practices. (5) Maria Ludovica Rosati complements this with a historical case study on the impact of language and terminology on *seri-technics*. With this exemplary selection, the volume also highlights the importance of bringing together text and textual research in the study of silk. For more than a century, luxury silks preserved in museum collections and more easily identifiable in written and visual documents have been the main foundation on which the history of silk textiles has been reconstructed. Only by combining texts, textiles, and oral accounts can we tell integrated histories about elite and everyday life.

Many sources indicate that in the westward migration of silk, cultures primarily grappled with the successful breeding of silkworms. Zanier suggests that successful examples were able to implement social structures corresponding with the cycle of silkworm growth. Timing and hygiene were indeed key to this phase of production. Rearing the worms required bottom-up structures that rulers and elites could not ignore in attempts to implement a top-down transmission of technologies and techniques. Elucidating the early history of silk before the sixteenth century, this contribution hence illustrates how attempts to raise silkworms in large numbers were dependent on following with great care a comprehensive set of rules and cultural know-how.

Cultural similarities in gender ideals and power hierarchies are indeed evident throughout various cultures engaging in sericulture. We find similar beliefs about silkworm’s well-being and the way in which actors ritualized such knowledge and enforced specific customs and habits to maintain such practices over time. Over the entire dynastic period, emperors regularly performed the basic tasks of the trade in state rituals. More subtly, literati writers

¹⁰ Lemonnier 1993, 177.

and officials enforced social practices conducive to silkworm breeding by codifying behavioral rules in moral guidebooks and praising in poetry sericultural prosperity as a sign of moral excellence.¹¹ We can learn from this that elites, understanding the complex implications of producing silk, often developed quite comprehensive strategies to maintain the social pressure and institutional structures for a trade that was not only producing wealth, but also, as a tributary ware, maintained the social and political balance of power in this region of the world. Rural gentry and village communities, for instance, cemented fathers and mothers' moral obligations to train their sons and daughters in trade. At other times, the state interfered directly and ensured the continuity of such ideals, through coercion, or by demanding silk weavers perform *corvée* labor or deliver their taxes in the form of woven tabby silks.

Zanier shows that women dominated silkworm cultivation not only in and across China, as Bray has argued, but eventually also in the western areas of Asia and in southern Europe.¹² Gender hierarchies became a constitutive prerequisite for the proper functioning of the technology. This seems to have been a common feature of the silk trade since antiquity worldwide: whenever skills achieved social status and became a viable source of income or moved into the public realm, males replaced females. The silk sector also engendered working organisation, as Daryl Hafter shows, well beyond silk breeding. In the case of eighteenth-century Lyons, the new profession of designers was unable to break away from the gendered nature of labor that characterized much manufacturing in this period. Hafter also illustrates the gender bias to be observed in regulations which suggests that only masters in the silk guild—not unlicensed female workers—had the qualifications to satisfy the official rules that men had created. In theory, Lyon's eighteenth-century silk trade operated harmoniously, with government regulations setting manufacturers' standards and consumers choosing from a set array of woven samples. In practice, consumers demanded combinations of threads that the regulations forbade; merchants pressed the whims of buyers onto reluctant weavers. And the weavers, in turn, struggled to realize, in cloth, the novel patterns with which designers sought to capture an unsteady market. Lyon's famous entrepreneur and silk designer Philippe de Lasalle (1723–1804), as maker and merchant of luxurious fabric, received praise, whereas governmental inspectors of manufacture who examined cloth and issued fines for regulatory infractions, identified unlicensed female weavers as the originators of “illegal” fabric. Women were relegated to subaltern roles or, as wives, they were employed to develop and share new designs in household embroidery and weaving.¹³

A historical approach also reveals that actors defined *seri-technics* by way of exclusion: that which did not belong within the network of silk. Distinct historical narratives thus exist about the use and technical development of wild silk textiles, nowadays addressed as “tussah silk.” Sources attest the presence of tussah silk production in Asia, across Africa, Americas and Europe since early times. African Asante tribes cultivated local wild silk spun from the broken threads of the hatched caterpillar to weave a shiny greyish yarn. Danish colonial settlers reported that Nigerians domesticated wild silk worms to weave their traditional

¹¹ Such efforts are also obvious elsewhere. Cameron discusses the poem *In laudem Iustini Augusti minoris* as testimony to developed ceremonial ritual in the sixth century. Corippus 1976, 13.

¹² Kuhn 1984, 231, shows that by 1742 Chinese historiographers strove to equate the legend of the first sericulturalist with the historical figure of Xiling.

¹³ Pattern books and sample exchange played an important role for such exchanges, easily crossing cultural boundaries. Schäfer 2015, 107–18. See also the works by Silberstein 2015.

Yoruba robes.¹⁴ Silks made from Indian species also became known as tussah silks. Tussah silks never became fully part of *seri-technics*, neither did wild silk ever achieve any validity within narratives of technical developments. We have, for instance, no records of actors attempting to reel a perfect thread from broken cocoons. Surprisingly rare are the instances when actors attempted to broaden definitions of silk and challenge the perception of the very nature of the silk thread as being white, sturdy and even. This highly exclusive technical character of *seri-technics* was also able to respond effectively to historical efforts of relocating the origin of this trade to other regions such as India.¹⁵

The failure of historical attempts to broaden the remit of sericulture and its proper technics to include wild silk underlines the role of technical reductionism. Mau Chuan-hui brings to the fore the exceptional, yet fruitless, attempt of Emperor Qianlong (r. 1735–96) in the 1750s to promote wild silk. Qianlong’s motivation was to overcome the shortage of raw silk supplies that had started to impact the trade widely.¹⁶ By that time, new clothing regulations had increased the demand for silk clothes but in more simplified styles. Maritime trade with European nations also continuously increased, inciting the development of sericulture in the Pearl River Delta, despite its substandard quality. As demographic pressure on land was intense the government reviewed wild silk pasturing that allowed it to capitalize on formerly “value-less” forests.

Qianlong invested heavily, relocating temples from the rural countryside to the cities to gain access to silk producing communities and gain control over customs and habits. Despite such wholesale efforts, wild silk pasturage only took root in poor regions such as Ningqiangzhou in Shaanxi, and Guizhou where local people had difficulty finding more profitable activities. Despite his ability to mobilize imperial resources, Qianlong’s efforts to integrate wild silk into *seri-technics* not only foundered, but also endangered his own political reputation, because his efforts challenged the exclusive technical nexus of a product that by that time, had also come to underpin cosmological structures and social hierarchies central to the state’s very power and legitimacy.

The highly cosmological purpose of silk also explains the density of written records on silk techniques in Chinese history. In other regions scholars regularly rely on the analysis of the organisation of silk manufacturing and more specifically on the products of silk weaving to show how much oral knowledge circulation and visual representation relates to the development of *seri-technics*. In this volume, Vijaya Ramaswamy exemplifies that silk weaving in the medieval era (before colonial rule in the mid-eighteenth century) on the Indian subcontinent mostly relied on oral communication. Oral history reveals that silk weaving communities nostalgically defined their identity in terms of a geographic relocation. Both the Pattu Saliyar and the Pattunulkarar, two communities traditionally associated with silk weaving, conceived their communal identity by way of a historical migration of expert craftsmen. Weaving techniques spread to the Southernmost region of Peninsular India from the thirteenth to the seventeenth century. As Ramaswami observes, her essay “locates silk in the social and political imagination of the Vijayanagara Empire.” She does so by considering the complex linkages between consumption and production implicit in a shift from the purely courtly culture of silk-wearing before the fourteenth century to one in which silk was widely consumed by affluent merchants, military elites and even wealthy craftsmen especially from the fifteenth century onwards.

¹⁴ McKinney and Eicher 2009, 40–55. See also Adams and Webb 2002.

¹⁵ Varadarajan 1988, 564.

¹⁶ Kuhn 1988, xxv–xxxiv.

Ramaswami exemplifies a larger trend in research on silk in India illustrating the importance of studying sources beyond elite texts. Another important impediment to silk studies is the verbal confusion that came about through the regional expansion and diversification of *seri-technics* and its globalizing consumption. Traders, consumers and producers employed a varied rhetoric of “new” and “old,” familiar or exotic wefts, types and patterns. Naming practices sometimes indicate technical development. Sometimes, only the terms varied regionally. Historians often grapple with the fact that various names exist for the same product in different cultures, whereas some words seem to have no match at all. Often words do not match the still existing materials.

Ludovica Rosati exemplifies in her contribution on *panni tartarici* (“Tartar cloth”) a case in which a new word generated new desires, and new technics, too. By the late thirteenth century this newly created category of silk fabrics, headed by the heavily golden *nasicii*, filled the wardrobes of Popes, soon becoming the hallmark of Western royalty and power. As revealed in inventories, descriptions and poetry, these imported oriental fabrics were used in Europe as symbols of status by upcoming social groups. Tartar cloths are thus in their genesis an expression of a quasi intercultural *koiné*, that weavers across different geographic areas applied and produced in many variations. Weavers from Lucca and Venice, for instance, imitated the technical features and patterns of *panni tartarici*, or blended them with better-known Byzantine products. What emerged was a series of new inventions and cloths whose production formed the basis for the take-off of the Italian silk industry in the second half of the fourteenth century.

Researchers have also begun to identify the many other silks, more simply woven, that are referenced in written documents. Archaeological studies have helped to further this research agenda as they have unearthed a variety of simpler silks, probably available on local markets. They show different yarn-processing and weaving qualities. In fact, the techniques and practices of *seri-technics* cannot be understood without understanding the raw materials and tools, and considering the finished product, such as cloth, ribbons, or threads. One might even say that artefacts embody their techniques and are used to study them in the absence of other evidence. Such studies reveal that regional variations in the technical processes were maintained and fostered. Following technical analysis, variations in silk production processes can be identified that allow for a better understanding of their regional histories in Han China as well as in Italy between the twelfth and the sixteenth century. We can also see skills must have traveled together with materials. Though not discussed in texts, it seems that Italian silk weaving practices were the same as those adopted in Asia. Here the dating of the artefacts also suggests a transmission from the Near East to Italy either by product imitation or vocational training or a combination of the two.

This collection shows that the production of silk rests on the shoulders of many trades: studying its history requires technical understanding as much as a contextualized embedding in cultural, political and social accounts. Behind the simple term “silk” stands a complex history of co-evolving technical processes and forms of social organisation. Scholarly sources and economic records suggest ideas of use and reveal cultural know-how about silk, sometimes they tackle the mechanics of production and consumption. In other cases, an informed study of the product and technicalities is at stake. Artefacts clearly indicate that weavers performed on a variety of looms and, by the seventh century, pursued techniques in Japan, Persia, and the Byzantine world.¹⁷ Archaeological excavations recently completed in Cen-

¹⁷ Sasanian weavers for instance were building on Syrian draw loom technology. Feltham 2010, 16. Monnas 1988, 35.

tral and East Asia show that much has to be researched afresh about the sets of technics that Mumford's generation already considered fully understood: the mechanization of reeling and weaving, loom construction, and the use of implements for the refinement of threads, weft structures, or practices such as drumming or walking textiles or the applications of ornaments.¹⁸

References

- Adams, Nettie K. and William S. Webb (2002). Silk in Ancient Nubia: One Road, Many Sources. In: *Silk Roads, Other Roads: Textile Society of America 8th Biennial Symposium*. Ed. by Smith College. Sept. 26–28. Northampton, Massachusetts.
- Atasoy, Nurhan et al. (2001). *IPEK: The Crescent and the Rose, Imperial Ottoman Silks and Velvets*. Istanbul and London: TEB İletişim and Azimuth Publications.
- Bray, Francesca (1997). *Technology and Gender: Fabrics of Power in Late Imperial China*. Berkeley: University of California Press.
- Corippus, Flavius Cresconius (1976). In *Laudem Iustini Augusti Minoris*. Ed. by Averil Cameron. London: Bloomsbury Publishing.
- Cowan, Ruth Schwartz (2012). The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology. In: *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Ed. by P. Hughes Thomas E. Bijker Wiebe and Trevor Pinch. Cambridge, MA: MIT Press, 253–72.
- Feltham, Heleanor B. (2010). Lions, Silks and Silver: The Influence of Sasanian Persia. *Sino-Platonic Papers* 206: 1–51.
- Hicks, Dan (2010). The Material-Cultural Turn. Event and Effect. In: *The Oxford Handbook of Material Culture Studies*. Ed. by Dan Hicks and Mary C. Beaudry. Oxford: Oxford University Press, 25–98.
- Kuhn, Dieter (1984). Tracing a Chinese Legend: In Search of the Identity of the First Sericulturalist. *T'oung Pao* 70(4–5):213–45.
- (1988). Author's Note. In: *Science and Civilisation in China. Vol. 5, Part 9: Textile Technology. Spinning and Reeling*. Ed. by Joseph Needham. Cambridge: Cambridge University Press, xxv–xxxiv.
- ed. (2012). *Chinese Silks*. New Haven: Yale University Press.
- Lemonnier, Pierre (1993). *Technological Choices: Transformations in Material Cultures since the Neolithic*. London: Routledge.
- Ma, Debin (2005). The Great Silk Exchange: How the World was Connected and Developed. In: *Textiles in the Pacific, 1500–1900*. Ed. by Debin Ma. Aldershot: Ashgate, 1–32.
- McKinney, Ellen and Joanne B. Eicher (2009). Unexpected Luxury: Wild Silk Textile Production among the Yoruba of Nigeria. *TEXTILE* 7(1):40–55.
- Molà, Luca, ed. (2000). *The Silk Industry of Renaissance Venice*. Baltimore: Johns Hopkins University Press.
- Monnas, Lisa (1988). Loom Widths and Selvedges Prescribed by Italian Silk Weaving Statutes 1265–1512: A Preliminary Investigation. *Bulletin du CIETA* 66:35–44.
- Mumford, Lewis (1934). *Technics and Civilization*. London: Routledge & Kegan Paul.
- Schäfer, Dagmar (2015). Patterns of Design in Qing-China and Britain during the Seventeenth and Eighteenth Century. In: *Goods from the East, 1600–1800: Trading Eurasia*. Ed. by Maxine Berg et al. Houndsmills: Palgrave, 107–18.
- Schäfer, Dagmar, Giorgio Riello, and Luca Molà, eds. (2018). *Threads of Global Desire: Silk in the Pre-modern World*. Woodbridge: Boydell and Brewer.
- Schoeser, Mary (2007). *Silk*. New Haven: Yale University Press.
- Silberstein, Rachel (2015). Eight Scenes of Suzhou: Landscape Embroidery, Urban Courtesans, and Nineteenth-Century Chinese Women's Fashions. *Late Imperial China* 36(1):1–52.
- Varadarajan, Lotika (1988). Silk in Northeastern and Eastern India: The Indigenous Tradition. *Modern Asian Studies* 22(3):561–70.
- Zhao, Feng, Wang Yi, Luo Qun, Long Bo, Zhang Baichun, Xia Yingchong, Xie Tao, Wu Shunqing, and Xiao Lin (2017). The Earliest Evidence of Pattern Looms: Han Dynasty Tomb Models from Chengdu, China. *Antiquity* 91(356):360–74.

¹⁸ Zhao et al. 2017.

Chapter 2

The Silk Cycle in China and its Migration

Claudio Zanier

Silk cultivation by means of domesticating the *Bombyx Mori* began in China around 4000 BCE, or even earlier.¹ Its migration out of China proper started a few centuries before the Common Era. The technology first headed eastward, towards Korea and Japan, much later it moved westward. This essay deals with the westward expansion of sericulture. Sericulture here is defined as including the operations of raising mulberry trees, harvesting mulberry leaves (the only suitable food for *Bombyx Mori* silkworms), silkworm rearing, harvesting their cocoons and reeling from them the silk filaments commonly known as “raw silk.”² This chapter does not deal with “wild” silkworms as they have played an insignificant role in most Western silk cultivating countries outside China, apart from some regions in India.³ The mulberry trees referred to are usually *Morus Alba*, although other kinds of *Morus* such as *M. Nigra* or *M. Rubra*, have been used to feed silkworms in the past. In this essay I argue that the time required to raise mulberry trees to maturity, and problems in ensuring a regular supply of silkworm eggs to rejuvenate silkworm stocks, contributed to the very slow pace of westward expansion of sericulture outside China proper. Moving westwards, similarities in processes are much more striking than actual differences. We can see how beliefs were part of the transmission of know-how, as well as the gendering of sericultural tasks. Significant technical changes only happened when necessity arose in a specific economic and social environment. One example is Northern Italy in the sixteenth and seventeenth centuries, where special silk throwing machines to twist the silk thread, and modified silk reeling machinery, were developed to produce a much more perfect silk thread as required by the market.

¹ Stone or clay models of various stages of silkworm development, variously dated between 4100 and 3400 BCE have been unearthed in several provinces of China, from Gansu in the north to Zhejiang in the southeast. They appear to be coeval to the world’s earliest fragment of *Bombyx Mori* silk fabric, found in Henan and dated to around 3600 BCE. A second fragment, dated around 2750 BCE, was found near Huzhou in Zhejiang province. A detailed, up to date survey of such findings is presented in the China National Silk Museum in Hangzhou. They have been reproduced and/or commented on in Zhao 2005, 12ff and *passim*.

² Mankind has attempted for ages to find an alternate food for silkworms with very modest results. At any rate, feeding silkworms with non-mulberry leaves even for a few days invariably lowers more than proportionately both the quantity and quality of silk eventually obtained from their cocoons. *Shengsi* 生絲, (Raw silk, Italian: *seta greggia*, French: *soie grège*) is a fully formed silk thread which might be used as such in the loom. Before the custom of twisting silk threads (more properly: *silk throwing*) was introduced in the early Middle Ages, many surviving ancient silk textiles appear to have been woven purely out of untwisted raw silk threads.

³ On “wild” silkworms in China, see the chapter by Mau Chuanhui in this volume. Neither shall I deal with “multivoltine” varieties of *Bombyx Mori*, that is, silkworms capable of reproducing several times within a single year. Besides their silk being of much inferior quality, “multivoltine” silkworms thrive in subtropical and/or in monsoon areas (that is, areas regularly experiencing hot and damp summers), such as Bengal or southwest China. Their role in the Mediterranean basin has been minimal. The prevailing *Bombyx Mori* varieties employed in the western world were “univoltine,” that is, silkworms that are born in spring, produce eggs after roughly two months of larval life (as “worms”) and these eggs hatch in the spring of the following year.

The sericulture section of the silk production cycle has been a rather localized process until recent times. Mulberry leaves can only be transported for a few miles, as they must be fresh when fed to silkworms. Silk cocoons were usually reeled on the spot because, in order to be transported long distances without being spoiled, they had to be most carefully dried using a sophisticated heating process. Such a process was first fully developed during the course of the nineteenth century.⁴ Hence silkworm rearing and raw silk reeling were consecutive operations performed in the same area for centuries. On the contrary, raw-silk hanks could travel with impunity for thousands of miles. The length of their voyage was supported by their high value per unit of weight.

Silk textile-making—which in early times must have been performed in, or very near, the place where silk thread was produced—could in later times easily be located far from sericulture areas. Such was the case with the luxury silk fabrics woven in Lucca in the thirteenth and fourteenth century. Lucca's vast raw silk thread input came for the most part (70 to 80 percent on average) from Iran, Central Asia and China. None or very little of it came from Tuscany or any other silk cultivating area in Italy.⁵ Similarly, the fabled silk cloths of Byzantium were manufactured for centuries with Far Eastern raw silk, imported via Persian middlemen. Needless to say, a number of sericulture areas also housed their own silk textile industry, for instance, Andalusia.

While the weaving of silk textiles can be performed in any place and in any climate—both Stockholm and Moscow developed large silk weaving firms in the eighteenth and nineteenth centuries—the rearing of silkworms and the making of raw silk has been confined to well-defined geographical areas, that is, areas where the mulberry tree can be cultivated with ease and the *Bombyx Mori* silkworm can thrive. In this sense one can plot a “mulberry belt” stretching across the Eurasian continent. West of China it roughly corresponded to the areas where grapes can be grown.⁶ It also broadly corresponds to the inner Asia land trade routes that the nineteenth-century German geographer Ferdinand von Richthofen (1833–1905) first called “The Silk Road.”

Two factors limited how sericulture traveled westward. The first relates to the climate mulberry trees need to flourish. The second relates to the belief in the regenerative capacity of the silkworms.

Most of China, particularly south of the Jiangxi river, and coastal East Asian countries such as Korea and Japan, experience high precipitation in late spring and summer due to the monsoon winds. In these conditions mulberries can easily be grown as low bushes that allow abundant leaf picking shortly after planting. Introducing sericulture to a monsoon area

⁴ There are a number of documented instances of long-distance trade in cocoons in the late Middle Ages (for example, from ports in present day Albania to Venice). Owing to the primitive ways in which they were dried and stored, those cocoons were hardly fit for proper reeling. They were most likely carded by Venetian artisans, resulting in a thread of much lower quality and value.

⁵ Import data from several Lucca trading firms for the years 1284–1314, recently published by Alma Poloni, confirm Roberto S. Lopez's previous research on Genoese imports of foreign raw silk destined to Lucca. Poloni 2009; Lopez 1952.

⁶ While mulberry trees may prosper in much colder climates than those that permit grapevine cultivation, the harvesting of all leaves in late spring to provide nourishment for silkworms will harm them. A number of experiments with sericulture in England, Flanders, Moravia, Russia, and elsewhere in Northern Europe failed partly because of the damage suffered by the mulberry trees when stripped of their leaves in cold climates. For England see Feltwell 1990, 72–9, 100–12, and for Flanders see Bonafous 1847; for the Austrian Empire and Russia see Rondot 1885, i, 344–46, 418–19. For specialized literature on mulberry trees, their varieties, and their world diffusion see: de Gasparin 1843, iv–633; Verson and Quajat 1896.

is relatively easy and fast, as the mulberry bushes can produce a vast amount of leaves in a short period, allowing a large crop of cocoons to be gathered.

On the contrary, inner Asia, most Middle East countries, and the countries around the Mediterranean basin usually have a dry period starting in late spring and stretching into summer, often experiencing up to three months with very little rain, if any. Mulberries are therefore better raised as full trees, so that their roots can extend deep into the soil in search of water. Even where irrigation is available, the hot, dry summer climate rarely permits mulberries to be grown as bushes. As a consequence, when sericulture moved westward from China along inner Asia routes, mulberries had to be raised and tended as full-grown trees. When grown this way, leaf picking must be postponed for at least six to eight years of growth before full-scale picking can safely start, any earlier picking will stunt the growth of the young plants. Moreover, the mulberry trees require another twenty years to reach full growth and yield a supply of leaves ample enough to support a voracious horde of silkworms. In other words, expansion of silk cultivation in a new non-monsoon area, where few or no mulberry trees previously existed, required a number of decades before the supply of mulberry leaves was adequate to sustain a viable local silk industry or to export its silk thread in meaningful quantities. In the case of *Morus Nigra*—the variety of mulberry tree indigenous to the Mediterranean and the only one existing there up to the beginning of the fifteenth century—the pace of expansion for new viable plantations was slowed by the *M. Nigra*'s limits of adaptation to different soil types, dampness, weather conditions, pruning methods, and the restriction of propagation to seed germination.⁷

The second factor relates to silkworms. It was a common belief in the past—confirmed by practical evidence—that silkworm races first imported from elsewhere tended to “degenerate” in a few years, requiring a fresh import of silkworm eggs from their place of origin.⁸ While the degeneration of silkworm assumption is frowned upon by modern scientists, there are plenty of historical documents to support its existence.⁹ One such example is the Arab geographer Ibn Hawqal's report that Jurjan (present day Iran) silkworm cultivators imported silkworm eggs at intervals from the eastern oasis of Merv (nowadays in Turkmenistan).¹⁰ Another can be seen in the Northern Italian cultivators' habit of considering Calabrian and/or Valencian silkworm eggs a must to rejuvenate their stocks of silkworms.¹¹ It appears that the re-import of silkworm eggs from selected places of origin at intervals of every few years in order to rejuvenate the old stock was standard practice almost everywhere, at least up to early eighteenth century. Documentary evidence of such a practice can be used today (with due circumspection) to help identify the sequential chronology of sericulture expansion. Such experimental history though can only speculate how in practice factors such as wars, epidemics, and a host of natural and man-made disruptive elements, may have retarded or complicated the regular rejuvenation of silkworm stocks, slowing down the pace of growth of local sericulture.

⁷ See Verson and Quajat 1896, 181 ff.

⁸ On the presumed need to import silkworm eggs anew, see: Gallo 1569, 99; Olivier 1599, 58; Zanon 1763, ii–1. Silkworms as such cannot be moved during their lifetime, but their eggs can be transported for long distances, with due care and much attention.

⁹ One of the earliest agronomy texts to consider the rejuvenation of silkworm stocks by importing silkworm eggs from afar was unnecessary and even dangerous: Guichard 1786.

¹⁰ See the Chapter on Jurjan in Le Strange 1905.

¹¹ See Guichard 1786.

Taken together, both factors—raising mulberry trees to maturity and problems with a regular supply of silkworm eggs to rejuvenate silkworm stocks—contributed to the very slow pace of westward expansion of sericulture once it left China proper. As a matter of fact, it took several centuries for a viable sericulture to reach the Mediterranean basin from China.

2.1 The Westward Expansion of Sericulture since the Third Century CE

The first step of sericulture westward from China appears to have been to the Kingdom of Khotan in the modern Chinese autonomous province of Xinjiang.¹² Ancient literary sources testify to silk being cultivated there around the third century CE, and archaeological excavations—first undertaken by Aurel Stein (1862–1943) at the beginning of the twentieth century—also prove that sericulture flourished there in about the third century.¹³ After his visit to Khotan in the early seventh century, the famed Buddhist pilgrim Xuanzang 玄奘 (602–64 CE) reported on the earlier introduction of silk.¹⁴ Tibetan texts as well as the Arab geographer Ibn Hawqal confirm the existence of silk cultivation as well as the story of its introduction from China several centuries earlier.¹⁵

From Khotan, sericulture proceeded westward, with the next documented step being the then vast and rich oasis of Merv (in present-day Turkmenistan), where sericulture was already flourishing by the late ninth century according to Arab geographers quoted by G. Le Strange. There may have been some intermediate milestones on the long road from Khotan to Merv, which have not yet been identified. From Merv, sericulture migrated to the nearby province of Nishapur, in eastern Iran, and from there to the southern shores of the Caspian Sea (proceeding westward from Nishapur to Jurjan to Mazendaran, and later on to Ghilan) and thence to Transcaucasia, where the then Armenian town of Bardaa became one of the most important raw silk production centers in the Middle East for several centuries before being razed to the ground by Mongol forays in the early thirteenth century (see Figure 1).¹⁶

¹² The capital was at modern-day Hotan (Hetian 和田). The Buddhist kingdom spread from Southern Taklamakan Desert to the Tarim Basin (Xinjiang Province, PR China).

¹³ In January 1901 Aurel Stein realized that the fossilized tree trunks he was discovering during his excavations at Niya were mulberry tree trunks. The village of Niya, some 150 km to the East of Hetian, had been destroyed and abandoned in the third century CE, implying that sericulture existed there prior to the abandonment of the place. Stein 1912, i–68. Subsequent archaeological excavations in Xinjiang brought to light used silk cocoons, silk threads, silk making implements etc. For a survey of cocoon troves in Xinjiang see Kuhn 1988, 310–ff. There are more recent updates in Zhao 2005, 12–ff. See also Hansen 2015, 39.

¹⁴ Xuanzang 1884, ii.

¹⁵ Emmerick 1967, 33–35; Ibn Hawqal 2001. Aurel Stein discovered at Dandan Oiliq (to the North-East of Hetian) the fragment of a painted wooden tablet, which might possibly refer to the story of the Chinese Princess who allegedly introduced silkworm eggs in Hetian hidden in her hair-dress. Both Xuanzang (see Xuanzang 1884, 318–19) and the Tibetan text (Emmerick 1967, 33–35), hint at such a princely introduction. Stein 1981, 259–60, with image at Pl. LXIII (D.x.4). See also de la Vaissière 2014, 85–7

¹⁶ The site of former Bardaa is now in Azerbaijan. In the nineteenth century the area around the nearby town of Noukha experienced a flourishing sericulture.



Figure 1: Migration of sericulture since third century CE. Map designed by Wiebke Weitzmann.

Two sets of differing data exist on the arrival of sericulture in the Mediterranean basin. On the one hand, two sixth-century Byzantine historians, Procopius (500–60 CE) and Theophanes (fl. second half of sixth century CE), tell of a bold and successful attempt by a few pilgrims or travelers to circumvent the Persian monopoly on trade in silk thread by directly importing a batch of silkworm eggs into Byzantium from “the faraway land of Seres,” which modern historians identify either as eastern Central Asia or, more likely, China itself.¹⁷ The attempt was made during Justinian’s reign (527–65 CE) and it somehow crowned various previous unsuccessful attempts by the same imperial court to bypass the Persian middlemen trading raw silk for the Byzantine imperial manufactures either by sea (with the help of Ethiopia) or by land (with the help of Turkish chieftains). On the other hand, the earliest documented proof of actual large-scale sericulture in the Mediterranean comes from the so-called “Cordoba Calendar” (from mid-tenth century) and from a twentieth-century discovery of a parchment related to Calabria on the southern tip of the Italian peninsula (early eleventh century).¹⁸

Although many modern historians affirm that the reported introduction of sericulture in the times of Justinian freed Byzantium from Persian intermediaries once and for all, and rendered the Empire autonomous in regard to silk thread (raw silk) production, there is not a single piece of evidence to support this assertion for the three to four centuries after Justinian’s reign. For one thing, apart from one indirect quote in the eleventh century, no Byzantine historian after Procopius and Theophanes ever refers to the attempt.¹⁹ Indeed no historical documents support the claim that before the ninth to tenth century raw silk was produced within the boundaries of the Byzantine Empire. Given the scarcity of sources the issue will remain highly debatable, with the validity of Procopius and Theophanes’ reports having been called into question, too.

My educated guess is that if the Procopius-Theophanes story is true (and I believe it is), either the early sixth-century attempt to install sericulture in the Byzantine Empire failed miserably, or, if it was successful, did not take off as expected and perhaps limped along for decades or even longer with few products of low quality. The very fact that the silk fabrics of Lucca, which had begun their swift ascent in Europe by the late twelfth century, did not make use of more than trifling amounts of Mediterranean raw silk until the thirteenth and fourteenth centuries, suggests that it did not meet the quality requirements of luxury silk fabrics. One should note that earlier Byzantine woven silks were much pricier than those of Lucca, hence their quality requirements must have been all the higher.

A highly fascinating documentary source such as the early medieval Cairo Geniza papers, painstakingly perused and analysed by the late Shelomo D. Goitein (1900–85) may add some interesting details, although the validity of dating through those parcelled fragments is in many cases questionable.²⁰ A few references to a limited trade in raw silk emerge from them, and one might state that a few places in Sicily, in Tunisia (Gabes), and on the shores of Syria did produce some medium to low quality raw silk in an unspecified period earlier than the tenth century. If anything, the data reinforces the hypothesis of some marginal

¹⁷ Haurly 1905, 576–77; Dindorf 1870, 446–49. On “seres” see: Plinio il Vecchio (Pliny the Elder) 1997, 54.

¹⁸ Dozy 1961; Guillou 1978. In the former document silkworm rearing is cited as a regular source for fiscal dues; in the latter, the parchment states that the Bishop of Reggio Calabria was entitled to a fee from those picking mulberry leaves from a large number of mulberry trees growing within his domain.

¹⁹ Zonaras and Pinder 1897, iii–72.

²⁰ Goitein 1967a, 6 vols., see particularly for Sicily and Tunisia silk, Goitein 1967b, 222–224. See also: Goitein 1971.

sericulture scattered here and there in the Mediterranean basin on the eve of the take-off of large-scale sericulture in Andalusia and Calabria. It is highly likely that by the eleventh century a few areas in the Hellenic section of the Southern Balkan Peninsula might have achieved a significant level of raw silk production too, both in terms of quantity and quality, although firm evidence of the scale of operation is still lacking.²¹

Be that as it may, once sericulture eventually took off in the Mediterranean basin, it never stopped expanding.²² In the course of the late Middle Ages, the Italian peninsula overtook the Iberian peninsula in raw silk production and while the latter somewhat re-trenched after the fall of Granada in 1492—and above all after the rebellions of Morisco silk cultivators in the late sixteenth century—the former expanded even more rapidly. Once the main regions of northern Italy (Piedmont, Lombardy, the Veneto) joined the mulberry planting frenzy of other areas of the peninsula, Italy became the main producer of raw silk in the Western world. From the seventeenth century onward most Italian states saw a gradual reduction of their role as exporters of highly prized silk textiles—as they were matched and superseded by French, English, and later on German and Swiss competitors—but they simultaneously experienced a rapid growth in their international role as exporters of quality raw and thrown (twisted) silk. By the mid-nineteenth century, Italy was the leading world producer of silk thread after China. But by the early twentieth century, it had lost its runner-up status to Japan. Silk products (mostly threads) continued to be the first export item (in value) of the Italian peninsula for the entire nineteenth century and up to the Great Depression of the 1930s.²³

Having broadly outlined the centuries-long journey of sericulture towards the west after leaving China in or around the third century CE, it may be helpful to note that various kinds of silk fabric manufactured in China and perhaps also in neighbouring Central Asia, had already reached the Roman Empire long before the westward journey of sericulture begun. It is well known that some Roman intellectuals were deeply worried by the fashion craze induced by the new exotic textile products, both because their thinness hid nothing of the bodies of the ladies who wore them and due to the apparently outrageous sums spent on their purchase. The recent finding of dozens of Chinese silk fabrics fragments in the tombs of Palmyra bear witness to a rather diffuse use of imported silks, even among the wealthy provincial elite in the first centuries of our era.²⁴ In the following centuries and even after Middle Eastern states and the Byzantine Empire had developed their own silk textile manufacture, Chinese silk fabrics continued to arrive in the West, influencing dress, fashion, and cloth patterns, but also how looms were used, and how warp and weft were set.²⁵

Soon after Chinese silk fabrics first made their appearance in the Roman Empire, silk thread followed. By the fourth century CE, raw silk from China or Central Asia was already common in the Eastern provinces of the Roman Empire.²⁶ Seen in perspective, silk came to

²¹ David Jacoby has devoted much of his scholarly research to silk production in the Hellenic area in Medieval times. See, among other contributions, Jacoby 1991; 1994.

²² Dini 1993; Jacoby 1999.

²³ ISTAT 1959.

²⁴ Liu 2010, 27–8.

²⁵ Personal communication, Prof. Sophie Desrosiers, EHESS, Paris (Seminars 2007–2008).

²⁶ See Homily VIII of Basilus Magnus (B. Caesariensis), composed around 377 CE, where he refers to the precious threads provided by “Seres,” from which the local women Basilus preached to used to weave soft garments. Di Cesarea 1990, 264–67.

Europe in a reverse order with regard to its production process: first silk fabrics, then silk thread, and finally sericulture and the silkworms themselves (by way of their eggs).

2.2 Sericulture Transmission: The Similarities of Customs and Beliefs

In examining the technical aspects of sericulture transmission, one would expect that the length of the journey, both in terms of geographical distance and the number of centuries it took to reach Europe, together with the lack of direct contact between the two terminals would have resulted in technical divergences in the execution of the process as well as in the instruments employed. In other words, while moving westward and settling in successive areas with different agricultural and manufacturing traditions over a very long span of time, the process itself, or at least some important sections of it, might have evolved along different lines. Instead, similar, at times identical, technical practices seem to be the rule rather than the exception. As a matter of fact, some of the exceptions are quite interesting and one or two deserve close examination in light of the technological competition between Chinese and Western manufacturers on the eve of the Industrial Revolution. I shall deal with those further on. The focus here is on the far more numerous similarities.

One might rightfully expect that sericulture, having been exported from China some seventeen centuries ago, would have experienced a wide evolutionary change in the course of its adaptation to the Western world. Instead, Europeans who visited China from the sixteenth century onwards perceived the Chinese origin of sericulture: many technical aspects of it were quite identical in the two areas, particularly so in silkworm rearing practice. It appears that the two sericultures either developed in tandem or changed very little over time. If anything, European reeling instruments were somewhat clumsier than most of the Chinese ones, with the only exception, at the end of seventeenth century, of the new Piedmont reeling machinery and of the related water-powered silk-twisting mill.²⁷

Starting in the mid-eighteenth century and continuing, with increased frequency, into the early decades of the nineteenth century, Europeans (especially the French), baffled by the low cost and high quality of Chinese silk products, began sending experts—industrial spies—to China to study and possibly acquire the technical “secrets” of Chinese silk production.²⁸ They came back almost empty-handed, apart from marginal details and processes which brought no radical change to the way sericulture and silk industry were practiced in the West.

As already mentioned, most silk-making machinery and instruments to be found in China, particularly those used in the various stages of silk thread manufacturing and refinement, were very close to European ones in concept as well as in design. Silk reeling at the end of the eighteenth century was a pretty sophisticated and quite efficient process, compared to the ancient methods peasants used to spin cotton and manufacture cotton threads. While mechanical spinning of cotton first took place in Western Europe in the second half of the eighteenth century—and was one of the leading components of the industrial revolution—it was not until the 1830s, by applying advanced metallurgy and steam technology,

²⁷ For an overall, detailed view of silk production in Piedmont (Italy) see: Chicco 1995; for the role of the non-Chinese hydraulic silk-twisting mill in Italy see: Poni 1972; for a technical survey of the hydraulic silk-twisting mill see: Crippa 1990; for a comparison of Piedmontese silk reeling and silk-twisting instruments to Chinese ones see: Zanier 2005.

²⁸ Zanier 1988. For earlier (seventeenth and eighteenth century) attempts see: Zanier 2005, 12–18.

that silk-reeling in selected areas of Western Europe began distancing itself from the older model of Chinese design.

One may infer from the above, that Chinese sericulture at the time it started its journey to the West was a fairly advanced production and had already evolved in China by way of successive refinements and trial-and-error procedures for a very long period of time.²⁹ Sericulture was particularly suited to being introduced to an equally advanced agricultural and manufacturing environment. Whenever this was not the case, sericulture adapted to the new circumstances by “lowering” its technical standards.³⁰ Improvements would only come if there was a sharp evolution of the overall economic and social environment. As we shall see later on, fast growing European demand for high-quality textiles in the thirteenth century and a similar, albeit on a much larger scale, increase in demand in the late seventeenth century, brought about the only two significant basic non-Chinese innovations to the way silk thread was made in Europe, that is the introduction of the giant hydraulic silk-twisting mill and the modifications in the manufacturing of the silk thread in the reeling instruments (the latter being first applied in Bologna and then in the whole of Piedmont). Coupled together, as they were in Piedmont from the 1670s onwards, these two innovations in reeling and twisting resulted in a product (the *organzine* twisted silk thread) that was one of the very few manufactured items, perhaps the only one indeed, to be decidedly superior to equivalent Chinese ones in textile making before the Industrial Revolution.³¹

2.3 Beliefs as Part of Know-How

To the surprise of European nineteenth-century silk experts touring the Eurasian continental areas where sericulture was practiced, the “superstitions” and “false beliefs” they found there were very similar to those that infested, in their positivistic view, European silk cultivators.³² These included ways to prevent silkworm nurseries from being hit by the “evil eye” or from other natural or supernatural evils. Several proverbs and various habits, concerning both silk and silkworms, may be added.

Western literary sources of the Renaissance period, such as silkworm rearing manuals and poems dedicated to silk-making, show traces of mythology and rituals which, under their Classic garb, bear striking similarities to ancient Chinese myths and rituals linked to mulberry trees and silkworms.³³

Sericulture must have traveled to the West as a comprehensive set of know-how. That is, state-of-the-art techniques were inextricably linked with what our forefathers would have

²⁹ Once all the stages of silk cultivation from China to the West were settled, constituting a sort of active “sericultural belt” from Xinjiang to the Mediterranean basin, there is no reason to assume that a number of further details and innovations might not have flown from China towards Europe along that route. Contributions of the sort are likely to have taken the sea route from China to Europe as soon as the Cape route was opened, too. The striking similarity between silk reeling machinery still employed today in the Canary Islands with analogous Chinese machinery could well be one example of the latter point.

³⁰ Such was possibly the case with silk looms. Chinese looms were far more advanced than European ones up to late Medieval age: silk-loom *à-la-tire* began being used in Europe around the late thirteenth to fourteenth century while similar Chinese model looms have been recently excavated in one tomb of the Han dynasty period (206 BC–220 CE). Similarly, before innovations in Piedmont and in Bologna on silk-reeling instruments in the seventeenth century, most instruments used in Europe were much clumsier than Chinese ones, although identical in basic design.

³¹ For technical details on these innovations see Chicco 1995, and Zanier 2005.

³² Fortune 1857. Castellani 1860. The latter book has been translated into Chinese and English: Castellani 2016.

³³ Most importantly Vidae 1527, which was translated into several European languages. It served as a model for silkworm manuals for the following two centuries.

called a bunch of superstitions. From this perspective one may better understand why, until quite recently, silk producing countries across Eurasia kept up so many of the ritual aspects of sericulture. A delicate and fragile process such as the rearing of silkworms could only be accomplished through the careful, learned, and trained use of an entire set of knowledge which included, to give one example, knowing how many times a day to feed silkworms as well as knowing how to dispel the evil eye of a hostile person. Both types of knowledge were deemed equally essential for the well-being of the insects.

In pre-industrial times, the technical aspects of a production process were just a section of a complex whole, made up, among many other things, of know-how, individual skills, instruments, social roles, beliefs, rituals, cults and myths. There could be no question of knowing how to apply only one, ignoring the other.

As late as the 1930s, silk workers of Bukhara considered their precious instruments passed down from father to son, and from mother to daughter—as sacred objects to be preserved and revered. Much of their income as well as their standing among their fellow artisans depended upon these instruments. When one implement broke, the fault was invariably attributed to an evil act by some individual enemy or by an evil spirit. The broken pieces were never thrown away but carefully saved as a talisman to protect the artisan's family.³⁴

If the concept of a comprehensive know-how, necessarily including “techniques” (as understood today) and “beliefs” holds true, and many details point to it, then it is a logical consequence that the journey of sericulture from China to the Mediterranean could not have been accomplished by simply passing along, stage after stage, a set of technical instructions to interested strangers who would have then applied them once back home. Either instructors themselves moved to the new location with their whole baggage of knowledge and instruments, or strangers had to be admitted into the local silk workers community and work there as apprentices for very long periods of time before moving elsewhere. So the migration of sericulture westward would have depended not only on silk worm eggs and mulberry trees, but also on the migration of the learning of a highly specialized knowledge.

Indeed, when Britain tried to circumvent the world monopoly on “organzine” silk thread held by Piedmont around 1720, it first “obtained” (stole?) the blueprint of the most advanced silk throwing machinery, and built giant copies of it in a huge industrial building at Derby. The experiment failed miserably as neither the necessary prerequisite set of preceding steps (silkworm rearing, cocoon sorting, careful reeling on innovative machinery etc.) nor skilled workers who knew the process were imported together with the plans for the machinery.³⁵ Having learnt this lesson dearly, all later attempts to transplant the Piedmontese model and the establishment of sericulture implied the recruiting in Italy or in France and transfer of skilled workers to the new locations. Two examples are the early attempts at silk production in the British colonies of North America as well as the transfer of scores of mostly Piedmontese silk-reelers to Bengal from 1769 onwards. A similar attempt was made after 1778 in the northern Portuguese province of Tras-os-Montes, again with Piedmontese

³⁴ Reported in Gibbon and Hale 1997, 65. Ampler details on Central Asia silk workers beliefs in: Tursunov 1974, 150–71.

³⁵ The story of the Lombe brothers who allegedly worked in disguise in a silk twisting (throwing) mill close to Turin to learn how the machines were made and how to work them and then got a huge Government subsidy to build the Derby silk mill—considered by many the first plant of the Industrial Revolution—has been a *pièce célèbre* in economic history manuals since Paul Mantoux dealt with it in his Mantoux 1906. The story has been moreover popularised and romanticised to the extreme. A neat reconstruction of it based on archival and contemporary sources is to be found in Chicco 1995.

technicians.³⁶ It must be added that all of these attempts were only partly successful, if at all, perhaps because the socio-economic environment in which they were made was wholly different and/or much less advanced than that which had allowed Piedmont to significantly innovate on the highly effective silk making model it had inherited from China.

2.4 The Gendered Nature of Silkworm Breeding: Women in Sericulture

A further striking similarity between all non-Chinese sericultures and the original is the role of women. Wherever sericulture has been practiced it was women only who reared silkworms. As a matter of fact, the whole silk production process was originally in the hands of women.³⁷ Such was definitely the case in China since the remotest antiquity. According to the classical text *Zhou li* 周禮 (*Book of Rites*), which documents the ceremonies and rites of the Zhou dynasty around tenth century BCE, the very first duty of an Empress was to take care of silkworms, to superintend silk weaving and to settle the terms for pricing and selling silk products in the special markets of the capital city that were under her exclusive control. A number of complex rituals accompanied each stage of her duties.³⁸ Jean-Pierre Diény has gone even further by examining ancient Chinese peasant poems that were collected in classical texts a few centuries BCE but which had been passed down orally for generations. He underlines how in pre-historical times women made use of mulberry tree groves, which were under their full control for silkworm rearing, as places where collective ritual mating took place under their initiative.³⁹ In Chinese tradition, individual mulberry trees or mulberry groves placed near rivulets became symptom and synonym of fertility rites. They had a highly relevant position in myths, legend and rituals, as reflected in several passages in ancient classical literature. This is also shown by the very high status given to silkworm care by the Empress herself.⁴⁰ In this context women in general—and the Empress most of all—had a sort of “catalyst” power to start fertility cycles. After silkworm rearing, the next main duty of the Empress was to personally perform rituals that would grant fertility to the carefully preserved agricultural seeds that the Emperor would sow soon after.

The first step in caring for silkworms is the hatching of their eggs. It requires a high degree of attention, first because those tiny eggs are to be handled most delicately, second, and most importantly, because they must be brought to hatch in perfect accordance with the budding of mulberry tree leaves, which is often unpredictable due to the vagaries of spring weather. Were the eggs to hatch before the leaves sprouted, there would not be any food

³⁶ For more on all three examples see Chicco 1995. In 2004, Roberto Davini submitted a PhD dissertation prepared with the use of original archive materials from Calcutta dealing with the impact—technical, social and economic—of the prolonged experiment of the transplant of Italian silk making practices in Bengal in the latter part of the eighteenth century. Davini 2004.

³⁷ To dispel the doubt readers may have that women were connected with sericulture simply because it was low paid labor, it must be stressed that up to the early nineteenth century, silk-reeling women were often paid more than men on an hourly/daily basis, and that profit from cocoon sales was quite often the personal income of women only, not to be shared with the rest of the family. See Zanier 2007; Zanier 2010.

³⁸ Biot 1851, see especially vol. 7, 140 ff.

³⁹ Diény 1977.

⁴⁰ Beside Confucian classics, several passages in *Shanhaijing* 山海經 and *Soushenji* 搜神記 as well as in several more texts composed during the Han dynasty (206 BCE–220 CE) or shortly after, deal with the mythical role of mulberry trees or silkworms, both invariably connected to women, to supernatural powers, to extraordinary events or to the birth of exceptional persons. Rémy Mathieu suggested that in Chinese mythology “la métamorphose de la larve du bombyx occupe une place centrale.” Fracasso 1996; Gan 1966; Mathieu 1983, xli.

for the new born insects, spoiling the crop entirely. It was therefore necessary to attentively guide the hatching by applying moderate heat at the appropriate time only. Once eggs are heated, it is impossible to stop the process of hatching.

All over the world it was the female body that performed this delicate and strategic task. At the proper time, silkworm eggs were gently wrapped in a piece of white, clean cloth and placed between a woman's breasts for two to three days to hatch. This procedure is quoted in Medieval Arab texts relating to sericulture in Morocco, Iran, Egypt and elsewhere in the Muslim world.⁴¹ It is to be found in a brief fourteenth-century Byzantine guide to silkworm rearing (by Manuel Philes) and it is universally quoted in European manuals from the fifteenth century onwards.⁴² Travelers met with it in nineteenth-century Iran, Central Asia, Anatolia and China. Eighteenth-century agricultural reformers in Europe considered the practice obsolete and dangerous. Nineteenth-century agronomists saw it as an unhygienic, antiquated and irrational habit, proof of peasant backwardness. Special hatching machinery was devised and amply publicized in order to eradicate a habit that moralists too were beginning to view with disdain. Yet even today, older people in former sericulture areas of China, Japan, Italy, France, and Spain might remember their mothers or their grandmothers telling of having seen or practiced this custom with the utmost care.⁴³ The persistence of the practice, unabated for centuries, together with its diffusion at a world level among people of different creeds and with different attitudes towards the use of the human body tells of a strong root in ancient rituals. Italian manuals of the Renaissance tell of the "special" warmth of the female body, which alone could guarantee the optimal outcome of the process. One of the founders of modern entomology, Ulisse Aldrovandi (1522–1605), a most rational scientist in all his writings, maintained that silkworm eggs could be made to hatch by other heating methods *sed felicius nascuntur* (but they hatch best) when kept between a woman's breasts, his *felicius* implying that the worm will thrive after this treatment up to the cocoon spinning.⁴⁴

Indeed, the process had taboo overtones. In telling of different heating methods, mention is made of places such as under the pillow or under the mattress at night, or close to the fireplace, etc. But to my knowledge, there is no mention that hatching might be performed by men. In most cultures, men were on principle strictly excluded from the process of silkworm rearing or even from the room where it took place. As late as 1910 in a large farm near Mantua in Northern Italy the woman (a peasant) in charge of the silkworm nursery would allow one pre-pubescent male child to enter the place as an exception; adult males, including the powerful farm owner, were definitely barred.⁴⁵

The role of women in charge of silkworms was explicitly equated to that of mothers caring for their children. In order to achieve the best possible outcome they had to be young, healthy, and plump. One sixteenth-century Italian manual on silkworms states that old women too could, when needs must, look after the hatching of silkworms. In this case the

⁴¹ Kazwini 1805, 39; Renaud and Muḥammad Ibn al-Bannā 1948, 34; Muhammad ibn Musa al-Damîrî 1906, 794–95.

⁴² Lehrs and Dübner 1846, 68; Della Cornia 1982, 278; Magino 1588, cciii.

⁴³ Candiani 2000, 31 (the author witnessed the practice in his own family in the late 1940s); Giuseppina Bonelli of Saluzzo (Piedmont, Italy) witnessed the practice by her mother in the 1920s and 1930s (personal communication, Saluzzo, June 1993). For Romania see Murgoci 1928, 251.

⁴⁴ Aldrovandi 1602, 286.

⁴⁵ Personal communication by prof. Giovanni Tassoni speaking of his own experience in Viadana (Mantova, Italy).

heat of fireplace was to be employed, not their cold, useless bosom.⁴⁶ Chinese texts as well as silkwormers called the woman who superintended the nursery the “mother of silkworms” (*canmu* 蠶母).⁴⁷ Traces of women-centered fertility rites performed to ensure successful silkworm rearing can be detected in sixteenth-century literary sources on European sericulture too. These practices certainly fell under the axe of the Counter-reformation, but may well have gone underground.⁴⁸

Women, with a few exceptions, have been considered the most apt choice for reeling quality silk threads from cocoons. Since the Middle Ages, expert silk-reelers were known in Italy by the reverential title of *maestre* (masters), a title only granted to qualified senior artisans. In many Italian towns, guild regulations imposed several years of controlled apprenticeship to silk-reeler women before they could be recognized as *maestre*. They usually were women in their thirties or even older. Much younger girls, in most cases their own daughters or younger relatives, were employed in menial jobs such as turning the reel by handle or minding the fire under the basin where cocoons were immersed. Watching and listening to their mothers and female relatives perform the skilled tasks formed a “de facto” apprenticeship that preceded the guild training. At the same time it kept the transmission of know-how within (female) family lines. Technical literature abounds with warnings to those who would like to invest in the trade that no good silk could ever be produced without skilled *maestre*.⁴⁹ Expert women in the field might receive pay higher than that of men with equivalent duties. The privileged role of *maestre* first began to decline with the industrialisation of the silk production process after the mid-nineteenth century. However a number of specialized, delicate tasks required the dexterity of female hands until the early twentieth century.

As already mentioned, women in China appear to have controlled the whole silk-making cycle since antiquity, including the actual property of most of its products. There are few scattered indications in the late Middle Ages and up to the sixteenth and seventeenth century that in Europe too women were seen as the sole owners of some of their silk products, such as cocoons and, possibly, the raw silk they had reeled themselves. There are also signs of an early gender conflict in the case of the natural resources needed for silkworm rearing. Pietro de’ Crescenzi (1233–1321) from Bologna, writing circa CE 1300 in one of the earliest post-Classical agricultural manuals in Europe did not mention silk cultivation at all although he devotes some time to mulberry trees, both for their succulent fruits as well as for their medical uses. However he complained about “le troppo moleste femmine” (those very troublesome women) when they pick leaves from the tallest branches in order to feed silk worms because, in so doing, they risk badly spoiling the tree for its next fruit crops.⁵⁰ Clearly men had no say, or interest, in silkworm rearing in those times and an open gender conflict was developing in regard to mulberry trees growing on communal lands and maybe also for those growing in home gardens.

Starting in the early fifteenth century, in Italy as well as in France, men gradually replaced women as weavers of higher quality silk stuff and women were eventually banned

⁴⁶ Magino 1588, 47.

⁴⁷ Broadwin 1999.

⁴⁸ A book on the subject and on the role of women in silk making is in its early editing stage: Zanier forthcoming. Two preliminary essays have been published: Zanier 2007; Zanier 2010.

⁴⁹ Bonfante 1620, 54.

⁵⁰ de’ Crescenzi 1605, 239. The Italian epithet translates correctly the Latin one reported in the *incunabulum* of circa 1477. See de Crescentiis 1477.

from joining weavers' guilds or forming their own trade associations. It was part of a wider process of women's marginalisation in economic and social life, which continued for the next few centuries and which can be equally observed in Asia. In some areas of Southern Europe, silk reeling passed, wholly or partially, in the hands of itinerant male reelers. Interestingly, the quality of raw silk reeled by men was on average decidedly inferior to that reeled by women. The core of sericulture stubbornly resisted male encroachment. Silkworm rearing rested firmly in female hands up to the twentieth century, despite repeated attempts to bring it under male control.

2.5 Similarity in Practices and the Role of Technical Innovations

Silk is the only long natural fiber mankind has ever made use of. One cocoon is made up of a single filament whose length in pre-modern cocoons (that is, before Japanese innovations in the early twentieth century) could reach some 600 to 800 meters.⁵¹ Each filament is very thin (0.015 / 0.020 mm.) although its strength equals the strength of an iron thread of the same diameter.

Short fibres (wool, cotton, flax, hemp etc.) have to be intertwined together in a somewhat haphazard way to form a thread. Seen through a magnifying lens a short fibre thread looks "hairy" because of the many loose ends sprouting from it. Its diameter is hardly constant. On the contrary, silk threads are made up of several filaments (up to 80 or more in Medieval times in Europe and in the Middle East) placed with dexterity side by side while going from the basin (where cocoons are immersed in hot water) to the reel and being joined together only by the natural glue (sericin) they are coated with—no twisting whatsoever—notwithstanding what is often maintained in present-day literature. Through a magnifying lens they look like a beam of cohered parallel filaments. Such a thread will reflect far more light than any short fibre thread: hence the extraordinary sheen and brilliance of silk.

At the same time any single minor imperfection (knots, impurities, loose ends), however minute or isolated, will stand out and be immediately perceived by the eye.

The same is true for minuscule variations in its diameter. Tiny imperfections that would never even be noticed by a close inspection of wool or flax thread might easily spoil silk, sharply reducing its selling price. The problem was most acute with plain fabrics, since in operated ones complex design patterns might hide minor imperfections.

It was the duty of a female expert *maestra* to use her skill and concentration to avoid any irregularity in the forming thread. The most difficult part of her job was maintaining uniformity in the diameter of the thread. As the length of filament in each cocoon varied sharply, she had to be aware when one filament of the forming thread was close to end, finger the diameter of the thread and choose the right moment to add a new one picked from a cocoon in the basin.

In medieval times, western silk threads were made of many filaments, 40, 60, even 80 or more, possibly because the diameter of other fibre threads in use were as gross and also because woven fabrics were also rather heavy. Chinese silk threads were much thinner. This is a case of a lowering of the technical content of the Chinese model of silk thread making when it reached the West, in order to adapt to a context of coarser threads, fabrics and garments.

⁵¹ Japanese cross-breeding and subsequent evolution have brought the length up to 2000 metres.

With 40 to 80 filaments in one thread it was relatively easy to keep constant the diameter, as the lack of one or two filaments was hardly discernible. However, when in the late sixteenth and early seventeenth century, Chinese silk cloths and garments began sailing en masse to Europe, textile Europe shuddered in fear. Besides the attraction of their splendid exotic patterns and their much lower cost, those cloths were far lighter, as they were made up of much thinner and more perfectly formed silk threads. Whoever could reproduce these would have a major advantage over competitors. It was then, as a reaction to the renewed challenge of Chinese competition, that silk thread making in selected western areas evolved. As Carlo Poni put it: it was then that “the silk thread [in Italy] became thin and perfectly round.”⁵² The technical “revolution” took place in Europe only in a few areas, namely Bologna in early seventeenth century, and some fifty years later in Piedmont raising their products (raw and thrown silk) to the top of the market. Silk threads made in the old fashion soon lost their former position. Price differentials between raw silk made by male itinerant reelers in Calabria compared with threads manufactured in Piedmont were in the order of 50 to 100 percent in the late seventeenth century.

Silk reeling machinery was deftly improved with a few ingenious additions—one of which, the crossing of the threads going to the reel, was a novelty in regard to Chinese practice.⁵³ Machinery and related instruments were standardized throughout Piedmont with repeated sets of detailed written instructions, strictly enforced by frequent inspections.⁵⁴ But by far the most important element remained the high dexterity of the *maestre*. They had to be most careful in following the “construction” of the threads meter by meter. It was in Piedmont, probably for the first time ever, that government guidelines prohibited outright the paying of the *maestre* by piece rates. The *maestre* were to be given the time they needed to mind the thread and they had to be paid a daily rate, not by the physical amount of thread they were able to produce. The only variation in pay was based on the quality of raw silk thread produced.

Although the new Piedmont raw silk threads were much thinner than the older threads, their high uniformity and quality meant they were strong enough to be thrown into *organzine*—the special double twisted thread used for warp in high quality silk fabrics—in the giant hydraulic throwing (twisting) plants that within a few decades dotted most of southern Piedmont.⁵⁵ In this way Piedmont came to play a basic role in providing, above all, Lyons with a set of high-quality silk threads twisted both for warp as well as for weft. In the course of a short time most of the advanced silk weaving industry in Europe became fully dependent on Piedmontese *organzine*, to the point that they could only produce their best silk cloth if that thread was available. This assured Piedmont of a sort of world monopoly—no comparable threads were available elsewhere—which lasted up to the 1830s, that is to

⁵² Poni 1981.

⁵³ The crossing of the threads was first applied in Bologna in the early seventeenth century and then thoroughly applied in Piedmont. See Zanier 2005.

⁵⁴ For details of late seventeenth-century Piedmontese Royal Orders on the subject see Chicco 1995.

⁵⁵ The earliest industrial buildings of the sort were built in the 1670s. Nowadays at Caraglio (a small town not far from Cuneo) one of the few remaining late seventeenth-century plants, the imposing “Filatoio Rosso,” has been entirely renovated including fully operational replicas of the throwing machinery. A large hydraulic circular silk throwing “tower,” operated by a handful of workers, had over 1000 spindles revolving (up to 1800 in the largest plants), that is, substituting an equal number of women operating with hand machinery to twist single threads one by one. Early Piedmontese plants operated four to eight “towers” each. See Mellano and Toselli 2000; Galleani d’Agliano 2013.

say through the early phase of Industrial Revolution, which ironically was largely based on textile technology.

Italian silk throwing technology, employing a highly labor saving ingenious mechanical device, had important characteristics.⁵⁶ First, it was not of Chinese origin. Silk throwing machines had been known in China since at least early Song Dynasty (960–1279), but worked on an altogether different principle and design, being much less efficient and producing a thread of inferior quality. Second, the technology first appeared, out of the blue, in Lucca in the late thirteenth century and until now no one has been able to identify any documental trace of where it came from or how, when, and where it was conceived. The only hypothesis, advanced here as a purely speculative exercise, is that its origins may lie somewhere in the Middle East in the early Middle Ages when the response to a vast demand for silk fabrics in the Islamic world and elsewhere forced artisans to devise a machine capable of bypassing the supply bottleneck with a large quantity of adequately twisted threads.⁵⁷

2.6 Conclusion

A whole cycle of an advanced production process migrated from China in the course of several centuries. With it, came beliefs, ritual, and myths. From the start, the silk cycle appears to have been exclusively in the hands of women. Once in the Mediterranean basin it developed on its own, gaining speed in the late Middle Ages to become a significant economic force in several regions around the Mediterranean as well as, mainly for the sole weaving sector, elsewhere in Europe. For a long time it retained close similarities to the original Chinese model, including the gendered nature of breeding tasks. Women initially had exclusive control of it, retrenching in some sectors from the fifteenth century onwards but remaining fully in charge of the most crucial part of it, the silkworm rearing process together with the largest section of raw silk making.

This imprint encompassed several sectors of human activity, behavior and thought. Late into the seventeenth century, when necessity arose, Italian practitioners of silk developed and applied highly rewarding innovations in their attempt to draw near to China's qualitative lead in silks. In the case of raw silk these innovations rendered Piedmontese *organzine* silk the best in the world for well over 150 years. In the early nineteenth century, French producers improved these innovations in silk-reeling and silk-twisting and it was only in the early twentieth century that a full supremacy in silk thread making went back to East Asia, first to Japan, and soon after to China.

⁵⁶ Silk throwing mills were largely mechanical and did not request much dexterity on the part of workers who were in the majority men. However, the mills would operate best (in economic terms) only with the use of very high quality raw silk that was produced by expert silk-reelers, women (*maestre*), only.

⁵⁷ Details on productivity and a thorough technical analysis of its functioning can be found in Crippa 1990 and Poni 1972.

References

- Aldrovandi, Ulisse (1602). *De animalibus insectis libri septem cum singulorum iconibus*. Bologna: apud Ioan. Bapt. Bellagambam.
- Biot, Édouard (trans.) (1851). *Le Tcheou-Li ou Rites des Tcheou*. Paris: Imprimerie nationale.
- Bonafous, Mathieu (1847). *Promenade en Hollande*. Ms6046. Lyon: Bibliothèque Municipale.
- Bonfante, Giovanni Andrea (1620). *Compendio ovvero raccolta di alquante regole utilissime appartenenti al governo de' vermi che producono la seta a pubblico beneficio ...* Cuneo: per Gio. Tomaso de' Rossi e Francesco Fiorito.
- Broadwin, Julie (1999). "Intertwining Threads: Silkworm Goddesses, Sericulture Workers and Reformers in Jiangnan, 1880s–1930s." Unpublished PhD thesis, University of California.
- Candiani, Guido Eugenio (2000). *Il tempo della seta*. Como: Museo didattico della Seta.
- Castellani, Giovanni Battista (1860). *Dell'allevamento dei bachi da seta in China fatto ed osservato sui luoghi*. Florence: typogr. Barbera.
- (2016). *On the Rearing of Silkworms in China Carried Out and Observed in Loco* 中国养蚕法: 在湖州的实践与观察. Hangzhou: Zhejiang daxue chubanshe.
- Chicco, Giuseppe (1995). *La seta in Piemonte. 1650–1800: un sistema industriale d'ancien régime*. Milano: Angeli.
- Crippa, Flavio (1990). Il torcitoio circolare da seta. *Quaderni Storici* (73):169–211.
- Davini, Roberto (2004). "Una conquista incerta. La Compagnia inglese delle Indie e la seta del Bengala. 1769–1833." Unpublished PhD thesis, European University Institute, Florence.
- de Crescentiis, Petrus (1477). *Ruralia Commoda*. Ed. by Louvain Johann de Westfalen. f. 86 a.
- de Gasparin, Adrien (1843). *Cours d'agriculture*. Paris: La Maison rustique.
- de la Vaissière, Étienne (2014). Silk, Buddhism and Early Khotanese Chronology: A Note on the Prophecy of the Li Country. *Bulletin of the Asia Institute* 24:85–7.
- de' Crescenzi, Pietro (1605). *Libro dell'Agricoltura*. Florence: Giunti.
- Della Cornia, Corniolo (1982). *La Divina Villa di Corniolo della Cornia: lezioni di agricoltura tra XIV e XV Secolo*. Ed. by Lucia Bonelli Conenna. Siena: Accademia dei fisiocritici.
- Di Cesarea, Basilio (1990). *Sulla genesi (omelie sull'Esamerone)*. Ed. by Mario Naldini. Milan: Fondazione Lorenzo Valla.
- Diény, Jean-Pierre (1977). *Pastourelles et magnananelles. Essai sur un th.me litt.raire chinois*. Geneva: Librairie Droz.
- Dindorf, Ludwig (1870). *Historici Graeci Minores [Theophanis Byzantii Fragmenta]*. Leipzig: in aedibus B. G. Teubneri.
- Dini, Bruno (1993). L'industria serica in Italia. secc. XIII–XV. In: *La seta in Europa. secc. XIII–XX, Istituto internazionale di storia economica 'F. Datini', Prato*. Ed. by Simonetta Cavaciocchi. serie II, Atti delle 'Settimane di Studi' e altri Convegni 24. Florence: Le Monnier, 91–124.
- Dozy, Reinhart (1961). *Le calendrier de Cordoue de l'année 961*. Leiden: Brill.
- Emmerick, Ronald E. (1967). *Tibetan Texts Concerning Khotan*. London: Oxford University Press.
- Feltwell, John (1990). *The Story of Silk*. Stroud: St Martins Press.
- Fortune, Robert (1857). *A Residence among the Chinese: Inland, on the Coast, and at Sea. Being a Narrative of Scenes and Adventures during a Third Visit to China, from 1853 to 1856*. London: John Murray.
- Fracasso, Riccardo (1996). *Libro dei monti e dei mari (Shanghaijing)*. Venice: Marsilio Editori.
- Galleani d'Agliano, Andreina (2013). *Nascita del setificio moderno: scritti in onore di Luigi Galleani d'Agliano*. Cuneo: Tipolitoeuropa.
- Gallo, Agostino (1569). "Le sette giornate dell'agricoltura di M. Agostino Gallo," nuovamente aggiunte alle tredici altre volte date in luce. In: Venice: appresso Grazioso Percacino.
- Gan, Bao (1966). *In Search of the Supernatural. The Written Record*. Translated by Kenneth DeWoskin and J. I. Crump. Stanford, CA: Stanford University Press.
- Gibbon, Katherine Fitz and Andrew Hale (1997). *Ikat: Splendid Silk of Central Asia*. 1st ed. London: Laurence King.
- Goitein, Shelomo D. (1967a). *A Mediterranean Society. The Jewish Communities of the Arab World as Portrayed in the Documents of the Cairo Geniza*. 6 vols. Berkeley: University of California Press.
- (1967b). *A Mediterranean Society. The Jewish Communities of the Arab World as Portrayed in the Documents of the Cairo Geniza*. Vol. 1: Economic Foundations. Berkeley: University of California Press.
- (1971). Sicily and Southern Italy in the Cairo Geniza Documents. *Archivio Storico per La Sicilia Orientale* (67/1).
- Guichard, Joseph (1786). *L'art de faire écloire et d'élever les vers a soie, tel qu'on le pratique dans le Levant*. Avignon.

- Guillou, André (1978). La soie du katépanat d'Italie. In: *Culture et société en Italie byzantine*. London: Variorum Reprints.
- Hansen, Valerie (2015). *The Silk Road: A New History*. Oxford: Oxford University Press.
- Haurly, Jacob, ed. (1905). *Procopii Caesariensis Opera Omnia, Vol. II: De Bellis V–VIII [De Bello Gothico]*. Leipzig: Teubner.
- Ibn Hawqal (2001). *Configuration de la terre (Kitab Surat Al-Ard)*. Paris: Commission internationale pour la traduction des chefs-d'oeuvre. Translated by J. H. Kramers and G. Wiet.
- ISTAT (1959). *Sommario di statistiche storiche italiane*. Rome: Istituto Poligrafico dello Stato.
- Jacoby, David (1991). Silk in Western Byzantium before the Fourth Crusade. *Byzantinische Zeitschrift* 84/85(2): 452–500.
- (1994). Silk Production in the Frankish Peloponnese: The Evidence of Fourteenth Century Surveys and Reports. In: *Periēgētes Kai Axiōmatouchoi Stēn Peloponnēso: Perigraphes-Anaphores-Statistikes [Travellers and Officials in the Peloponnese: Descriptions-Reporters-Statistics]*. Monemvasia.
- (1999). Genoa. Silk Trade and Silk Manufacture in the Mediterranean Region, ca. 1100–1300. In: *Tessuti,oreficerie, miniature in Liguria XIII–XV secolo*. Ed. by Anna Rosa Calderoni Masetti, Clario Di Fabio, and Mario Marcenaro. Bordighera: Istituto internazionali di studi liguri, 11–40.
- Kazwini, Mohammed ben Mohammed (1805). *Extraits du Livre des merveilles de la nature et des singularités des choses créés par Mohammed ben Mohammed Kazwini, trans. by Antoine-Léonard Chézy*. Paris: Impériale.
- Kuhn, Dieter (1988). Textile Technology: Spinning and Reeling. In: *Science and Civilisation in China: Vol. 5*. Ed. by Joseph Needham. Chemistry and Chemical Technology, Part 9. Cambridge: Cambridge University Press.
- Le Strange, Guy (1905). *The Lands of the Eastern Caliphate. Mesopotamia, Persia, and Central Asia from the Moslem Conquest to the Time of Timur*. Cambridge: Cambridge University Press.
- Lehrs, Franz-Siegfried and Jean-Frédéric Dübner (1846). *Poetae Bucolici et Didactici. Theocritus ... Phile Iambi de Proprietate Animalium ... Graece et Latine Cum Scholiis*. Paris: Firmin-Didot.
- Liu, Xinru (2010). *The Silk Road in World History*. Oxford: Oxford University Press.
- Lopez, Roberto S. (1952). China Silk in Europe in the Yuan Period. *Journal of the American Oriental Society* (72): 72–76.
- Magino, Gabrielli (1588). *Dialoghi di Magino Gabrielli, hebreo venetiano: Sopra l'utili sue inventioni circa la seta*. Rome: Heredi di G. Gigliotti.
- Mantoux, Paul (1906). *La révolution industrielle au XVIII^e siècle*. Paris: Société nouvelle de librairie et d'édition.
- Mathieu, Rémy (1983). *Étude sur la mythologie et l'ethnologie de la Chine ancienne*. Paris: Institut des hautes études chinoises.
- Mellano, Alessandro and Aurelio Toselli (2000). Palazzo e “fabbrica”: Il setificio di Caraglio. In: *La seta in Italia dal Medioevo al Seicento: dal baco al drappo*. Ed. by Luca Molà, Reinhold Mueller, and Claudio Zanier. Venice: Marsilio.
- Muhammad ibn Musa al-Damīrī, Kamal al-Din (1906). *Kitāb Al-Hayawān*. Translated by Atmaran Sadashiv G. Jayakar. London and Bombay: Luzac.
- Murgoci, Agnes (1928). Moths and Silkworms in Roumanian Folklore. *Folklore* 39(3).
- Olivier, de Serres (1599). *La Cueillete de la soye, par la nourriture des vers qui la font*. Paris: Librairie de M^{me} V^e Bouchard-Huzard.
- Plinio il Vecchio (Pliny the Elder) (1997). *Storia naturale (Naturalis Historia)*. Vol. 1. VI. 54. Personal communication. Torino: Einaudi.
- Poloni, Alma (2009). *Lucca nel Duecento. Uno studio sul cambiamento sociale*. Pisa: Pisa University Press.
- Poni, Carlo (1972). Archéologie de la fabrique. *Annales E.S.C.* 27(6):1475–96.
- (1981). Misura contro misura: come il filo di seta divenne sottile e rotondo. *Quaderni Storici* 16(47): 385–421.
- Renaud, Henri-Paul-Joseph and Ahmad ibn Muhammad Ibn al-Bannā, eds. (1948). *Le Calendrier d'Ibn Al-Bannā de Marrakech (1256–1321 J.C.)* Publications de l'Institut des hautes-études marocaine 34. Paris: Larose.
- Rondot, Natalis (1885). *Les Soies*. Paris: Imprimerie nationale.
- Stein, Aurel (1912). *Ruins of Desert Cathay: Personal Narrative of Explorations in Central Asia and Westernmost China*. London: Macmillan.
- (1981). *Ancient Khotan. Detailed Report of Archeological Explorations in Chinese Turkestan*. New Delhi: Cosmo Publications.
- Tursunov, Nazirjon Ochilovich (1974). *Iz Istorii Gorodskogo Remesla Severnovo Tadjikistana Iz ustopuu gorodskogo remesla severnogo Tadjikustana [Excerpts from the History of City Crafts of Northern Tajikistan]*. Dushanbe: Donish.

- Verson, Enrico and Enrico Quajat (1896). *Il filugello e l'arte sericola*. Padua: Drucker Fratelli.
- Vidae, Marci Hieronymi (Marco Girolamo Vida) (1527). *De Bombyce*. Roma.
- Xuanzang, Si-Yu-Ki (1884). *Buddhist Records of the Western World*. Translated by Samuel Beal. London: Trübner.
- Zanier, Claudio (1988). La sericoltura europea di fronte alla sfida asiatica: la ricerca di tecniche e pratiche estremo-orientali (1825–1850). *Società e Storia* (39):23–52.
- (2005). Pre-Modern European Silk Technology and East Asia: Who Imported What? In: *Textiles in the Pacific, 1500-1900*. Ed. by Debin Ma. Aldershot: Ashgate/Variorum, 105–189.
- (2007). La fabrication de la soie: un domaine réservé aux femmes. *Travail, Genre et Sociétés* (18):111–30.
- (2010). Le donne e il ciclo della seta. In: *Percorsi di lavoro e progetti di vita femminili*. Ed. by Alessandra Martinelli and Laura Savelli. Ghezzano: Felici, 25–46.
- (forthcoming). *Miti e culti della seta: dalla Cina all'Europa*.
- Zanon, Antonio (1763). *Dell'agricoltura, dell'arti, e del commercio in quanto unite contribuiscono alla felicità degli stati. Lettere di Antonio Zanon*. Venice: appresso Modesto Fenzo.
- Zhao, Feng 趙豐 (2005). *Zhongguo sichou tongshi 中國絲綢通史 [The General History of Chinese Silk]*. Suzhou: Suzhou daxue chubanshe.
- Zonaras, Joannes and Maurice Pinder (1897). *Ioannis Zonarae Epitome Historiarum*. Leipzig: in aedibus B. G. Teubneri.

Chapter 3

The Silken Tug-of-War in Eighteenth-Century Lyons: The Gendered Nature of Knowledge in the *Grande Fabrique*

Daryl Hafter

The sumptuous and intricate fabrics woven in eighteenth-century France called forth admiration and praise from consumers of the time and have been inducing the same reactions in textile historians ever since. Far less interest, however, has been afforded to the makers whose largely under-appreciated professional knowledge was an essential component in the making of these extraordinary textiles. This chapter focuses on the skill of the silk workers and the effect that their knowledge had on their technical, economic, and political status within the industry.

The *Grande Fabrique* was a premier center of preindustrial technology, consisting of some 35,000 workers spread throughout eighteenth-century Lyon. According to the historian Maurice Garden, there were 5,575 master weavers, 1,796 journeymen, and 507 apprentices—all men. Working alongside them in families were around four thousand wives and 5,500 children.¹ However, some 30,000 female auxiliary workers did sixty percent of the industry's work—spinning, reeling, warping, pulling down cords, and preparing the silk threads for weaving.² These auxiliary workers were integrated into the guilds as wage laborers, forbidden to advance or attain the prestigious title of master of weaving.

For most of the workers in Lyons, their skill was their capital and their pride. Signalling the precious materials they worked with, they called their guild the "*Communauté des maîtres marchands et maîtres ouvriers fabricants en étoffes d'or, d'argent et de soie*" (Community of master merchants and master weavers of gold, silver and silk fabrics). Master weavers owned their looms, auxiliary female workers had their tools, but what they all relied upon was their proficiency with the expensive luxurious materials. One of the ironies in the *Grande Fabrique* was the disparity between the exorbitant cost of the product, and the humble and precarious livings of the silk workers themselves. Despite this fact, silk workers valued their own technical specialisation and were proud of it. During the French Revolution (1789–99), when the silk industry was in decline, spinners refused the charitable expedient of spinning other fabrics such as linen, cotton, or wool, claiming that their life-long experience with silk had left them unsuited for any other kind of work.³ Master weavers and the auxiliary women workers were under the direction of the wealthiest segment of the silk industry, the master merchants, or *maîtres marchands fabricants*. These merchants ranged from renowned international firms to modest local traders struggling to maintain their independence. The tension between master weavers and master merchants, the two dominant

¹ Garden 1970b, 53–4.

² Pierre Cayez estimated that 69 percent of silk workers were women. Cayez 1978, 44.

³ Hafter 2007, 259–89. For information on the silk industry during the Revolution see Hafter 2007, 271.

groups within the *Grande Fabrique*, brought the importance of specialized knowledge to the fore.⁴

Master weavers relied on the codified information in guild regulations to maintain their status and to exclude “unlicensed” workers who had not become certified through apprenticeships. Yet, the industrial regulations equally served as a bulwark against the master merchants’ attempts to dominate the master weavers. The weaving instructions in these guild regulations would provide the arena for political contests within the *Grande Fabrique*. In 1744 the master weavers lost the right to take direct commissions from outside buyers; instead they could only receive orders through the master merchants whose role it then was to negotiate price and work. This would have reduced the master weavers to the position of hired proletariat if it had not been for their insistence on equal guild status. The guild regulations validated the master weavers’ existence; they alone could interpret the intricate rules, and then only after training and certification. This became another bone of contention resulting in the master merchants on one side seeking to produce novel varieties of cloth, while on the other, master weavers clung to the classic forms.⁵

3.1 Contracts and Creations

In this era of bespoke commissions, no contract was a routine affair; each project was the result of negotiation between the merchant and the weaver. For master weavers, each individual contract rested on their understanding of the loom and its product: for “cloth of one-color” (*étoffes unies*), the discussion could be relatively simple; for “cloth of mixed fibres, stripes, and plaids,” there might be a lengthier conference; for brocades, the prize textile of the *Grande Fabrique*, negotiations could be quite complex.⁶

Original brocade patterns might have started with a conversation between a merchant and a designer about what motifs and color scheme were likely to be attractive to the consumer; if the client were royalty or in a high clerical office, special designs would be ordered. If not, the designer would be free to make his or her own suggestions. Perhaps a sketch or two might have got the process going. Then the designer, or an assistant, would actually represent the scene by painting it. This artisan would brush transparent colors onto stiff paper so that a grid representing the warp and weft showed through, making a *mise-en-carte*. At this point, if not before, the master weaver needed to scrutinize the picture to ascertain how difficult it would be to realize on the loom. No doubt, adjustments to the design were made at this time, as the master weaver calculated the time and materials required for the job.

All designers needed to be extremely familiar with the technical craft of weaving. The best ones understood both the capacities and difficulties of the loom, and they adapted their paintings appropriately. Given the horizontal and vertical structure of fabric, the most difficult forms to weave successfully were circular ones. The fame and success of the early eighteenth-century designer Jean Revel (1684–1751) came in part from his ability to design circular forms that could be woven with some degree of accuracy. In addition, Revel invented a form of weaving called “*points rentrés*” or “*berclé*,” in which the fabric resembled

⁴ For details see Pariset 1901.

⁵ The classic account of this struggle is found in Godart 1899.

⁶ Such negotiations were reflected in the complicated commerce according to Miller 2014, 85–98.

a sort of “line engraving” (*taille douce*), giving the illusion of depth to brocaded figures. Aileen Ribeiro described Revel’s technique as consisting of:

[...] modeling in dark and light and dovetailing tones of color, which meant that instead of just a surface pattern on the silk, three-dimensional forms could be represented with greater subtlety and almost overwhelming realism. Flowers in full bloom and gargantuan fruit were woven into huge repeats, as much as twenty-eights [sic] inches or longer [...].⁷

Contemporaries, like Joubert de l’Hiberderie, called Revel “the celebrated artist to whom the “*fabrique*” owes its lustre and the splendor with which it shines today.”⁸ Apparently Revel excelled in demonstrating his designs with precision on the *mise-en-cartes* that guided the weaver, and before him, the *liseuse* who made up the cordage to program the loom. The weaver would then intersect two weft threads adroitly in certain parts of the design, in order to achieve the effect of gradation and depth.

Other designers too achieved status by grappling with technical problems that showed their intimate understanding of textile manufacture. When “watered” silks became fashionable mid-century, brocaded cloth would be treated to the shimmering process after having been woven. L’Hiberderie, a designer himself, suggested weaving two identical lengths of silk and binding them together, so that they could go through a calender flat, in order to avoid the usual fold that could never be erased from the material.

The premier designer of the last quarter of the eighteenth century, Philippe de Lasalle (1723–1804), made stunning, much admired, large, naturalistic, fluid designs, many of which covered Catherine the Great’s (1729–96) palace walls. Since the cost of gold and silver thread increased the price of the fabric, every designer had to face the challenge of how to create impressive cloth while economising on materials. De Lasalle received praise for his parsimonious use of gold and silver, substituting chenille for the precious metals.

Even cloth of one color required a skilled hand to manufacture. As Natalie Rothstein wrote, “Before the advent of the Jacquard, different types of silk required different arrangements on the loom and master weavers specialized in producing them.”⁹ The *armure* of taffeta, satin, crepe, twill, and other silks each required entirely different mounting on the loom.

Moreover, although master weavers were able to turn out a variety of silk types, there were other specialized trades within the *Grande Fabrique*. Notable is the group of *passementiers* that produced ribbons, decorative braid, tassels, netting, tulle, and gauze. This trade alone in the *Grande Fabrique* had always had female masters. By the end of the eighteenth century, when light garments were in style, this was the only group to thrive. Many a brocade weaver tried to push his way into the *passementiers*’ guild, hoping that his pitiable pleas about children starving at home would grant him access.

⁷ Ribeiro 2002, 41–2. See also Thornton 1965, 118–22.

⁸ de l’Hiberderie 1765, cited by Algood and Brochier 1986, 123–27. Revel’s method strove “[...] pour obtenir des demi-teintes intermédiaires, augmentant de beaucoup l’effet de ce modelage, d’entrecroiser, de mélanger en quelque sorte dans certaines parties du dessin, deux nuances de trames, de les fonder dans une droite dégradation ou *rentrure*.”

⁹ Rothstein 2003, 549.

3.2 The *Grande Fabrique* and Invention

The *Communauté des maîtres marchands et maîtres ouvriers fabricants en étoffes d'or, d'argent et de soie* was perhaps unusual in the eighteenth century for being a guild that continually produced inventions. It was a laboratory for developing new tools and testing them. The collective system of developing new devices, and of vetting those machines, was in the hands of the master weavers and master merchants themselves.¹⁰ The best example of this is the long process of solving the problem of enabling a solitary brocade weaver to weave ground and pattern without relying on an auxiliary worker to advance the pattern. From Basil Bouchon's roll of pierced paper in 1725 to the pierced cards of Jean-Baptiste Falcon in 1728, from the 1745 cylinder of engineer-inventor Jacques de Vaucanson (1709–82) and its imitators, to the removable *semple* of the designer Lasalle, and finally Joseph Marie Jacquard's (1752–1834) device introduced in 1801, dozens of large and small inventions flowed from Lyon. It was the master weavers who recommended their new devices to the king, as they applied for subsidies and the status of royal manufactures.

The guild officers were acknowledged to be the experts; their reports demonstrate their rigour in judging applications for royal support. They were candid in ruling when the device did not work as well as the applicant claimed, or if its function was so close to a current device that it did not show enough originality to be called an invention. Lyons's Academy joined the assessment process. The workers themselves demonstrated that Vaucanson's rotary cylinder for fixing a design was too awkward and too limited to be practical for brocades. Savants in the Royal Academy in Paris also relied on the judgment of Lyons's institutions.¹¹

While it was logical for master weavers to undergo an apprenticeship in loom technology, merchants in the Silk Weaving Guild were also required to become accredited in weaving before they set up business. Even the merchants' sales representatives had to know quite a bit about the technical possibilities of silk making in order to successfully deal with prospective customers. Itinerant agents of the prestigious Pernon company were faulted if they were not perfectly aware of what the loom could and could not do. The traveling representatives became mediators between the keepers of the warehouses in Paris, Lyons, and other silk centres, the silk producing firms, and the clients. As they displayed their samples in warehouses in Paris and at courts in Madrid, St. Petersburg, or the German states, the traveling salesmen received numerous demands for particular colors, sizes, and even changes in design. They did send enquiries back to Lyon, but the home firm would not have appreciated requests that were clearly impossible to fulfil. Such a lack of technical knowledge would have undermined the whole marketing process. While warehouses maintained the practice of stocking some textiles already dyed and woven, there was a much more fluid interchange between making and buying in the rarefied markets of aristocrats. Since weavers held off beginning new projects until they had firm orders, there was a premium on settling these details promptly.¹²

These elements of business became ever more problematic as new fashions accelerated the pace of design changes.¹³ In the late seventeenth century, the previously fashionable

¹⁰ See Hilaire-Pérez 2002 discussing merchants' influence on new technique.

¹¹ For an analysis of weaving inventions, tracts promoting them, and officials' opinions see: Hafter 1979. See also: Hilaire-Pérez 2008. An early account is Ballot 1978.

¹² For analysis of business practices in the *Grande Fabrique* see: Miller 1998.

¹³ For a path breaking study see: Poni 1997.

small patterns with stripes were gradually abandoned in favor of larger, more exotic patterns. This caused a drastic change in the technology required and indeed, in the business of silks. While the small patterns could be woven on looms with shafts, the larger and more elaborate patterns required a draw loom. The simpler looms were relatively easy to manage, but the draw looms were a much more complicated proposition. Silk workers of the time estimated that each draw loom required some five operators, the weaver, drawgirl, and three others to clean and process the material. Although brocades woven on draw looms were more profitable than simpler weaves, the master had to calculate whether his workshop could accommodate and afford the salaries of the five workers necessary for each loom. In addition, mounting a loom for brocade took weeks; when the weaver came to the end of one contract, the loom stood idle while it was restrung for the next project.

In 1666, Controller General Jacques Colbert (1619–83) issued strict regulations stating that a fabric should consist of only one material in order to curtail fraud. But since there were only four materials available for use in the Old Regime—silk, wool, cotton, and linen—it was natural that weavers combined them for variety’s sake. No doubt each silk centre experimented with different material combinations despite the ruling. Even more amalgamations emerged as weavers learned through imported wares from far off sources. In time the names of particular cloths like *bergamino*, *siamoise* etc., no longer referred to the place of origin, rather to the specific type of cloth.¹⁴

This growing array of illegal weaves offered a tremendous increase in the range of goods. More importantly, from our perspective, the significant examples that escape from the straight jacket of the restrictive regulations at the time are the result of the skilled daring of some weavers. This is not the first time that the law tried to restrict knowledge. Any of the amalgams that weavers produced, like “false gold,” increased the master weaver’s margin of profit, and perhaps allowed them to sell the goods for lower prices increasing their potential market.

3.3 The Sociology of Weaving: Gender Politics in the *Grande Fabrique*

Knowledge was a precious object in silk making, and its ownership followed the structure of society at that time. As the group with the lowest prestige, women—whose legal status was equivalent to that of minors—had legal access to the least prestigious techniques. Throughout the array of trades in eighteenth-century France, women worked at jobs that were considered unskilled and their pay was commensurately low. Although many guilds prevented women from becoming full members, virtually every workshop had female workers, cleaning, carrying, and performing routine tasks. They were integrated into every industry, and gradually took on tasks that required adroit hands. But because most women did not have the “authorisation” of formal guild training, irrespective of the job they were doing, they continued to be considered unskilled. The gender-specific divisions of labor in the Old Regime perpetuated these norms: complex, machine-oriented work for men; routine, handicraft work for women.

The silk industry followed these practices in theory, giving the most complicated and prestigious tasks to the male guild masters. “Sitting at the loom,” especially weaving brocades, held pride of place in the *Grande Fabrique*. This was the preserve of men. Thus, although many non-guild free crafts considered weaving by nature to be women’s work,

¹⁴ Hilaire-Pérez 2002.

the high-tech and capitalist *Grande Fabrique* of Lyon restricted the skill of weaving to a privilege. The largest group of women workers, some 30,000, worked as cocoon tenders, throwers, spinners, cleaners, bobbin winders, warp technicians, drawgirls, and all the other auxiliary tasks that silk weaving required. But, unless they had family ties to master weavers, they were forbidden to weave. In Lyon, weaving knowledge became a commodity that was used to influence and to control the industry.

At the beginning of the trade in 1466, in order to encourage silk manufacture in France King Louis XI declared that any person would be welcomed into the trade, whether secular or religious, male or female. As a further inducement, the wives of master weavers and women in training were permitted to weave. Indeed the earliest guild regulations assumed that a master would have four looms, one of which would be operated by his wife and another possibly by a journeywoman or *compagnonne*. Therefore weaving knowledge did not start out as an exclusively masculine domain, but became so with the commercialization of the process and subsequent regulations.

But it soon became a prize that was fought over in the tug-of-war between the master workers and the master merchants. Weaving was a more lucrative task than most women's jobs, and it offered the master worker's family crucial financial support in the fluctuating silk industry. One could say that in this trade, knowledge equalled profit. In 1561, when silk making became a guild, weaving as a skill became the exclusive domain of the male masters. It was considered a *privilege* that might be extended to a woman who was related to the master, or to a journeywoman trained by him. The right of a woman to sit in a man's place fluctuated with economic cycles and the relative power that the master workers had in the guild.¹⁵

After originally allowing women to weave, the regulations of 1569 prohibited even females in guild families from weaving while later rules once again authorized female weaving.¹⁶ In subsequent years, a reduction in work caused the master workers to suspend access to mastership to men from a different region who married daughters of masters; but the daughters maintained their right to weave. By 1686, journeymen could once again attain mastership by marrying the widow or daughter of a guild master. The regulation specifically authorized the wife to work at one of the two looms. It offered the license emphasizing the equal contribution of wife and husband, authorising "*la franchise nécessaire pour occuper deux métiers, et y travailler tant le mari que la femme*" (the license required for both husband and wife to occupy two trades and work in them).¹⁷

As the silk industry expanded, the guild was torn by conflict between the master workers with only four looms and the wealthy master merchants, eager to hire numerous workers for large-scale production. Participating in international commerce, the wealthy master merchants, who did no weaving themselves, had businesses that employed some indigent male weavers and many more females. Guild regulations indicate that it was becoming normal for women to become weavers, not only at home but also in the workshops of masters with whom they were not related.

The regulations of 1703 specify that if the daughters, wives, and widows of masters worked outside the home, they must show documents proving that they were related to silk masters. Journeymen and their wives (no longer called *compagnonnes* or journeywomen)

¹⁵ Details of these activities may be found in Pariset 1901, and Godart 1899.

¹⁶ Jacques 1948, 114.

¹⁷ The italics are mine. The guild disputes are detailed in Hafter 1995.

also found places with *maîtres ouvriers* other than those who were their original masters. Even women in the families of journeymen who had been classified as “foreign” (coming from outside Lyon), were allowed to weave as long as “they had been registered in the guild’s book of workers.” It is clear that women with no family tie to guild masters were also infiltrating the workshops.¹⁸

The volume of business done by the wealthy master merchants gradually suppressed the small master weavers’ status both economically and politically within the guild. The original practice of a master with a family workshop to make his own contracts with customers, or to use small merchants as intermediaries, declined as wealthy merchants took over a larger share of the available business. Master weavers found themselves cut off from direct access to commerce and profits. Some could no longer manage their own workshops and had to take wage work from larger or more prosperous competitors. The small merchants also slipped down to the level of master weavers, as they were forced to support themselves with wages earned from their own labor rather than sales.

In their struggle against the wealthy merchants, the *maîtres ouvriers* and their journeymen joined with the small merchants to petition the king for new regulations that would be more favorable to them. The new bylaws of 1737 advantaged those with small family workshops, rebalancing the governing roles by authorizing four master *gardes* representing weavers and four from the merchants. Master weavers were given the explicit right to “produce or be responsible for production for all sorts of persons, merchants, and others, who wish to place orders whether for their own use, or even to sell,” as long as these persons were members of the guild.¹⁹

But the new bylaws also recognized the subordinate economic position that master weavers found themselves in, stipulating how they, like their wives and widows, might work for wages in the ateliers of other masters. The rule declared, “Masters who work at the dwellings of other masters, in the status of journeymen, just like their wives or widows, are held to conform to that which has already been prescribed for journeymen.”²⁰ Even while they were trying to regain control of contracts and finances, the *maîtres ouvriers* were publicly recognized as falling into the condition of journeymen. Under these conditions, the likelihood of wives and daughters bringing funds into the family became a matter of survival.

Yet the master weavers’ relatively impotent position, described in the 1737 regulations, was still not enough for the large-scale merchants. The regulations of 1744 tightened the screws even further and put the 300 wealthy large-scale master merchants firmly in control. New guild by-laws set the tax of hiring one master to weave for another at the exorbitant rate of 800 *livres*, and placed a fee of 200 on any master who changed his classification from weaver to merchant or vice versa.²¹ The master merchants finalized their control by successfully lobbying Paris to forbid the master weavers’ wives to weave outside the home.

¹⁸ Archives Municipales de Lyon 1720.

¹⁹ Archives Municipales de Lyon 1720, “Lettres patentes du Roy, Pour l’exécution du règlement concernant les Manufactures des étoffes de soye, or, et argent, de la ville de Lyon, et la communauté des maistres marchands et fabriquants desdites étoffes,” Fontainebleau, 1 October 1727, Title LX.

²⁰ Archives Municipales de Lyon 1720, “Les maistres qui travailleront chez d’autres maistres, en qualité de compagnons, de mesme que leurs femmes ou veuves, seront tenus de se conformer à ce qui est cy-devant prescrit pour les compagnons,” “Lettres patentes,” Title CLXXVIII.

²¹ Archives Municipales de Lyon 1720, 704.603, “Arrest du Conseil d’État du Roy,” “Qui ordonne l’exécution des Statutes et Règlements pour les fabriques de Lyon,” 19 June 1744.

The one privilege the weavers held onto was the freedom for their daughters (and sons) to “sit at the loom” for any master. This long-held practice was confirmed as a charitable gesture rather than a legal right. Each daughter’s permission to take employment outside the family came after a formulary plea for work in order to help their poor or aged parents. Ironically, despite having no independent rights of their own, the daughters brought one-third more revenue into the family than the sons.²²

Widows’ rights to weave seem to have received no impediment. The widow’s privilege was founded on the tradition of gaining skill by hands-on learning within the guild family. In addition, as guild masters insisted when negotiating with reforming ministers later in the century, mastership was a class of property certified and paid for by the guild master. It was therefore inherited by his widow who acted as the proxy for her husband under such circumstances. In practical terms, a widow might hold the workshop open until her son or daughter came of age to claim mastership. Moreover, a working widow could feed her household and avoid the disreputable position of prostitution or becoming a charge on the parish. In theoretical terms, here was another example of a woman taking on masculine knowledge and position, under the aegis of guild allowance and life situation.²³

However, the guild family’s power to imbue females under its jurisdiction with skill did not mean that just any woman would be awarded the chance to weave. This became absolutely clear when reforming ministers sought to open the guilds to women. Pursuant to regulations that reshaped the guilds from 1779–81, royal administrators finally insisted in 1786 that the Silk Weaving Guilds’ masterships should be open to women. According to these instructions, girls and women who had been drawgirls, bobbin winders, or other auxiliary workers should be given apprenticeships that would result in their achieving masterships for weaving. The *mâitres ouvriers* objected strenuously to this rule. They had already dragged their feet in responding to the government’s command that they reformulate their various crafts into separate guilds and pay a second tariff to restore their masterships. Now they fell back on essentialist excuses to disqualify women unrelated to guildsmen from weaving.

Women outside of guild families had neither the training nor the temperament to weave, according to the masters’ petitions against the new rule. It would take ten years at least to instruct these apprentices, and even then it was doubtful that they would become proficient in the craft. According to the barrage of tracts circulated by silk masters, the problem was that women were simply not suited to being weavers. Their hands were too small and delicate to manage the implements. They were not strong enough to work the pedals or the shuttle (this claim comes at a time when drawgirls were spending fifteen-hour days pulling down 60-pound weights!). The complex system of mounting the looms according to requisite designs was beyond their intellectual capacity. They would be incapacitated several days of the month and the speed of production would suffer. Finally, it would be unseemly for them to climb up to the top of the loom, which was sometimes necessary when the cordage became tangled, because few *ouvrières* wore underclothes.

Of course the real underlying problem with allowing these women official access to the mastership was that their low salaries and competition would undercut the master workers

²² Documentation of daughters’ work is found in Register, “Permissions Accordés,” Archives Municipales de Lyon 1720, HH 586. See also Godart 1899, 169–72.

²³ Maurice Garden found that most widows in the Silk Weaving Guild were so poor that many were exempt from paying taxes. See Garden 1970a. For a wide-ranging treatment of guild widows see: Lanza 2007. Other independent female economic roles are shown in Hafter and Kushner 2015.

and cause “the fathers of families to lose their jobs and throw their children into destitution,” as weavers complained. Journeymen protested that, “in hard times especially, the masters would give the women preference. They alone would be hired, and the men would have no other choice but to leave the country.”²⁴ They warned that so few journeymen would be left, the *maîtresses ouvrières* would have trouble finding husbands.

The master weavers had another objection. They feared that the merchants would staff their workshops with non-guild women, driving down salaries of their own daughters and completely ignoring family workshops. This was particularly egregious since the workshops of small-scale master weavers, as well as the large workshops of master merchants, were filled with so-called “untrained” women. (Their complaints were a bit like the laws prohibiting the import and use of calicos—which were written and signed in rooms with chairs and drapes of that material.) Pressed by the merchants and by economic cycles, the small master weavers were already illegally using spinners, drawgirls, and other auxiliary female workers to increase their output.²⁵ No doubt the intimacy of the family workshop, where women and men toiled together, facilitated this illicit work. Considering that the master weavers themselves had instructed their domestic workers in weaving, their denigration of female capacity was especially meretricious.

3.4 Conclusion

Contrary to the analysis of scholars who locate knowledge in pure science or realms of the academy, study of Lyons’s silk industry underscores the vital necessity of understanding every aspect of manufacture. From the first conception of a cloth through to its production and sale, intricate technicalities needed to be mastered. These skills took the form of privileged knowledge, linked to guild training. As economic conditions grew more difficult, this knowledge became gendered male, and survival in the industry came to depend largely on gender politics. In this trajectory, the silk industry followed the European early modern evolution from artisanal guild production to a capitalist separation of patrons and labor.²⁶

References

- Algoud, Henri and Jacques Brochier (1986). *La soie: art et histoire*. Lyons: La Manufacture. Archives Municipales de Lyon (1720). *Règlements et Statutes*. 4.301. Lyon.
- Ballot, Charles (1978). *L'Introduction du machinisme dans l'industrie française*. Geneva: Slatkine.
- Cayez, Pierre (1978). *Métiers Jacquard et hautes fourneaux: Aux origines de l'industrie lyonnaise*. Lyon: Presses Universitaires de Lyon.
- de l'Hiberderie, Joubert (1765). *Le Dessinateur pour les Fabriques d'Etoffes d'or, d'argent et de soie*. Paris: Sébastien Jorry.
- de Vries, Jan and Ad van der Woude (1997). *The First Modern Economy: Success, Failure, and Perseverance of the Dutch Economy, 1500–1815*. Cambridge: Cambridge University Press.
- Garden, Maurice (1970a). *Lyons et les lyonnaises au XVIII^e siècle*. Paris: les Belles lettres.
- (1970b). Ouvriers et artisans au XVIII^e siècle: l'exemple lyonnais et les problèmes de classification. *Revue d'histoire économique et social* (48):28–54.

²⁴ This comment was aimed at the drawgirls who were slated to become masters after a ten-year apprenticeship. Archives Municipales de Lyon 1720 HH 572, “Avis concernant les tireuses de cordes,” “Livres de Délibérations de la Grande Fabrique.”

²⁵ Garden 1970b, 29–32, 53–4, estimated that by the century’s end there were 1,015 women weaving illegally.

²⁶ For an example of this dynamic see de Vries and Woude 1997.

- Godart, Justin (1899). *L'ouvrier en soie monographie du tisseur Lyonnais: étude historique, économique et sociale*. Lyon.
- Hafter, Daryl M. (1979). The "Programmed" Brocade Loom and the Decline of the Drawgirl. In: *Dynamos and Virgins Revisited: Women and Technological Change in History: An Anthology*. Ed. by Martha Moore Trescott. Metuchen, NJ: Scarecrow, 49–66.
- (1995). Women Who Wove in the Eighteenth-Century Silk Industry of Lyon. In: *European Women and Preindustrial Craft*. Ed. by Daryl M. Hafter. Bloomington: Indiana University Press, 31–64.
- (2007). *Women at Work in Preindustrial France*. University Park: Penn State University Press.
- Hafter, Daryl M. and Nina Kushner (2015). *Women and Work in Eighteenth-Century France*. Baton Rouge.
- Hilaire-Pérez, Liliane (2002). Cultures techniques et pratiques de l'échange, entre Lyon et le Levant: inventions et réseaux au XVIII^e siècle. *Revue d'histoire moderne et contemporaine*:89–114.
- (2008). Inventing in a World of Guilds: The Case of the Silk Industry in Lyons in the XVIII Century. In: *Guilds, Innovation, and the European Economy, 1400–1800*. Ed. by Stephan R Epstein and Maarten Roy Prak. Cambridge: Cambridge University Press, 232–63.
- Jacques, Jean (1948). *Vie et mort des corporations: grèves et luttes sociales sous l'Ancien Régime*. Paris: R. Lefeuve.
- Lanza, Janine M. (2007). *From Wives to Widows in Early Modern Paris: Gender, Economy, and Law*. Aldershot: Ashgate.
- Miller, Lesley Ellis (1998). Paris–Lyons–Paris: Dialogue in the Design and Distribution of Patterned Silks in the Eighteenth Century. In: *Luxury Trades and Consumerism in Ancien Régime Paris: Studies in the History of the Skilled Workforce*. Ed. by Robert Fox and Anthony Turner. Aldershot: Ashgate, 139–67.
- (2014). Material Marketing: How Lyonnais Silk Manufacturers Sold Silks, 1660–1789. In: *Selling Textiles in the Long Eighteenth Century. Comparative Perspectives from Western Europe*. Ed. by Bruno Blondé and Jon Stobart. London: Palgrave, 85–98.
- Pariset, Ernest (1901). *Histoire de la fabrique lyonnaise: étude sur le régime social et économique de l'industrie de la soie à Lyon, depuis le XVI^e siècle*. Lyon: A. Rey.
- Poni, Carlo (1997). Fashion as Flexible Production: The Strategies of the Lyons Silk Merchants in the Eighteenth Century. In: *World of Possibilities: Flexibility and Mass Production in Western Industrialization*. Ed. by Charles F. Sabel and Jonathan Zeitlin. Cambridge: Cambridge University Press, 37–74.
- Ribeiro, Aileen (2002). *Dress in Eighteenth-Century Europe, 1715–1789*. New Haven: Yale University Press.
- Rothstein, Natalie (2003). Silk in the Early Modern Period, c. 1500–1780. In: *The Cambridge History of Western Textiles*. Ed. by David Jenkins. Vol. 1. Cambridge: Cambridge University Press, 528–61.
- Thornton, Peter (1965). *Baroque and Rococo silks*. London: Faber.

Chapter 4

Sericulture and its Complementary: Wild Silk Production in China's Seventeenth and Eighteenth Centuries

Mau Chuan-hui

During the Ming dynasty (1368–1644) a combination of agricultural policy carried out by the throne and technical progress led to the concentration of sericulture in particular regions such as the Lower-Yangzi Delta, the Red Basin (or Sichuan Basin), the Pearl River Delta and the Lower-Yellow-River Delta.¹ By the late Ming dynasty, this concentration was particularly pronounced in the lower-Yangzi Delta, as the silk produced here was indispensable for the making of refined silk goods. One century later, the state began to take an interest in wild silk production and Emperor Qianlong (1711–1799, r. 1735–95) even officially promoted its production in 1744. These developments occurred against the background of fiscal reforms and a flourishing maritime trade.

The history of the Chinese silk industry in these areas has long interested modern historians. Many consider that sericulture centralized in these particular regions because it complemented the expansion of cotton, which had been introduced into the region of Jiangnan around the mid-thirteenth century during the late Southern Song dynasty (1127–1279). Sericulture was arduous, risky, and more technically demanding than cotton culture, but market demands for raw silk and silk products rose incessantly throughout the Ming and Qing (1644–1911) eras. Due to technical progress in sericulture, productivity increased and thus prices for raw silk fell.² Soon after 1684, when maritime trade was re-opened, domestic silk prices skyrocketed. By the mid-eighteenth century the Imperial Weaving Manufactures whose prices were regulated by the Imperial Instructions were hit by a dramatic rise in the price of their raw materials.³ Demographic shifts and a lack of cultivable land lead to Qing official interest in wild silkworm pasturing, that is, a practice whereby natural forests were used to grow wild silkworms (from here on abbreviated as “wild pasturing”).

In the second half of the twentieth century, the “golden age” of studies on the history of the Chinese silk industry, few scholars dealt with sericulture and even fewer with technical progress during the Ming-Qing period. Dieter Kuhn, like many others, took the technical achievement of the Song-Yuan period to be the model for later eras, assuming that Ming-Qing era silk workers did not add any major improvements of their own. This paper focuses on the technical revolution in sericulture during the late Ming and early Qing period. Emphasizing regional variations and delineating technical evolution in mulberry plantations, silkworm breeding and silk reeling as well as broadening the view to include wild pastur-

¹ Mau 2012.

² Quan 1991, 580–84.

³ Tuojin 托津 1991, 7170–71 (*juan* 900, *Gongbu*, “Neiwufu 16,” 11b–12a) lists silk prices regulated by the central authority for raw material acquisition for the Imperial Weaving Manufactures according to different uses, including imperial families, tributary nobles and administrations. A margin was tolerated for adapting to market movements.

ing, provides new insights into the evolution of Chinese silk production after the sixteenth century.⁴

4.1 Domesticated Silkworm Breeding and Wild Silk Production: The Song-Yuan Period

Several species of caterpillar from the *Bombycidae* and *Antherea* families produce silk viable for textile manufacture. Whilst elite writing singled out the *Bombyx mori* (named formally household silkworms, *jiacan* 家蠶) as the most suitable genus, historiography documents that the rural practice of collecting wild silkworms continued. For example, in 40 BCE, locals in Donglai (modern Shandong) collected more than ten thousand *dan* (circa 342 000 litres) of cocoons in the Dongmou mountains.⁵ Wild silk thread was uneven, and heavy because of its high levels of *sericin* or *gres* around the fibroin. This complicated unwinding the cocoons and dyeing the thread. Yet, the high level of *sericin* also made the thread more durable and gave it a distinctive dark color that came to be appreciated by both men of letters and commoners.⁶ Ma Zuzhang 馬祖常 (1279–1338) also praised wild silk for its low price.⁷ By the early seventeenth century, farmers had pastured wild silkworms in several mountainous areas of modern Shandong, a traditional sericulture region.⁸

The introduction of advanced sericultural know-how and of a species of mulberry from Shandong—known in Chinese literature as the Lu-mulberry tree (*Lu sang* 魯桑) and later classified as Linnaean *Morus multicaulis*—into the Jiangnan region promised a significant development in silk production. Simultaneously, silk-farmers improved methods of breeding higher quantities of silkworms and more effective technology for the unwinding of cocoons. Central to this growth was the increased productivity of mulberry tree culture through land management, fertilizing methods, grafting and layering, and the culture of dwarf mulberries.⁹

The climate of the lower Yangzi Delta was humid and warm and the region also experienced annual flooding which deposited silt on the soil, effectively fertilizing the land. With the fall of the northern capital Kaifeng and the retreat of the Huai River to the south, the Song government had to invest in draining swamps and building dikes in order to create new rice fields to feed the population. Chen Fu 陳夔 (born in 1076)—a disciple of Quanzhen Daoism—suggested reserving 20 to 30 percent of a property for the digging of a pond surrounded by high and wide dikes built with the excavated soil.¹⁰ This way water could be stored for the dry season, fish could be cultivated and flooding prevented, while mulberry trees planted on the dikes would stabilize the earthworks and provide for sericulture (*sangji yutang* 桑基魚塘).

The *Essential Treaties on Agriculture and Sericulture* (*Nong sang jiyao* 農桑輯要, below evoked as “*Essential Treaties*”) promoted the culture of dwarf mulberry and suggested that silkworms could be fed with dried mulberry leaves (*shou gan sangye* 收乾桑葉) or

⁴ In his work on *Textile Technology*, Dieter Kuhn dealt with Chinese traditional production of textile fibres (hemp, ramie, cotton, and silk), but did not mention the artisanal industry of wild silk. Kuhn 1988.

⁵ Li 1960. 1 *dan* equalled 100 *sheng*; 1 *sheng* was equivalent to 0,342 ml. Cf. Wu 1984, 70.

⁶ In regions such as Bengal, wild silk, tussah, represented an important industry. See Peigler 1992.

⁷ “Unwind Silk from Wild Cocoons by Appreciating Its Low Price (野繭抽絲喜價低).” See Ma 1968, 84.

⁸ Mau 2018.

⁹ Mau 2018; Mau 2010.

¹⁰ Chen 1966.

bean and rice flour (*zhi doufen*, *mifen* 製豆粉米粉).¹¹ Some Northern Chinese masters of sericulture believed these had medicinal properties, such as neutralizing the toxins silkworms developed if overheated (*jie can redu* 解蠶熱毒) or they simply strengthened the silkworm and thus improved the end product.¹² The leaves of the silkworm thorn tree (*zhe* 柘, *Cudrania triloba*) could serve as a substitute.¹³

Chen Fu was an atypical handbook author who, in his attempts to spread advanced agricultural and sericultural knowledge, wrote down his own personal experience and developed guidelines for farmland management appropriate to Southern China, mulberry cultivation and silkworm breeding.¹⁴ In contrast, most literati provided instructions by gathering existing documents, together with information from experienced farmers and their own observations. The *Essential Treaties* represented the later format: it gave advice on quality of leaves, frequency and timing silkworm feeding and passed on knowledge on cultivation and fertilization. From these sources we know that farmers believed that feeding caterpillars abundantly during the last stage before pupation increased both the quality and quantity of silk thread. The guidelines also suggest that lady silkworm farmers (*canmu* 蠶母) should dress in unlined garments to test the temperature and humidity of the room. Instructions also assert that an experienced breeder could recognize the developmental status and needs of their silkworms through the changes in the silkworm's skin color:

White coloration suggests they are starting to eat; those with a blue color need to be abundantly fed; those with a wrinkled skin are hungry; stop feeding those that start turning yellow little by little.¹⁵

By the early fourteenth century, sericulture farmers in Jiangnan grasped that moving silkworms during the moulting stages could inflict injuries. As healthy silkworms quickly clamber onto fresh leaves, Wang Zhen 王禎 recommended using a silkworm net (*canwang* 蠶網) to clean up waste and move the caterpillars. Caterpillars would pass quickly through the nets filled with fresh leaves and two breeders could place the whole onto another split-bamboo basket and remove the underlying debris and excrement (Figure 1).¹⁶ The *Essential Treaties* says nothing about mulberry feeding quantities, preferring to stipulate the spatial requirements for caterpillars at different stages:

[...] place three ounces (circa 120 g) of new-born silkworms on a basket. When they reach the age for cocooning, divide them into thirty baskets. One ounce of new-born caterpillars requires ten baskets of silkworms for cocooning. The basket is one *zhang* (circa 300 cm) in length and seven feet wide (circa 210 cm).¹⁷

¹¹ Sinongsi 1995, 124–25 (*juan* 4, 5b–6b). One can read the method for using bean flour after the third moulting on pages 14a–b (129) of the same *juan* (*Damian taisi* 大眠擡飼).

¹² Sinongsi 1995, 134 (*juan* 4, 24b).

¹³ See Jia 1982, 231–32.

¹⁴ Chen 1966 *juan shang*, 8a–9b, “*fentian zhiyi pian* 糞田之宜篇” and 18a–19b “*shan qi genmiao* 善其根苗”; *juan xia*, 3a–3b. One can read a detailed analysis on this work in Zhongguo nongye yichan yanjiushi 1984, 40–6. Wang 2006, 85–6; Zhongguo nongye yichan yanjiushi 1984, 36–50 explained the principles of mulberry plantation in the Jiangnan region, based on his personal experience.

¹⁵ Huang 1995, 136 (*juan* 4, 28a).

¹⁶ Cf. Wang 1981, “*cangwan* 蠶網” (*juan* 20, 19a–b).

¹⁷ Sinongsi 1995, 116 (*juan* 4, 16a).

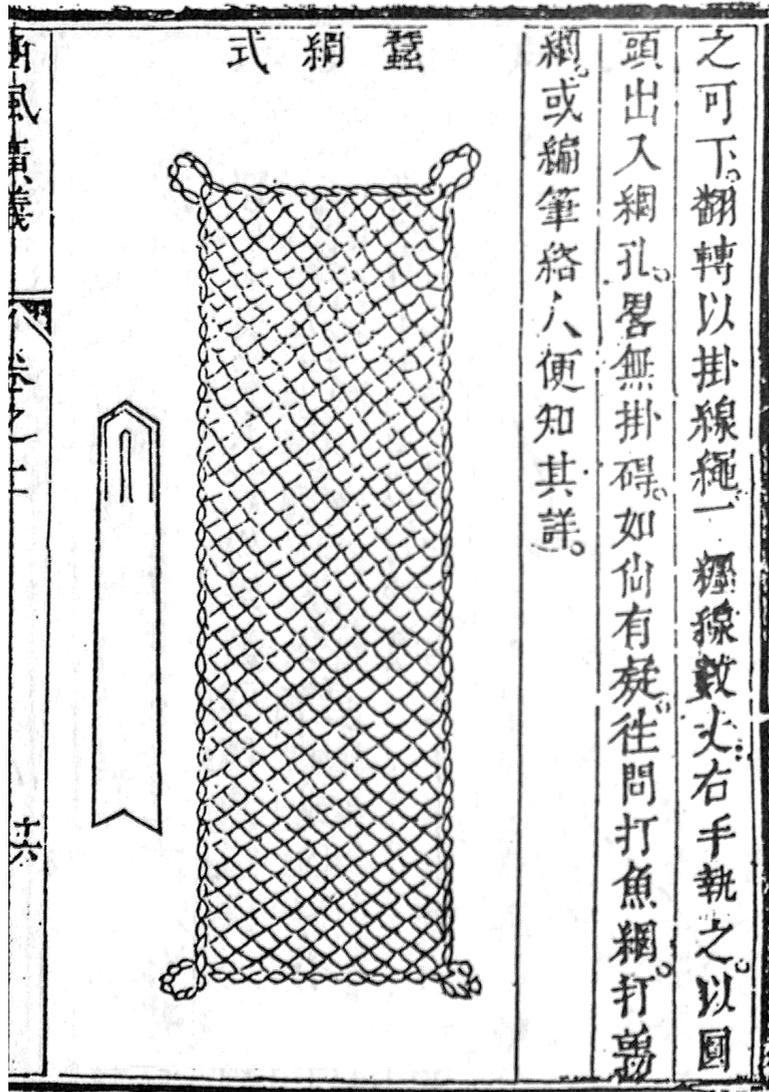


Fig. 1: Drawing of a silkworm net (*canwang* 蠶網), in Yang Shen 楊岫, *Binfeng guangyi* 幽風廣義, (Extensive Explication of Shaanxi Customs) *juan* 2, 16a, 1794.

Such a rule of thumb was useful for silk farmers who needed to provide sufficient space in their houses for the silkworms to grow (Figure 2).¹⁸

¹⁸ Up to the introduction of French sericultural knowledge in the late nineteenth century, Chinese farmers grew silkworms in their own home. When sericulture season came round, farming families fitted out a room for the silkworms to stay in.



Fig. 2: Silk farmer placing mulberry leaves on silkworm net, Haining 海寧, Zhejiang, May 2007 (© Mau Chuan-hui).

4.2 State Interference and Change: Sericulture in the Late Ming and Early Qing Period

Upon his accession to the throne in 1368, Emperor Taizu, Zhu Yuanzhang 朱元璋 (1328–98) ordered that:

People with land of between five to ten *mu* must cultivate half a *mu* (ca. 600 m²) each with mulberry trees, hemp,¹⁹ and cotton plants. Owners of more than ten *mu* have to double this number. The levy for hemp land is eight ounces per *mu*; four ounces per *mu* for cotton land. Mulberry cultivation will be taxed from the fourth year [of plantation]. Not cultivating mulberry trees has to be compensated with a piece of plain tabby; not planting hemp or cotton costs one piece of hemp and cotton cloth each.²⁰

Cotton cultivation was thus integrated into the agricultural policy by imperial edict. In 1381, Emperor Taizu restricted merchant families to wearing cotton and hemp attire, whilst allowing peasant families to wear silk gowns in an attempt to boost agriculture.²¹ In 1394, the Ministry of Public Work once again encouraged mulberry and jujube cultivation alongside cotton and hemp.²²

¹⁹ *Ma* 麻 refers to all kinds of fibers obtained from vegetable stem, including hemp, ramie and jute.

²⁰ Zhang 1997, 1894 (“*Shihuo* 2”).

²¹ Cf. Song 1947, 66.

²² Yi and Sun Jiazhen 孫嘉鎮 2005, 321 (*juan* 232).

Alongside the state's vigorous promotion of silk, a flourishing trade also positively influenced sericulture. The inhabitants of prefectures of Jiaying, Hangzhou, and Huzhou specialized in sericulture. By the Jiajing (1522–66) period, “the soil was available for mulberry trees” at Shimen (modern Zhejiang province) and “cocoon silk was marketed and merchants came from all over the world on the fifth lunar month of every year to purchase silk. They accumulated gold like stones.”²³ An increasing number of people dressed in silk. Emperor Chongzhen (1627–44) disliked luxury clothing. Mandarins in Court thus dressed in wild silk instead of the refined silk produced by *Bombyx*, and that provoked a craze for wild silk.²⁴

Another important influence was an increase in global trade. European merchants, but also Japanese and South Asian traders, flocked to Ming ports through the newly opened maritime trade or inland trade routes.²⁵ Foreign trade built on existing structures and stimulated the established private silk weaving workshops around maritime ports. In Quanzhou the Ming had already established state-owned Regional Weaving Manufactures (1438).²⁶ Nevertheless, it is important to note that, even though generations of officials had tried to promote sericulture, the silk produced in these regions was inferior in quality and quantity and weavers had to import raw silk from Zhejiang province.²⁷

Since the foundation of the Ming, prefectures in the Jiangnan region had borne the heaviest fiscal weight in the empire,²⁸ because of the occupation by Zhang Shicheng 張士誠 (1321–67) and of the fertility of the land in the western part of Zhejiang.²⁹ The Ming state encouraged both cotton and silk cultivation. Compared to silk, cotton cultivation was relatively simple, requiring no special agricultural technology, nor was cotton spinning limited to a brief time period. Thus cotton growing became popular and spread quickly. One exception was the Jiangnan region. The Jiangnan silk growers were very experienced and the location was easily accessible to both domestic and foreign trade. They persisted in practicing sericulture and silk weaving and the high profits reaped from silk enabled inhabitants to fulfil their fiscal obligations.

In the early Qing period, Yan Kaishu 嚴開書 (ca. 1612–72)—a native intellectual of Huzhou—bemoaned the situation, arguing that because the topography of his home region was not suitable for cotton cultivation, people were forced to continue sericulture: “the low land with wet soil is not suitable for cotton plantation. Also the soil is barren and the taxes heavy. We must rely on sericulture to make a living. Hence we cannot change our trade.”³⁰ Yan Kaishu's remark, though often quoted by historians as proof of the desire to replace sericulture with cotton, is in fact ambiguous: sericulture was a huge investment and the shift to cotton was not always viable. The high risk and huge potential profits involved may

²³ Wang 1971, *juan* 1, 1b.

²⁴ Zhao 1991, “Shiduji 豕度寄, Wuleiyu 物類悞,” *juan* 8. Before this event, wild silk goods were used for special imperial celebrations or as soft furnishings in some Imperial temples.

²⁵ Wang 1995a, *Jilu huibian juan zhi* 207, 17a); Yang 1987, 266 (*juan* 3 “*Shihuo* 食貨”).

²⁶ See Fang 1967, 62 (*juan* 2 “*Guizhi zhi, jiushu*,” 17b); Zhang 1997, *juan* 82 “*shihuo zhi*.”

²⁷ Cf. Schottenhammer 1999, 26–8.

²⁸ Several sources bemoan the high tax load. In 1425, for instance, the prefecture of Suzhou owed eight million *dan* of tax. Owing to the efforts of Zhou Chen 周忱, who was supported by Emperor Renzong (r. 1424–25), the inhabitants of Jiangnan region could finally escape from famine and debts resulting from their tax burden. Zhang 1997, “*Liezhuàn di* 列傳第 41.”

²⁹ Zhang 1997, *juan* 153.

³⁰ Yan 1995, 404 (*juan* 8, 18a).

explain why such regions often stood at the forefront of technical and practical change in sericulture.

Such innovations included new breeds of silkworms and new techniques. Farmers in the Jiangnan region bred older silkworms directly on the ground—the “silkworm farm on earth” (*dican* 地蠶)—in order to extend the breeding space (Figure 3). At the same time, farmers improved methods to unwind the cocoons that simplified the silk reeling process while still ensuring the quality of the silk produced. Most importantly, farmers learnt to estimate the productivity of their mulberry leaves by using enhanced empirical data on the number of silkworm eggs that silk farmers usually hatched in a breed. Such estimates were important for ensuring the benefits that silk farmers could obtain, especially as sericulture had become more and more specialized and most of them did not possess enough or any land for mulberry tree culture. The mulberry leaf market had been widely developed and the prices were unpredictable and prone to dramatic highs and lows.

4.3 Technical Developments in Moriculture

The Ming–Qing dynasties developed and spread the techniques of growing dwarf mulberry trees which facilitated leaf picking and favored leaf growing: moriculture became a proto-specialized activity. By comparison in the sixth century, Jia Sixie 賈思勰 suggested that farmers should plant “one mulberry tree every ten *bu*” (around 15 metres apart) which averages to two to three trees per *mu*.³¹ By the eleventh century Chen Fu advocated arranging rows at two *zhang* distance (ca. 6 metres, one *zhang* was equal to ten *chi*) and digging holes of seven feet in diameters (ca. 210 cm), which added up to 43 mulberry trees per *mu*.³² By the mid-sixteenth century, Shen Lian 沈練 (1497–1557) advised “keeping a distance of seven feet (ca. 210 cm) between two plants, which gave about a hundred plants per *mu*.”³³

In the Huzhou region, two main types of dwarf trees emerged: a “fist” shaped tree (*quansang* 拳桑) (Figure 4) and a mulberry with a short trunk (without the fist shape). Cultivators grafted mulberry cuttings onto robust native rootstock. The treetop was cut when the mulberry reached a height of more than two to three feet (ca. 60–90 cm). Two to five branches were kept. In this way, after five years of repeated pruning the trees would have achieved their final shape.³⁴

By the Ming–Qing period, Huzhou silk farmers had succeeded in cultivating high quality mulberry trees (*Hu sang* 湖桑). The *Local Monograph of Hui'an District* (*Hui'an xianzhi* 惠安縣志, ed. 1530)³⁵ mentions that “the Hu mulberry was frequently fertilized by excretions that strongly enriched leaves with much power. Silkworms that devour its leaves will make

³¹ Jia 1982, *juan* 5, “*Zhong sang zhe di* 45”: “率十步一樹。” One step (*bu* 步) was equal to five *chi* 尺 (1 *chi* equal to 30.3 cm on average. See Qiu 1992, 88). Li Bozhong estimated an average of fifty plants per *mu* during the Mid-Tang and early Southern Song period in Jiangnan region. Cf. Li 2009, 242–46.

³² Chen 1966, *juan* xia, “*zhongsang zhifa pian di yi* 種桑之法篇第一,” 3a.

³³ Shen 1966, “*Yun tiandi fa* 運田地法,” 12b.

³⁴ See for example Shen 1995, *juan* shang, 5a–7b.

³⁵ The *Local Monograph of Kuaiji* 會稽 Commandery (nowadays Shaoxing, in Zhejiang, original parts thirteenth century) recorded several locals named after *Hu sang*, such as Husangyan 湖桑堰 (*juan* 4, Shanyin xian, 6a); Husangdai 湖桑埭 (*juan* 11, Shanyin xian 山陰縣, 16a). Cf. Shi 1983. In that period, the term might refer to local mulberry trees from Lake Tai or simply to name the weir or dam around the Lake, on which mulberry trees were planted.



Fig. 3: Silkworm breeding on earth, *dican* 地蠶. Temporary bridges are placed to facilitate mulberry leaf supply. Hanshang in Zhejiang, May 2010 (© Mau Chuan-hui).

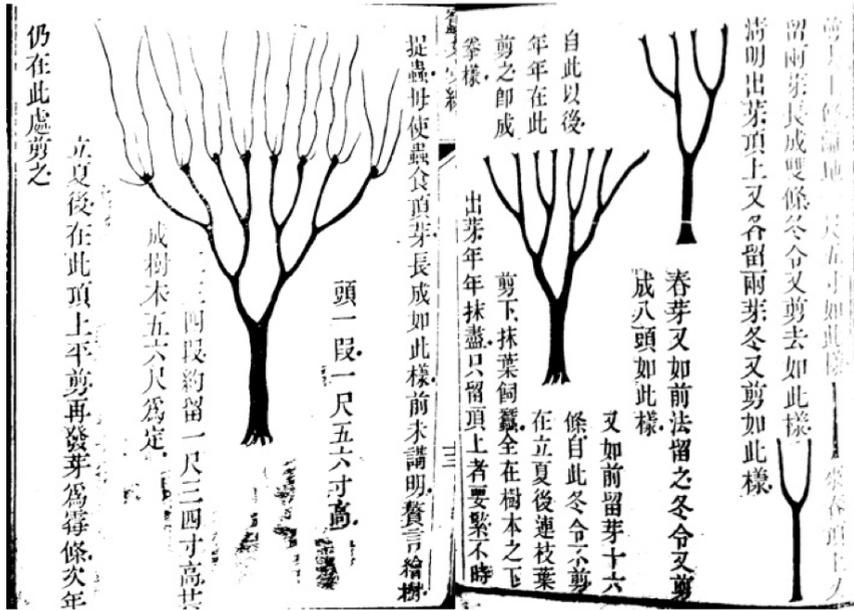


Fig. 4: Guide to pruning mulberry trees at various stages of growth (r. to l.). *Quansang* 拳桑, in *Cansang huibian* 蠶桑彙編 (also *Cansang hebian* 蠶桑合編), xubian, 12b-13a. by Sha Shian 沙石安, ed. 1869.

thick cocoons and produce silk without knots.”³⁶ By 1840, Huzhou natives named the local tree “domestic mulberry” (*jiasang* 家桑).

The Zhejiang gazetteer identifies *Hu* as actually a breed of the Jing mulberry,³⁷ whereas the Qing literati, Bao Shichen 包世臣 (1775–1855), linked the *Hu* mulberry tree to the *Lu* mulberry: “*Hu* mulberry trees grow big, fleshy and juicy leaves, but sparse. This species produces very few berries. If one feeds silkworms with these leaves, the silkworms become big and produce a lot of silk.” Chen Dai’an 程岱菴 (late eighteenth and first half of nineteenth century) saw Huzhou’s excellence in sericulture resulting from farmers’ mastery of soil preparation:

Because the mulberry tree prefers loosened soil, the cultivation must be times four and the depth more than one foot. As the mulberry prefers fertilizer, heap silkworm litter as well as bean dregs and compost made of manure and straw [around the roots]. Since mulberry hates gravel and weedy land, mulberry must be planted on plain and perfectly weeded ground. Because they [farmers] know how to prepare the soil according to the nature of mulberry tree, the latter produces many big and thick leaves.³⁸

³⁶ Mo and Zhang Yue 張嶽 1963, *juan* 5 “*mushu*,” 6a.

³⁷ Ji 2004, *juan* 106; Bao 1968, *juan di* 25 *xia*.

³⁸ Cheng 1995, *juan shang*, 3b–4a, 151–52.

Compared to the Song-Yuan period, materials for fertilizing had multiplied by the late Ming era:

Heap fertilizer around a mulberry root, use excrement, silkworm litter, ash from rice straw, mud from gutters or ponds and fertile earth. Use algae, or cotton seeds as heap fertilizer at the beginning of the culture.³⁹

Mud from riverbeds was highly valued as a free and abundant fertilizer: “if a mulberry tree is not flourishing, it lacks river mud.”⁴⁰ The practice also ensured the regular clearing of sediment.⁴¹ However, many Qing authors said to “stop fertilizing the mulberry tree at least half a month before leaf-picking” and not to feed silkworms with leaves picked from recently fertilized mulberry trees, because they considered that these leaves would be harmful to silkworms.⁴²

Advances in moriculture were hence central to increased yields and quality of raw silk. One of the main reasons silk farmers in the Jiangnan region were able to produce the best quality silk in the empire, must have been the culture of Hu mulberry trees.⁴³ Zhang Kai 章楷, Li Bozhong 李伯重, Chen Hengli 陳恆力 and Wang Da 王達 calculated an average of 1600–2000 pounds of mulberry leaves per *mu* for Jiangnan during the late Ming and early Qing period. However, the productivity was unreliable: while an optimal year could produce 2400 pounds, in a bad year the same number of trees produced only 800–1000 pounds.⁴⁴ This made it difficult for silkworm breeders to estimate how many eggs they could hatch with the available supply of mulberry leaves. The limits of moriculture hence defined the growth of sericulture. Wild silkworm pasturing benefited forests where formerly wood had only been grown for fuel.

4.4 The Wild Silk Industry: Individual and Imperial Campaigns

Since antiquity, Chinese historiography had hailed the appearance of wild cocoons as a good omen.⁴⁵ Further development of wild silk production relied on the initiatives of farmers and the efforts of some civil officials, until Qing emperors included wild silk onto the official list of textile production encouragement, including domesticated sericulture.⁴⁶

³⁹ Huang 1966. In the handbooks which appeared later than *Canjing*, such as *Can sang jiyao* by Shen Bingcheng 沈秉成 (1823–95) and *Can sang jixiao shu* 蠶桑捷效書 by Wu Xuan 吳烜, one can read more detailed explanations about different methods for fertilizing mulberry trees. We have access to the work of Wu Xuan, thanks to the edition of 1870, but with the titles of *Zhong sang shuo* 種桑說 and *Yang can shuo* 養蠶說 in *Xuxiu siku quanshu* 續修四庫全書, vol. 978.

⁴⁰ Shen 1966, 14b.

⁴¹ Wu 1995, 7a–b, 279.

⁴² Wu 1995, 7a–b, 279. As for Lu Xiechen 盧燮宸, the author of *Yuezhong cansang chuyian* 粵中蠶桑芻言, advised farmers to pick leaves two days after fertilization, but in case of rainy days, that would not be necessary.

⁴³ Zhang 1992, 1; Ji 2008; Li and Bao Yanjie 包艷傑 2010.

⁴⁴ Li 2002, 436–37.

⁴⁵ In addition to the example mentioned above, one can find several similar cases: Fang 1986, *liezhuan* di 41, *zhi* di 19 mentioned: “in the seventh year of Taikang era (AD 286), the cocoons formed by wild silkworms at Donglai Mountain reached forty *li* (ca. 4.5 km) and the indigenous peoples collected them for reeling silk and making goods.” (太康七年，東萊山蠶成繭四十里，土人繰絲織之).

⁴⁶ The term “official list of textile production encouragement” is used in a figurative sense; When provincial or local officials encouraged textile cultures, many of them encouraged wild silk culture at the same time with domesticated sericulture.

Sun Tingquan 孫廷銓 (1613–74) was the first person to report on wild silk production in Shimen in the Zhucheng district of Shandong.⁴⁷ In 1667, the newly-appointed local magistrate of Pingshun (in modern Shanxi), Wu Guan 吳琯 (1622–78), encouraged those under his jurisdiction to engage in wild silk pasturing in the mountainous fagacea forests. He brought wild silkworm eggs from his hometown and taught the inhabitants how to farm them. A year later, the people of Pingshun produced silk.⁴⁸ It is not clear if the practice was continued after Wu Guan was transferred to another post. Furthermore as recorded in several local gazetteers, fifteen or so years later, Shandong emigrants spread methods of wild silkworm cultivation from Zhucheng to other regions, both within the province and further afield.⁴⁹

Liu Qi 劉棨 (ca. 1656–1718) was one such proponent of wild silkworm pasturing. When he took up the post of magistrate of Ningqiangzhou (in modern Shaanxi province) in 1698, the region was suffering from severe famine. He sent personnel to purchase wild silkworm eggs and hire skilful artisans from his hometown in Zhucheng so that they could pass on the necessary know-how. His efforts bore fruit, enriching the locals. The manufactured cloth was branded “silk cloth by Mr Liu” (*Liugong chou* 劉公綢).⁵⁰

In 1738, Chen Yudian 陳玉壑 encountered a similar situation when he became the magistrate of Zunyi in modern Guizhou province. His first attempts to introduce wild silkworm pasturing failed because the eggs he brought from his hometown in Licheng hatched during the trip. He finally succeeded after three years and, by 1743, the region was already witnessing extraordinary harvests:

[...] the reputation of Zunyi silk cloth [*zunchou* 遵紬] can finally compete in quality with refined silk goods from Wu [the region roughly equivalent to the plain of Lake Tai] and silk clothes from Shu [an abbreviation of Sichuan] for a high price. Merchants from Shaanxi and Shanxi, as well as those from Fujian and Guangdong, roll [into Zunyi] during the cocoon harvests seasons and leave with bundles of silk.⁵¹

Chen Yudian’s campaign happened to coincide with that of Chen Derong 陳蕙榮 (1689–1747), the civil governor of Guizhou province (*Guizhou buzhengshi* 貴州布政使). Since the early years of Qianlong reign (1736–1795) Chen Derong had been working on a project to develop textile industries in Guizhou by introducing silk, hemp, cotton and wild silk. Financial support from Emperor Qianlong enabled Chen to establish more than one hundred wild silkworm pasture farms.⁵² Some local gazetteers of Guizhou province reported that

⁴⁷ Sun 1983, Shibū 11, Dililei 8, 1a–2b, vol. 592, 759.

⁴⁸ Wang 1997, *juan* 9, “Wenlinlang Neiqiu zhixian Wujun muzhiming” 文林郎內丘知縣吳君墓誌銘, 23a–25a; and see Ni and Zhong Tingying 鐘庭英 1976, *juan* 7, 17b.

⁴⁹ For example, the *Gazetteer of Qixia District* (*Qixia xianzhi* 棲霞縣志) contains a message concerning the introduction of wild silkworm production in 1681 by emigrants from Zhucheng. Cf. Wei 2004, *juan* 1, “wuchan 物產.” In 1744, the general governor of Henan, Shuose 碩色 (1687–1759), reported that “recently emigrants came from Shandong province carried with them [wild silkworm] cocoons into Henan province and cooperated [with local people] in wild silkworm pasturing.” (近有東省人民攜繭來豫，夥同放養俱已得種得法). Cf. “Gaozong shilu 高宗實錄 [Veritable Records of Emperor Gaozong (1736–1795)]” 1986, *juan* 225, Qianlong 9 *nian* 9 *yue*.

⁵⁰ Cf. Zhao 1977, 12995 (*juan* 476, “*Liezhuan*”). See also Gao and Gao Shuhuan 高樹桓 1915, 32b.

⁵¹ “遵紬之名竟與吳綾蜀錦爭價於中州遠徼界絕之區；秦晉之商，閩粵之賈，又時以繭成來。帶鬻稱載以去，” Cf. Zheng 1995, 623, “Zhihui 誌惠.”

⁵² Zhao 1977, 13303–05 (*Liezhuan*, *juan* 477).

Chen Derong recommended Chen Yudian as prefect in Zuyin, because of his knowledge of sericulture.⁵³

In 1744, following the suggestion of the provincial inspector of Sichuan Jiang Shunlong 姜順龍 (1696–1757), Emperor Qianlong ordered the officials of Shandong province to compile a manual on wild silk pasturage. Copies of the handbook entitled *Shandong yangcan chengfa* 山東養蠶成法 (*The Shandong Method of Silkworm Pasturing*) were sent to provincial governors throughout the empire.⁵⁴ Chen Hongmou 陳宏謀 (1696–1771), himself a provincial governor, supplied copies of the book to his subordinates who, in their turn, reproduced full or partial copies for their administration area.⁵⁵

Chen Hongmou's case illustrates how the central state thrived on local efforts. When Chen, for instance, arrived at his post in Shaanxi, local scholar, Yang Shen 楊屺 (1699–1794), had already founded an agricultural school in his hometown Xingping, where he taught students about agricultural knowledge and technology, and conducted experiments on *Bombyx* breeding. In 1725, having identified *hu* 榲 (a kind of fagaceae, see figure 5) forests during his trip to the Nanshan Mountains, situated in the neighbouring region of Xi'an, Yang Shen brought wild silkworm eggs from Yishui in Shandong and hired artisans to teach locals the techniques of wild silk making.⁵⁶ In 1740, he documented his experiences in the handbook *Binfeng guangyi* 邠風廣義 (*Extensive Explication of Shaanxi Customs*), including two chapters on wild silk production.⁵⁷ He published his manuscript in 1743 with the support of the civil governor of Shaanxi province and in the same year, Chen Hongmou came to Shaanxi as the new provincial governor relying on Yang Shen's expertise to promote silk production.⁵⁸

In the following years, several handbooks on wild silkworm pasturing appeared. Han Mengzhou 韓孟周 (ca. 1729–98), who assumed in 1766 the post of magistrate at Lai'an in Anhui, compiled *Yangcan chengfa* 養蠶成法 (*The Method for Silkworm Rearing*), which was organized into five sections and an appendix and Hada Qingge's 哈達清格 (eighteenth century) *Tazigou jilue* 塔子溝紀略 (*Brief Records of Tazigou 1773*) contained local history and processes for wild silk culture that were surprisingly similar to those described in the former.⁵⁹

4.5 From Wild Forests to Planned Wild Forest Plantations for Sericulture

From the end of the 1750s on, civil officers promoting wild pasture also started to plant suitable trees. For instance, Aertai 阿爾泰 (died in 1773),⁶⁰ a descendant of Manchu plain yellow banner and the general governor of Shandong from 1757 to 1763, encouraged people to grow *boluo* 椴 trees (a kind of fagaceae) on fallow and hilly land for wild silkworm

⁵³ Huang and Zou Hanxun 鄒漢勛 1849, *juan* 30; Xiao 1852, *juan* 66.

⁵⁴ Wang 1963, *juan* 6, 15b–16a, “Qianlong *chao*,” 203b–204a. So far I have been unable to locate the original of this booklet. However, after the distribution of the first edition by Qianlong, many local officials included either unabridged text or extracts in their local gazetteers, such as the whole text reproduced in Xu 1755 and the extracts in Luo 1758.

⁵⁵ For more details on the biography and career of Chen Hongmou, see Rowe 2002. Chen 1995, vol. 978, 647.

⁵⁶ Yang 1995, vol. 978, 81–2 (15b–16a).

⁵⁷ Yang 1995, vol. 978, 81–3 (15b–19b).

⁵⁸ Rowe 2002, 236–37.

⁵⁹ Hada 1970, *juan* 10, “*Canshi* 蠶事.” While the original manuscript has not yet been found, a comparison of these two handbooks may give an idea of the *Shandong yangcan chengfa*.

⁶⁰ For more details on Aertai, Zhao 1977, 10875–878 (*juan* 326, “*liezhuan* 113”).



Fig. 5: Illustration of a sample of the Beech Family (*Xiao hu zuo* 小柃柞) suitable for wild silk pasturing. In Wang Yuanqing 王元綖, 1905.

pasturing.⁶¹ He suggested that the emperor should exempt such farmers from “taxes for the cleared land.”⁶² This coincided with the establishment of trade with Kazakhs in Xinjiang in 1757, after the conquest of Dzungaria and the “James Flint Incident” (*Hong Renhui shijian* 洪任輝事件, 1757–69). The latter event had attracted attention from the Qing administration. Many civil officers imputed the inflation of raw silk prices to the maritime trade with European merchants.⁶³ In order to improve trade with the Kazakh, emperor Qianlong ordered the administrators of three Imperial Weaving Manufactures to study Kazakh tastes. They supplied this market from 1760 until the end of the Qianlong reign in 1795.⁶⁴ The Imperial Weaving Manufacturers did not possess enough weaving looms or artisans to fulfil imperial orders and had to subcontract to private workshops or manufacturers.

⁶¹ Chen 2004, *juan* 37, 1152. According to Yang Hongjiang 楊洪江 and Hua Degong 華德公, the annotators of *Zuocan sanshu* 柞蠶三書, *boluo* refers to the trees whose leaves do not fall in the autumn and winter.

⁶² “阿爾泰...疏請令民間就山坡隙地廣植柃柞，免其升科。” Cf. Zhao 1977, 10875 (*juan* 326, *liezhuan* 113 “Aertai”).

⁶³ In 1755, several merchants from different European Indian companies were busy opening up ports for maritime trade. This led to the imprisonment in 1759 of James Flint—an agent of the British East India Company. One can gather details of the affair through numerous documents in English, Chinese and other languages. Some of China’s trade affairs with the British were published in *Shiliao xunkan* 史料旬刊, for example, “Qianlong 24 nian Yingjili tongshang an 乾隆二十四年英吉利通商案 [The English Trade Case in the Year of Qianlong 24]” 1963. Many historians have attempted to reconstruct and analyse the event, such as Morse 1926–1929, 94; Liang 1999, 92–101.

⁶⁴ For statistics on the silk trade in Xinjiang, see Lin and Wang Xi 王熹 1985; Fan and Wen Jin 金文 1993, 301–48.

Due to the lack of cultivable land and the need to assure people's livelihood, the government considered wild silkworm pasturing an ideal way to exploit formerly "useless" land. Furthermore, in the early years of Daoguang Emperor's reign (1821–50) the administration restarted encouraging the exportation of raw silk to balance the silver deficit in the Imperial Treasury, thus stimulating a new rise in wild silkworm pasturing, as well as the planting of trees for wild silkworm feeding. As well as Shandong, Guizhou rose to prominence in this trade, as wild silk making had been established there since the beginning of Emperor Qianlong's reign. In the early Daoguang era (1820–50), Chen Yudian's model was imitated by the judicial commissioner in Guizhou, Song Rulin 宋如林 (late eighteenth - nineteenth century), who published *Zhong xiang* 種橡 (The Plantation of Oak) and a *Qing zhongxiang yucan zhuang* 請種橡育蠶狀 (Proclamation on Oak culture and Silkworm Pasturing).⁶⁵

Emphasis was placed on oak silkworms in Anping, Guizhou where the magistrate Liu Zuxian 劉祖憲 forbade local people to chop down trees, taught them to plant oak and supported the purchase of silkworm eggs.⁶⁶ In 1827, Liu published an illustrated handbook *Xiangjian tushuo* 橡繭圖說 (Illustrated Explanation on Oak Cocoons), and lent money to local people to establish weaving workshops, recruiting about thirty artisans to teach the community how to produce wild silk goods (Figure 6).⁶⁷ Many of these campaigns in the south were abruptly interrupted by the Miao rebellion in late 1850s. It was not until 1870, that the prefect of Liping, Yuan Kaidi 袁開第 (nineteenth century), was able to continue such efforts in Henan province as he initiated a series of official campaigns to promote wild silk pasturing with the objective of increasing incomes for the Imperial Treasury.⁶⁸

4.6 Conclusion

During the late Ming and early Qing periods, Jiangnan asserted its leading role in sericulture thanks to advanced techniques in mulberry culture, silkworm breeding, silk reeling, and soil improvement. The area featured a growing population with skilled labor and thriving foreign and domestic markets. By the late fifteenth century, farmers around Lake Tai were pursuing intensive sericulture and providing goods of outstanding quality. Increased high-quality productivity in Jiangnan put pressure on other regions where their sericulture know-how was relatively rudimentary and, freed from tax payments in silk and silk goods required by governments, Chinese farmers switched from mulberry cultivation to other crops, such as cotton, fruit trees and even the newly-introduced tobacco.

Silver inflow from Mexico via the maritime trade led to fiscal reforms generally known as the Single Whip Law, which freed people to grow the most profitable agricultural crops. At the same time, modification in clothing regulations further stimulated market demand for

⁶⁵ The text on "Zhong Xiang" is held in Zou 2004, *juan* 53, *Yiwen zhi* 10 and the proclamation (*qing zhongxiang yucan zhuang*) in Gu 2004, *juan* 33, *xianzheng zhi*, 11a–b. Wei Yuan 魏源 reproduced the declaration in Wei and He Changling 贺长龄 1992, *juan* 37. Wang Yuanting also included the declaration in Wang 1995b, 686–87, but did not give a precise publication date for Song Rulin. In Chen 1987, Chen Kangqi 陳康祺 (1840–90) summed up the most important attempts made by officials to spread wild silkworm pasturing since that of Liu Qi.

⁶⁶ Liu 1995, vol. 978, 551. See also Liu 1964, *juan* 4 "Tuchan 土產," 1b. "Oak" is a tree from the *Quercus* genus of the family Fagaceae. *Slyle* Zhongju 仲矩, native of Meixi 梅溪 town in the Mingqing 閩清 district of Fujian province. Cf. Liu 1995, 554 (*xu* 敘, 1a).

⁶⁷ Cf. Liu 1995, 554 (*xu* 敘, 1a).

⁶⁸ Yu and Chen Yu 陳瑜 2006, vols. 17–18, *juan* 3 *xia*, 49 a–b. Wang Yuanting reproduced the passage in Wang 1995b, vol. 978, 651–52.

silk clothes but in more simplified styles. Maritime trade with European nations incited the development of sericulture in the Pearl River Delta, despite its substandard quality. Still, the demographic pressure on land was intense and wild silk pasturing thus became valued by the government. Officials attempted to capitalize on formerly “value-less” forests in order to provide textiles to clothe the people and the growing international market of wild silk. However, wild silk pasturage only took root in poor regions, such as Ningqiangzhou in Shaanxi, and Guizhou, where local people had difficulty finding more profitable activities.



Fig. 6: Farmers digging holes to store oak seeds. Liu, Zuxian 劉祖憲. Xiangjian tushuo 橡繭圖說 [Illustrated Explanation on Oaks and Cocoons]. 1827, Xuxiu Siku quanshu 續修四庫全書 978. Reprint, Shanghai: Shanghai guji chubanshe, 1995, 1, "xiangli diyi", p. 4b.

References

- Bao, Shichen 包世臣 (1968). Qimin sishu 齊民四術[Four Techniques for the Welfare of the People]. In: *An Wu sizhong* 安吳四種[*Four Categories of Anwu*]. Taipei: Wenhai chubanshe.
- Chen, Fu 陳敷 (1966). *Nongshu* 農書[*Book of Agriculture*]. Taipei: Yiwen yinshuguan.
- Chen, Guan 成瓘 (2004). Daoguang Ji'nan fuzhi 道光濟南府志[Local Gazetteer of Ji'nan Prefecture (Daoguang Era)]. In: *Zhongguo difangzhi jicheng* 中國地方志集成[*A Collection of Chinese Gazetteers*]. Nanjing: Fenghuang chubanshe.
- Chen, Hongmou 陳宏謀 (1995). Guangxing shancan xi 廣行山蠶繭[Broadly implement the culture of mountain silkworms]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Chen, Kangqi 陳康祺 (1987). *Langqian jiwen* 郎潛紀聞[*A Record of What I Have Heard*]. Beijing: Zhonghua shuju.
- Cheng, Dai'an 程岱菴 (1995). Xi Wu canlue 西吳蠶略[Primer on Western Wu Sericulture]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Fan, Jinmin 范金民 and Wen Jin 金文 (1993). *Jiangnan sichou shi yanjiu* 江南絲綢史研究[*A Study of the History of Silk in Jiangnan*]. Beijing: Nongye chubanshe.
- Fang, Ding 方鼎 et al (1967). Jinjiang Xianzhi 晉江縣志[Local Gazetteer of Jinjiang County]. In: *Zhongguo fangzhi Congshu* 中國方志叢書[*China Local Gazetteers*]. Taipei: Chengwen chubanshe.
- Fang, Xuanling 房玄齡 et al (1986). *Jinshu* 晉書[*History of Jin Dynasty*]. Shanghai: Shanghai guji chubanshe.
- Gao, Shumei 高樹枚 and Gao Shuhuan 高樹桓 (1915). *Lidai quannong shilue* 歷代勸農事略[*A Survey of Agriculture Encouragement History in China*].
- Gaozong shilu 高宗實錄[Veritable Records of Emperor Gaozong (1736–1795)] (1986). In: *Qing shilu* 清實錄[*Veritable Records of the Qing Dynasty*]. Beijing: Zhonghua shuju.
- Gu, Cong 顧樞 (2004). Xifeng xianzhi 息烽縣志[Gazetteer of the District of Xifeng]. In: *Zhongguo difangzhi jicheng* 中國地方志集成[*A Collection of Chinese Gazetteers*]. Nanjing: Fenghuang chubanshe.
- Hada, Qingge 哈達清格 (1970). Tazigou jilue 塔子溝紀略[Brief Records of Tazigou]. In: *Congshu jicheng xubian*. Taipei: Yiwen yinshuguan.
- Huang, Shengzeng 黃省曾 (1966). *Canjing* 蠶經[Silkworm Classic]. In: *Congshu jicheng jianbian*. Ed. by Wang Yunwu 王雲五. Taipei: Taiwan shangwu yinshuguan.
- (1995). *Canjing* 蠶經[Silkworm Classic]. In: *Nong sang jiyao* 農桑輯要[*Essential Compilation of the Agriculture and Sericulture*]. Shanghai: Shanghai guji chubanshe.
- Huang, Zhaizhong 黃宅中 and Zou Hanxun 鄒漢勛 (1849). *Daoguang Dading fuzhi* 道光大定府志[*Local Gazetteer of Dading Prefecture (Daoguang Era)*].
- Ji, Fagen 嵇发根 (2008). Husang de qiyan jiqi neihan kaolun “湖桑”的起源及其內涵考論 [The Origins and Meanings of “Husang”]. *Nongye kaogu* (1):185–86.
- Ji, Zengyun 嵇曾筠 (2004). *Yongzheng Zhejiang tongzhi* 浙江通志[*Local Gazetteer of Zhejiang Province*]. Beijing: Beijing tushuguan chubanshe.
- Jia, Sixie 賈思勰 (1982). *Qimin yaoshu jiaoshi* 齊民要術校釋[*Annotated Edition of the Qimin yaoshu*]. Ed. by Qiyu 繆啟愉 Miao. Beijing: Nongye chubanshe.
- Kuhn, Dieter (1988). Textile Technology: Spinning and Reeling. In: *Science and Civilisation in China: Vol. 5*. Ed. by Joseph Needham. Chemistry and Chemical Technology, Part 9. Cambridge: Cambridge University Press.
- Li, Bozhong 李伯重 (2002). *Fazhan yu zhiyue: Ming Qing Jiangnan shengchan li yanjiu* 發展與制約: 明清江南生產力研究[*Development and Constraint: A Study of Productivity in Ming-Qing Jiangnan*]. Taipei: Lianjing.
- (2009). *Tangdai Jiangnan nongye de fazhan* 唐代江南農業的發展[*Agricultural Development in the Yangzi Delta during the Tang Dynasty*]. Beijing: Beijing daxue chubanshe.
- Li, Fang 李昉 (1960). *Gujin zhu* 古今注[Commentary on Ancient and Modern Texts]. In: *Taiping yulan* 太平預覽. Beijing: Zhonghua shuju, 3643 (juan 819, bubo bu liu, xu 3b).
- Li, Qun 李群 and Bao Yanjie 包艷傑 (2010). Husang suoyuan 湖桑溯源[The Origins of Husang]. *Gujin nongye* (1):82–8.
- Liang, Jiabin 梁嘉彬 (1999). *Guangdong shisanhang kao* 廣東十三行考[*Study of the Guangdong Thirteen Firms*]. Guangzhou: Guangdong renmin chubanshe.
- Lin, Yongkuan 林永匡 and Wang Xi 王熹 (1985). Qianlong shiqi neidi yu Xinjiang Hasake de maoyi 乾隆時期內地與新疆哈薩克的貿易[Trade between the Mainland and Xinjiang Kazakh during the Qianlong Period]. *Lishi dang'an* (4):83–8.
- Liu, Zuxian 劉祖憲 (1964). *Daoguang Anping xianzhi* 道光安平縣志[*Local Gazetteer of Anping District (Daoguang Era)*]. Guiyang: Guizhou renmin chubanshe.

- (1995). Xiangjian tushuo 橡繭圖說[*Illustrated Explanation on Oak Cocoons*]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Luo, Wensi 羅文思 (1758). *Xu Shangzhou zhi* 續商州志[*Local Gazetteer of Shangzhou*].
- Ma, Zuchang 馬祖常 (1968). Ti Guangshan Xian Kongzai Binfengting 題光山縣孔宰邨風亭[*Inscription of the Pavilion Custom of Ancient Shaanxi of the Magistrate of the District Guangshan, in Actual Henan Province*]. In: *Yuan Wenlei* 元文類. Ed. by Su Tianjue 蘇天爵. Taipei: Taiwan shangwu yinshuguan.
- Mau, Chuan-hui 毛傳慧 (2010). Song Yuan shiqi cansang jishu de fazhan yu shehui bianqian 宋元時期蠶桑技術的發展與社會變遷[*The Development and Social Changes of Sericulture Technology in the Song and Yuan Dynasties*]. In: *Zhongguoshi xinun – keji yu Zhongguo shehui fence* 中國史新論—科技與中國社會分冊[*New Perspectives on Chinese History: Science, Technology, and Chinese Society*]. Ed. by Chu Ping-yi 祝平一. Taipei: Academia Sinica/Lianjing, 299–351.
- (2012). A Preliminary Study of the Changes in Textile Production under the Influence of Eurasian Exchanges during the Song-Yuan Period. *Crossroads. Studies on the History of Exchange Relations in the East Asian World* (6):145–204.
- (2018). Qing Local Officials and the Circulation of Wild Silkworms Rearing. In: *Human Mobility and the Spatial Dynamics of Knowledge (XVIe–XXe siècles)*. Ed. by Catherine Jami. Paris: Éditions IHEC, 61–99.
- Mo, Shangjian 莫尚簡 and Zhang Yue 張嶽 (1963). Jiaqing Hui'an xianzhi 嘉靖惠安縣志[*Local Gazetteer of Hui'an*]. In: *Tianyige cang Mingdai fangzhi xuankan* 天一閣藏明代方志選刊[*A Collection of Local Gazetteers of Ming Dynasty in Tianyige*]. Shanghai: Shanghai guji chubanshe.
- Morse, Hosea Ballou (1926–1929). *The Chronicles of the East India Company Trading to China 1635–1834*. Oxford: Oxford University Press.
- Ni, Qiwang 倪企望 and Zhong Tingying 鐘庭英 (1976). *Jiaqing Changshan xianzhi* 嘉慶長山縣志[*Local Gazetteers of Changshan*]. Taipei: Chengwen chubanshe.
- Peigler, Richard S. (1992). Wild Silks of the World. *American Entomologist* 39(3):151–162.
- Qianlong 24 nian Yingjili tongshang an 乾隆二十四年英吉利通商案[*The English Trade Case in the Year of Qianlong 24*] (1963). *Shiliao xunkan* (3 and 5).
- Qiu, Guangming 丘光明 (1992). *Zhongguo lidai duliangheng kao* 中國歷代度量衡考[*A Study of the Historical Weights and Measures in China*]. Beijing: Kexue chubanshe.
- Quan, Hansheng 全漢昇 (1991). Song Ming jian baiyin goumaili de bianqian jiqi yuanyin 宋明間白銀購買力的變動及其研究[*The Development of the Purchasing Power of Silver between Song and Ming Dynasties and Its Research*]. In: *Zhongguo jingjishi yanjiu* 中國經濟史研究[*A Study of Chinese Economic History*]. Taipei: Daoxiang chubanshe, 580–84.
- Rowe, William T. (2002). *Saving the World: Chen Hongmou and Elite Consciousness in Eighteenth-Century China*. Stanford: Stanford University Press.
- Schottenhammer, Angela (1999). Local Political-Economic Particulars of the Quanzhou Region During the Tenth Century. *Journal of Song Yuan Studies* (29):1–41.
- Shen, Lian 沈練 (1995). Guang can sang shuo jibu 廣蠶桑說輯補[*A Supplement of the Collected Articles on Sericulture*]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Shen, shi 沈氏 (1966). Shenshi nongshu 沈氏農書[*Mr. Shen's Book of Agriculture*]. In: *Baibu congshu jicheng*. Taipei: Yiwen yinshuguan.
- Shi, Xiu 施宿 (1983). Jiatai Kuaiji zhi 嘉泰會稽志[*Local Monograph of Kuaiji (Jiatai Era)*]. In: *Zhongguo fangzhi Congshu* 中國方志叢書[*China Local Gazetteers*]. Taipei: Chengwen chubanshe.
- Sinongsi, 司農司 (1995). Nong sang jiyao 農桑輯要[*Essential Compilation of the Agriculture and Sericulture*]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Song, Xixiang 宋希庠 (1947). *Zhongguo lidai quannongkao* 中國歷代勸農考[*An Introduction to Agriculture Encouragement History in China*]. Shanghai: Zhengzhong shuju.
- Sun, Tingquan 孫廷銓 (1983). Shancan shuo 山蠶說[*On Mountain Silkworms*]. In: *Yanshan zaji* 顏山雜記[*Essays of Yanshan*], *Yingyin wenyuange siku quanshu* 景印文淵閣四庫全書. Taipei: Taiwan shangwu yinshuguan.
- Tuojin 托津 (1991). *Qinding Da Qing huidian shili (Jiaqing chao)* 欽定大清會典事例(嘉慶朝) [Imperial Commissioned Collection Regulations and Precedents of the Qing Dynasty (Jiaqing)]. Taipei: Wenhai chubanshe.
- Wang, Shimao 王世懋 (1995a). Minbu Shu 閩部疏[*Commentaries on Min*]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Wang, Shizhen 王世貞 (1997). Yuyang shanren wenlue 漁洋山人文略[*Essays of Yuyan shanren*]. In: *Siku quanshu cunmu congshu* 四庫全書存目叢書. Ji'nan: Qilu shushe.
- Wang, Xianqian 王先謙 (1963). Donghua xulu 東華續錄[*Sequel to the Donghua Records*]. In: *Shi'er chao Donghua lu* 十二朝東華錄[*Donghua Records of the Twelve Reigns*]. Taipei: Wenhai chubanshe.

- Wang, Yuanting 王元綖 (1905). *野蚕录*[*Record of Wild Silkworms*]. 4 vols. Shanghai: Shangwu yin shuguan.
- (1995b). *Shancan shuolue* 山蠶說略[A Brief Record of Silkworms]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Wang, Yuhu 王毓瑚 (2006). *Zhongguo nongxue shulu* 中國農學書錄[A Record of Treatises on Agriculture in China]. Beijing: Zhonghua shuju.
- Wang, Zhen 王禎 (1981). *Wangzhen nongshu* 王禎農書[Wang Zhen's Book of Agriculture]. Beijing: Nongye chubanshe.
- Wang, Zhideng 王禔登 (1971). *Keyue zhi* 客越志[Records of travel to Yue]. In: *Congshu jicheng sanbian*. Taipei: Yiwen yinshuguan.
- Wei, Chang 衛棻 (2004). *Qianlong Qixia xianzhi* 棲霞縣志[Gazetteer of Qixia District]. In: *Zhongguo difangzhi jicheng* 中國地方志集成[A Collection of Chinese Gazetteers]. Nanjing: Fenghuang chubanshe.
- Wei, Yuan 魏源 and He Changling 賀長齡, eds. (1992). *Qing jingshi wenbian* 清經世文編[Collected Writings on Statecraft of Qing Dynasty]. Beijing: Zhonghua chushushe.
- Wu, Chengluo 吳承洛 (1984). *Zhongguo du liang heng shi* 中國度量衡史[A History of Chinese Metrology]. Shanghai: Shanghai shudian.
- Wu, Xuan 吳烜 (1995). *Zhong sang shuo* 種桑說[On Planting Mulberry Trees]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Xiao, Guan 蕭瑄 (1852). *Daoguang Guiyang fuzhi* 道光貴陽府志[Local Gazetteer of Guiyang Prefecture (Daoguang Era)].
- Xu, Chengdong 徐成棟 (1755). *Lianzhou fuzhi* 廉州府志[Local Gazetteer of Lianzhou Prefecture]. Guangxi.
- Yan, Shukai 嚴書開 (1995). *Yan Yishan xiansheng wenji* 嚴逸山先生文集[A Collection of Mr. Yan Yishan]. In: *Siku jinhuishu congkan* 四庫禁毀書叢刊, *Jibu* 90. Beijing: Beijing chubanshe.
- Yang, Shen 楊岫 (1995). *Binfeng guangyi* 鬪風廣義[Extensive Explication of Shaanxi Customs]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Yang, Siqian 陽思謙 (1987). *Wanli Chongxiu Quanzhou fuzhi* 萬曆重修泉州府志[Local Gazetteer of Quanzhou (Wanli Era)]. In: *Zhongguo shixue congshu sanbian* 中國史學叢書三編[Compendium of Chinese Historical Studies, No. 3]. Taipei: Taiwan xuesheng shuju.
- Yi, Xing 易行 and Sun Jiazhen 孫嘉鎮, eds. (2005). *Ming Taizu shilu* 明太祖實錄[Veritable Records of Emperor Taizu (1368–1398)]. In: *Chaoben Ming shilu* 鈔本明實錄[Veritable Records of the Ming Dynasty, handwritten copy]. Beijing: Xianzhuang shuju.
- Yu, Wei 俞渭 and Chen Yu 陳瑜 (2006). *Liping fuzhi* 黎平府志[Local Gazetteer of Liping]. In: *Zhongguo difangzhi jicheng* 中國地方志集成[A Collection of Chinese Gazetteers]. Chengdu: Bashu shushe.
- Zhang, Kai 章楷 (1992). *Zhongguo gudai zaisang jishu shiliao yanjiu* 中國古代栽桑技術史料研究[Study of Ancient Chinese Technologies of Planting Mulberry Trees]. Beijing: Nongye chubanshe.
- Zhang, Tingyu 張廷玉 (1997). *Mingshi* 明史[History of Ming Dynasty]. Beijing: Zhonghua shuju.
- Zhao, Erxun 趙爾巽 (1977). *Qing shi gao* 清史稿[The Draft History of Qing]. Beijing: Zhonghua shuju.
- Zhao, Jishi 趙吉士 (1991). *Jiyuan jisuo ji* 寄園寄所寄[Transmissions from the Adobe of Mr. Jiyuan]. In: *Zhongguo biji xiaoshuo wenku* 中國筆記小說文庫[Collection of Chinese Novels and Jottings]. Shanghai: Shanghai wenyi chubanshe.
- Zheng, Zhen 鄭珍 (1995). *Chu jian pu* 樗繭譜[Manual on Ailanthus Silkworms]. In: *Xuxiu sikuquanshu* 續修四庫全書. Shanghai: Shanghai guji chubanshe.
- Zhongguo nongye yichan yanjiushi, 中国农业遺產研究室 (1984). *Zhongguo nongxue shi (xia)* 中國農學史(下) [A History of Chinese Agriculture, Part II]. Beijing: Kexue chubanshe.
- Zou, Hanxun 鄒漢勛 (2004). *Anshun fuzhi* 安順府志[Gazetteer of the Prefecture Anshun in Guizhou]. In: *Zhongguo difangzhi jicheng* 中國地方志集成[A Collection of Chinese Gazetteers]. Nanjing: Fenghuang chubanshe.

Chapter 5

The Culture and Economics of Silk Weaving During the Vijayanagar Era (1336–1646) in South India

Vijaya Ramaswamy

This chapter looks at cultures and consumption of silk during and immediately after the Vijayanagar period as reflected in inscriptions and medieval literary texts. In a broader sense, the essay also locates silk in the social and political imagination of the Vijayanagara Empire. Named after its capital (the present-day city of Hampi in Karnataka), the Vijayanagara Empire was based on the Deccan plateau in the south of the Indian subcontinent. I delineate the geographical location of silk and discuss some aspects of the lives and livelihood of traditional and non-traditional weaving castes to unfold the social status and economic value of silk within the framework of some broader issues of silk production and trade in silks in this area before the arrival of the East India Companies.

5.1 Vijayanagara in the Topography of South India

A knowledge of the topography of South India is central to understanding the development of silk weaving and trade exchange as well as the role of silk in this region. Trade was most vibrant in the expanding temple cultures of medieval times. The Vindhya and Satpura Mountain ranges divide India in two halves. Resembling an inverted triangle, the south, also addressed as “Dravida,” is nowadays made up of the four states of Andhra Pradesh, Karnataka, Kerala, and Tamil Nadu as well as the union territories of Lakshadweep and Pondicherry. Despite politically defined administrative boundaries, “Dravida” inhabitants share common linguistic and cultural traits. The British during the period of their imperial rule collectively referred to the region between the Eastern Ghats and the Coromandel Coast, as the “Carnatic” which mainly covers Tamil Nadu, southern Andhra Pradesh and south-eastern Karnataka excluding Kerala.

South India was a society of migrating communities which is reflected in the multilingualism of its inhabitants. Peoples frequently moved across these areas and hence most “South Indians” speak three or four languages fluently, carrying with them their original language and picking up the languages of the region where they re-located with their families. The multilingualism also testifies to the traveling of expertise. The Devanga weavers from the Kongu region of Northern Tamil Nadu, still speak Kannada and Telugu, the languages of their original homes in Karnataka and Andhra, as well as Tamil, the language spoken in their new settlement. All this illustrates that commerce cut across political and linguistic boundaries within a larger pan-regional entity. The hubs in these networks were *tirumadaivilagam*, which Tamil historians regularly translate as “temple towns.”

Such temple towns emerged since the seventh and eighth centuries in the Vijayanagar period (1136–1646). When state formation took place, every important kingdom would as-

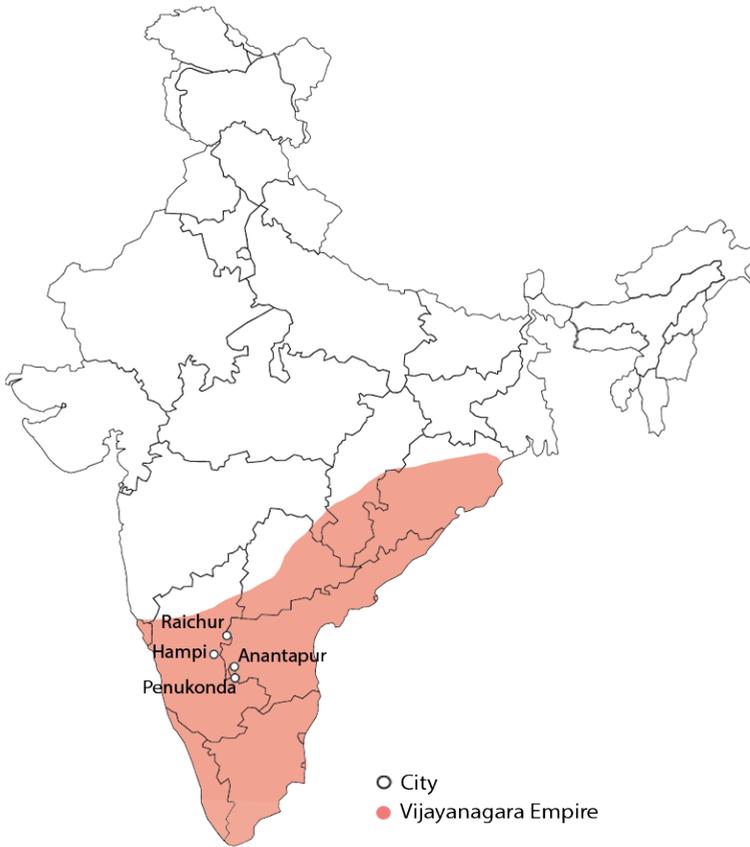


Fig. 1: The Vijayanagar Empire —1336 to 1646. Map designed by Wiebke Weitzmann.

sert its grandeur through a deity and through a temple complex that virtually replicated the palace. The sacred bolstered the secular and vice versa. These temple sites also attracted commercial activities. Many temples were dominated by mercantile corporations, such as *tisai ayirattu ainnutruvar* (the merchants of the five hundred guilds, literally “the five hundred of the thousand directions” often abbreviated to *Ainnutruvar*’ meaning “the five hundred”).

The streets of a temple town radiated from the temple at the centre. These streets were occupied by various artisanal groups—weavers, merchants, musicians and dancing girls besides many other service groups. In contemporary Tirunagesvaram and Kumbakonam, one can still find streets where craftsmen, communities, or caste groups such as Kaikkolar and Saliyar weavers live and practice their profession today. However, in contrast to the modern densely built-up and populated sites, these medieval temple towns, were more “rurally urbanized” or “rurbanized” as historians have called the expansive settlements in which the social, political, religious and professional elite lived spreading over a vast agricultural area

that sustained the town's growing population with food.¹ Craftsmen were also given small pieces of land for tenure farming.

“Vijayanagar” or “city of victory” identifies both a city and an empire. The pan regional empire was founded around 1336 CE. It lasted in its full glory until 1565 when the city was sacked. It continued well into the next century as a mere shadow of its former self, fading out around 1646. At its apogee it stretched from the Krishna River in the north to the extreme south of the peninsula. No other empire in the south has been so extensive, either before or after.

The cultural and economic renaissance during the Vijayanagar period was possible because of a strong resource base. The financial and economic strength of the empire derived from a number of factors including a strong polity, expanding agrarian base and above all a flourishing state of production and commerce. Political stability and commercial expansion provided the background for the growth of silk in the medieval era in the Vijayanagar empire and the neighbouring Deccani Sultanates of Qutb Shahi (1518–1687), centered in Golconda Fort region and the Bijapur Sultanate (1490–1686).

From this point on, medieval South Indian society presents a picture of a social order in ferment. Craft communities, especially weavers and smiths, were catalysts in this process of social change. As weavers of cloth responded to the shift away from a customer driven market for ordinary coarse cloth and began to specialize in fine cottons and silks, they increasingly became an indispensable component of prosperous towns and cities.² Textiles, both fine cottons and silks, especially from Gujarat and the Coromandel Coast, became the most important export item in terms of volume and value. Weavers experienced increased economic prosperity, which led them to seek a more dominant social and ritual role. This situation of social flux continued into the seventeenth century when Vijayanagar ceased to be an imperial power and the last ruler, Sriranga III (1642–78), held no greater title than that of King of Vellore.

5.2 The Culture of Silk and Consumption Patterns

To a certain extent the social role and the increasing prosperity of craftsmen and merchants in the Vijayanagar empire in the fifteenth and sixteenth centuries was due to active royal patronage and a commodification of society induced by the political elite. Due to a combination of social and religious implications, elite textile consumption entailed both silk and cotton-silk mixtures. On the one hand, the typical luxury cloth was made of silk which, on the other hand, Islamic religious rules prohibited. Weavers compromised by developing new weaving techniques.

The role of the ruling class in promoting commerce is attested in the *Amuktamalyada* (Garland of Pearls, compiled ca. 1515), one of the most famous poetic works of Telugu literature. Attributed to the greatest king of the Vijayanagar empire, Krishnadeva Raya (born 1471, r. 1509–29), this work spells out active encouragement of commerce as a major aim of state policy:

A king should improve the harbours of his country and so encourage its commerce that horses, elephants, precious gems, sandalwood, pearls and other arti-

¹ This phrase, coined by the economic historian Frank Perlin, is a pithy description of early towns with a strong rural component.

² See Riello and Tirthankar 2009 and Riello and Parthasarathy 2009.

cles of commerce are freely imported into his country. He should arrange that the foreign sailors who land in his country on account of storms, illnesses and exhaustion, are well looked after.³

A number of foreign chroniclers testify that this state patronage expanded to merchants. For example, the Portuguese writer and Indian Officer Duarte Barbosa (ca. 1480–1521) observed that as soon as a merchant landed on the soil of Vijayanagara, he was provided with a Nayar (a caste found in the Malabar region) to serve him, and a clerk and a broker to arrange for him to obtain such merchandise as he had need of and to assist him in all matters.⁴

Within this process of commodification, the Vijayanagar and Deccani court nobility adopted elaborate sartorial habits based largely on Islamic fashions. These tastes percolated down to affluent social groups such as merchants, a process I like to define as “Social Sanskritisation” following Wagoner who emphasized in his notion of “Islamicization” that religion soon became a placeholder for this era’s cultural identity and class attitudes.⁵ The term “upper class” refers to, in descending order, the courtly nobility, the regional nobility, bureaucratic officials, and affluent merchants.

Silk was a signifier of courtly culture from ancient to late-medieval Peninsular India. This would also by and large be true of much of Northern India, both Sultanate and Mughal.⁶ The thirteenth century Sufi poet Amir Khusrao (1253–1325) referred to the ubiquitous silken and brocaded garments in the courts of the Khaljis (1290–1320) and Tughlaqs (1320–1413). Khusrao’s poem *Nuh Siphir* (The Nine Heavens) refers to *nasij* (gold embroidered silk); *khazz* (Persian silk); *zarbaft* (shot silk) and *dibahe chin* (Chinese brocade) as well as *aksun*, a type of painted Chinese silk.⁷ Amir Khusrao’s *Khaza-in-ul-Futuh* (History of Sultan Alauddin Khalji’s r.) notes market and price control policy for textiles including silks.⁸

The Deccani Muslim states brought new clothing styles into fashion such as doublets, embroidered jackets and turbans. The fashion-conscious nobility in the Deccan were keen on using silk in its prayer mats but as followers of Islam they were technically forbidden to use silk. In response, weavers developed *mashroo* and *himroo* textiles, mixtures of cotton and silk. *Mashroo* cloth is made up of cotton warp threads on top, and a soft silken weft—thus technically fulfilling the Islamic injunction while effectively violating it. *Mashroo* and *himroo* soon become fashionable across the Mughal Empire and found a lucrative export market in West Asia.⁹

An inscription by the Vijayanagar Emperor Achyuta Deva Raya (r. 1525–42) from Tirupati dated 1538 CE suggests that *himroo* and *mashroo* silks were, by and large, woven by Muslim craftsmen.¹⁰ Cloth and yarn merchants of “Tondaimandalam, Puramandalam, and

³ Raya 2010, Fourth Canto, stanzas 244–45. See also Saraswati 1925.

⁴ Barbosa 1918–1921, Book I, 203.

⁵ Wagoner 1996. It is, however, interesting that while using “Islamicate” or “Islamicization” in a socio-cultural sense and locating it in the realm of material culture, Wagoner does not seem to perceive the same potential in the term “Sanskritization” (see 871–74).

⁶ An interesting paper by Johnson 2010.

⁷ Chandra 1961, 8. Also see Rosati’s chapter this volume.

⁸ Chandra 1961, 8–10: see for details of prices on textiles brought to the Sarai Adl or textile market during the r. of Ala-ud-din-Khalji.

⁹ Ramaswamy 2002.

¹⁰ Vijayaraghavacharya 1936. The terms “Puramandalam” and “Umandalam” refer to foreign and native merchants because *pura* means outside or foreign and *ul* means within or indigenous.

Ulmandalam,” equally conferred certain privileges like free house-sites for Muslim weavers for design or technical innovations. Inscriptions suggest that any Hindu weaver attempting to copy Muslim-specific styles of weaving would be fined with twelve gold *varaha*.¹¹ Such orders were made public “to every Hindu and Muslim dwelling [of the weavers], every cloth merchant and agent for strict observance and application in Tirupati, Kanchipuram and other parts of the South.”¹² Other inscriptions recognize innovative methods. One inscription, for instance, comments on the use of a square frame with diverse threads being used in a new technique which suggests the use of a draw loom. However, the inscription is ambiguous on whether silk or cotton was being woven. It indicates the influence of specialized and powerful merchant corporations, though, identifying weavers’ products as part of a very wide trade network necessitating state regulation and supervision.

Another variety of silk which rose to prominence was *paithani* silk, woven in and around the region of Paithan (today the Aurangabad district of Maharashtra). The technique for this fine silk with heavy gold borders may go back to the Satavahana dynasty (271 BCE–220 CE) located in the Andhra Pradesh region. It is not clear in which relation these stand to the medieval *paithani sarees* which were made of Chinese silk from the sixteenth or seventeenth centuries, probably as a way to reach out to a larger consumer network. Buddhist motifs such as lotuses, peacocks and flowering vines, which are found in the adjacent Ajanta caves, are very much a part of *paithani* silk designs. During the period of the Deccani Sultanates, *paithani* designs may have also drawn from the *jamdani* silks, which were popular in Mughal India. Interestingly *jamdani* silk seems to have been imported into the region from the North.

In the Tamil region the priests who belonged to the Brahmin caste also used silk, which suggests that, even though silk was produced from silk worms it was not taboo as were other animal products. On the contrary, silk was considered ritually pure as long as it was *venpattu*, cream or off-white silk, and not *colored* silk. Such silks were obligatory wear for the performance of sacrifice or special worship in patrons’ homes or in the temple. The Madhva Brahmins of Karnataka favored red silk on all ritual occasions. Priests were supposed to be “non-accumulative” and depended on patronage (by members of royalty or the upper class or castes) and benefactors for their livelihood. Priests wore silk if it was given to them as a charitable donation (*dana*) by the “haves,” even though silk was produced from silk worms. Powerful Brahmin landlords who flaunted silk also patronized the learned but “needy” Brahmins.

Sources attest that the urge to imitate the life style of the court, the rich or religious nobility, was strongest among affluent mercantile and craft communities and the new officialdom of military and administrative heads of territorial units entitled *Palayakkarar* (an English corruption of the Tamil term *Polygar* for head of a Palayam which was a geographical division under the Vijayanagar empire). Non-Brahmin elites favored in particular heavily embroidered varieties of silken cloth. Affluent merchants and craftsmen, such as goldsmiths, copied the style of the Brahmins. The process of “social Sanskritization” can be seen in the urge among many communities to move from using cotton to silk, especially for display in public spaces. Pure cotton cloth called *sante* or *sandai* by contrast was mass consumed by common people whereas silk in the milieu of medieval Southern India was (and still is) a

¹¹ As the fine is in gold coins (*varaha*) it seems to be quite steep, but in a situation of complete absence of data it is difficult to say what exactly this implies.

¹² I have analyzed this unusual inscription at several places in Ramaswamy 2006, see specially 66–7, and 81.

cultural statement about social superiority and a means of entering into the world of the rich and fashionable. The emergence of affluent social groups became an important factor in the growing consumption of silk.

5.3 Medieval and Portuguese Chroniclers on Consumption of Silk

Abdur Razzaq (1413–82), the Persian ambassador to the Vijayanagar court (1442–44), comments that while the common people and even the king wore a plain cotton garment called *veshti* from the waist down and left their upper body bare, “Mussalmans dress themselves in magnificent apparel after the manner of the Arabs.” Razzaq referred also to the use of brocaded silks and elaborate silk turbans (head gear) that had spread to Hindu royalty and the elite by the time Barbosa arrived in Vijayanagar.

Portuguese chroniclers such as Barbosa testify to the great popularity of Chinese embroidered silk in the Vijayanagar empire, showing that by the fifteenth century domestic sericulture and weavers were no longer able to satisfy the growing demands of the local markets: “Here [Hampi] also is used great store of the brocades of poorer quality brought for sale from China [and Alexandria] [...] and much cloth dyed scarlet-in-grain [...]”¹³ Since Duarte specifies that these silks were of an inferior order, it is plausible that officials and merchants who could not afford the finest variety of silk demanded this quality. Barbosa also suggests that among the inhabitants of Vijayanagar some wore white shorts and lower garments tucked between their legs (*veshti*) made of cotton, silk, or coarse brocade.¹⁴

Apart from Duarte Barbosa who compiled his notes in 1508–09, the Portuguese chronicler Domingo Paes commented on the impact of Muslim culture on the sartorial habits of the Vijayanagar kings and nobility around 1520–22 and his colleague Fernao Nuniz in 1535–37.¹⁵ All mention the elaborate costumes of the Vijayanagar kings. According to Nuniz King Achyuta Raya (r. 1529–42) wore a doublet with a skirt attached to it made of fine *patola* (same as *pattavali pattu*) silk and a cap of rich brocade. Nuniz adds that “the king never puts on any garment more than once [...]. His clothes are silk cloth *pacholis* of very fine material and worked with gold, the worth of each is ten *pardaos*.”¹⁶ Nuniz also provides the cost of a heavily brocaded silk cap in the early sixteenth century as twenty *cruzados* noting that “when he [the king] lifts it from his head, he never again puts it on.”¹⁷ The king’s household also customarily used silks as bedspreads.¹⁸ The king’s demands alone hence must have contributed in significant measure to keeping the silk looms working!

Similarly the court of the Zamorins of Calicut that was active from around the twelfth century to 1806 whose name literally translates as the land that touches the Indian Ocean, (located in the modern state of Kerala) accounted for a sizable share of silk consumption. Barbosa refers repeatedly to the resplendent silken garments of the Zamorin—either very fine cotton, pure silk, very fine scarlet cloth or embroidered silk—depending on the occasion.¹⁹ He comments that the many queens and concubines of the Zamorin, a thousand in all, were

¹³ Barbosa 1918–1921, Book I, 203.

¹⁴ Barbosa 1918–1921, Book I, 205.

¹⁵ For the story of these travellers see Sewell [1900] 1970a.

¹⁶ The word *pacholis* may mean the same as *patola*. Sewell [1900] 1970b, 363. The value of a *pardao* is said to be between 320 and 360 *reis*, Barbosa 1918–1921, Book I, 203.

¹⁷ Sewell [1900] 1970b, 364.

¹⁸ Barbosa 2000, 20.

¹⁹ Barbosa 2000, 19.

also resplendent in silk: “From the waist down they wear garments of rich silk, above the waist they are naked.”²⁰ It is noteworthy that as recently as the beginning of the twentieth century only women of the Brahmin-Namboodri in Malabar wore an upper cloth.

5.4 The *Kabayi* Silk Tunic and the *Kullayi* Cap in Vijayanagar Courtly Culture

Wagoner inferred from a painting panel in the Virabhadra temple at Lepakshi in Anantapur district of Andhra Pradesh datable to the 1530s that both the *kabayi* silk tunic and the *kullayi* cap were a part of the islamicization of Vijayanagar sartorial culture.²¹ Neither the tunic-like *kabayi* nor the *kullayi* cap were new to the Hindus, at this point. Rather at some point between early and medieval times there was a shift in the social groups who wore these as well as their manner of wearing them as the pioneering historian of textiles, Moti Chandra, points out. Many Buddhist paintings of this era at the state capital Amaravati in the region of modern Andhra Pradesh depict both high caps and tunic-like costumes. Such tunics can be seen on representations of foreigners, cavalymen etc. and, as Moti Chandra also observes, such tunics and caps clothed also lower rung service groups like soldiers, cavalymen, bodyguards, musicians etc. but significantly never the upper class.²² This observation is borne out by evidence from Peninsular India for the period prior to the Vijayanagar empire. Paintings from the Pallava (sixth–ninth century CE) and Chola (300 BCE–1279) periods show only certain service groups and entertainers wearing tunics.²³ Evidence of stitched clothes and hence development of textile technology can be seen in the Brahadisvaram Hindu temple of Shiva completed in 1010, located in Tanjavur (modern Tamil Nadu).²⁴ These tenth-century Chola paintings depict attendants wearing frock coats made of coarse cotton with full sleeves. When tunics and caps became fashionable in the course of the Vijayanagar period, the medium used was either fine cotton or muslin and silk. The silk cap in the pre-Vijayanagar days, however, has another historical trajectory as Chola and Hoysala sculptures show some sort of silk cap was worn among the Hindu royalty and elite.

The sculptures and paintings of the Vijayanagar period are, however, unambiguous about the increasing use of the *kabayi* and *kullayi* by the Hindu elite, the process Wagoner has called “Islamicate.” The portrait sculpture of the ruler Vira Narasimha (r. 1505–09) at Tadpatri (in Karnataka) depicts both tunic and cap.²⁵ Another figure on the *gopuram* (gatehouse tower) of the same temple in Tadpatri is shown wearing a cloak-like garment reaching down to the knees.²⁶ The sculptures at Hampi city are replete with many such examples including the famous stone sculpture at the Achyuta Raya temple of the ruler Krishnadeva Raya riding a horse which depicts the king in a peaked cap with a long flowing tunic. The portraits of foreign merchants on the frescoes of the Mahanavami dibba also show them wearing caps and tunics.

²⁰ Barbosa 2000, 28.

²¹ Wagoner 1996, 856–58.

²² Chandra 1950, 132. See also Chandra 1973. This work is a free rendering by Moti Chandra of his Hindi monograph on Textiles and Costumes.

²³ Ramaswamy 2006, 2–17ff.

²⁴ Champakalakshmi 1973, Chamber 9, figures 13 and 14.

²⁵ Reddeppa 2000, 210–11.

²⁶ Champakalakshmi 1973, figure IV, No. 5.

The Lepakshi mural panel dated to the 1530s, shows the donor brothers Viranna and Virupanna wearing full-sleeved flowing ankle-length coats.²⁷ The coats are closed at the waist with waist-cloths in geometrical and floral motifs. The Lepakshi panel depicts the two donor brothers with attendants standing in front of them wearing full-sleeved tunics, though these are knee-length. We can infer that while the tunic material may have been silk in the case of the former, the material could only have been cotton in the case of the latter. Status differentiation can be seen in the material used and the length of the garments.²⁸

5.5 The Value of Silks: Prices and Taxes

Although chronologically interrupted, state as well as merchant records testify to the role of silk as a luxury commodity. A description of the production of raw silk and its processing occurs in the writings of the Chinese traveler Ma Huan 馬歡 (active ca. 1413–31) in the fifteenth century (1409). Ma Huan notes the price of cloth produced at Coimbatore in the Kongu region (a region which he phonetically renders as *cam-pa-mei* 坎巴美) which he equals to “cloth from the Li” (people of Hainan Island)²⁹ as “made up into bolts, four feet, five inches wide and twenty-five feet long”³⁰ at eight to ten gold pieces per bolt. He further elaborates that raw silk was dyed several shades and then woven into flower-pattern cloth, each piece being four to five feet wide and ten to thirteen feet long, and was sold for 100 gold pieces!

Let’s compare Ma Huan’s figures with those provided by Vasco da Gama (ca. 1469–1524) almost a century later. Arriving at the port of Calicut in 1498, da Gama commented that a fine silk shirt, which in Portugal would fetch 300 *reis*, could be had for only two *fanams* (30 *reis*).³¹ Since 1£ would roughly be equivalent to 400 *reis*, 300 *reis* would be around 15 shillings and 30 *reis* would be 1 shilling and 6 pence. Da Gama’s evidence indicates first the high price of exported textiles and second, the enormous profits accruing from foreign trade in cloth. The wide variety available was confirmed by the statement of another European chronicler of the medieval period, Tomé Pires (1465–1524 or 1530) (in Malacca 1512–15), who remarked that at Calicut the Malabar port, “they make many kinds of silken cloths.”³²

Portuguese records show that customs duties charged on silks at the port of Goa and on its pricing for the year 1571, amounted to 4200 *pardaos* which accounted for six percent of Goa’s total revenues.³³ Since silk was taxed at four and a half percent, the total value of silks in Goa (volume not known) can be placed at 93,324 *pardaos*.³⁴ The tax collected from shops selling silk in Goa in 1581 was 1,236,000 *reis* (value of trade being 27,463,920 *reis*)

²⁷ The Lepakshi panel has been analysed by a number of scholars, one of the earliest being Sivaramamurti 1937.

²⁸ This analysis is partially derived from K. Reddappa’s interpretation of the Lepakshi panel; Reddeppa 2000, 12.

²⁹ The rendering “chih-li-pu cloth” (指黎布) is a misunderstanding of the translator, George Philips. The term here should be *Libu* and NOT *Zhili bu*. Li refers to a people/tribe on Hainan Island in the South China Sea (known since the Tang era). The literati Lu You 陸游 (1125–1210) refers to the cloth of the Li people in his poem “Staying at Home” (Jiaju 家居): “the cloth of the Li equals pure and refined silk floss” (*li bu di chunmian* 黎布敵純綿). See Lu 1966, chapter 59.

³⁰ Philips 1896, 345.

³¹ Mahalingam 1975, 176.

³² Pires 2005, ii–78.

³³ de Matos 1999. I am grateful to Prof. Pius Melakandathil for drawing my attention to these documents and for translating some passages from them.

³⁴ These figures have been provided in Varghese 2011, 151.

and the same for 1588 was 1,410,000 *reis* (value of silk trade being 31,330,200 *reis*).³⁵ Pius Malekandathil notes that the annual tax collected from silk-weavers of Goa rose from 1140 *xerafins* in 1548 to 3400 *xerafins* in 1595.³⁶ We can hence see a general trend towards rising prices, although the evidence of the pricing of silk cloth in medieval sources is too scarce to arrive at any clear quantification.

A new variety of silk called *sella pattu* seems to have been the most popular and prized during the period of the Vijayanagar empire, only the *pattavali pattu* could compete. An inscription from the city of Kanchipuram states that during the period of the Vijayanagar ruler Venkatapatideva Maharaya (r. 1585–1614), the port/customs authorities remitted customs duties on both *sella pattu* and *pattavali pattu* brought in by the guild of Nanadesi merchants.³⁷ The Nanadesis (which literally means “from many lands”) were one of the well-known mercantile corporations who evolved in the Hoysala Empire (1026–1343) operating in southern India from the twelfth to the seventeenth century with strong trading networks as far as Malaya, Persia and Nepal. They were one of the mercantile corporations with power and influence in the society and economy of South India due to the very brisk trade both inland and overseas, including the entire South Asian and South East trade and dominating the commerce of the Indian Ocean.

Trade in silk was clearly in the hands of such mercantile corporations and not in the hands of individual weavers. Some of the major trading corporations in medieval India, somewhat along the lines of the Hanseatic league, were: Tisai Ayirattu Ainnutruvar from Ayyavole in Karnataka, the Manigramattar who operated essentially in the Tamil and Kerala regions, the Anjuvannam who are identified with a mercantile corporation of “Black Jews” from Kerala along with several other major and minor mercantile organizations. In terms of their inception and functioning these differed from the guilds of medieval Europe and therefore I prefer to use the term “corporation” rather than “guild” for both the craft and mercantile organizations.³⁸

A late-Pandya inscription suggests that in the fourteenth century, at Piranmalai³⁹ in the region of Tamil Nadu, all the mercantile corporations supervised by the Tisai Ayirattu Ainnutruvar donated to the local temple calculated per head (*talai chumai*), per bag load (*pakkam*), per smaller load (*podu*) and per cart load (*vandi*) on all their commodities. The items of trade ranged from *parum pudavai* (could refer to a simple cotton sari) and for men *pudavai* (fine cottons) to several varieties of silks like *pattavala pattu* and *konikkai pattu*. While *pattavala pattu* refers to tie-dyed silk which is still woven today in the entire belt from Gujarat and Andhra to Karnataka, the description of *konikkai pattu* is unclear and calls for further research into silk varieties which are no longer woven. The most significant aspect of this later-Pandya inscription is that the various mercantile corporations, who were part of this joint donation, signed their acceptance as distinctive organizations. Prominent among these were the “Cloth Merchants of Jayangondamandalam” (*Jayangonda Chilai Chettis*, which is the medieval name for the Kanchipuram region) and “Cloth Merchants of Kongumandalam” (*Kongumandalam Chilai Chettis*, which refers to the modern Salem and Coimbatore belt)

³⁵ 1 Pardao = 320 *Reis* and in the seventeenth century one Portuguese cruzado was reckoned to be 400 *reis*. For more on pricing see Varghese 2011, 195.

³⁶ Malekandathil 2010, 23.

³⁷ Subramaniam 1954, ii, 446.

³⁸ See Abraham 1988; and Subrahmanyam [1990] 2002 and Ramaswamy 2006.

³⁹ Subrahmanya Aiyer 1937

Salem and Coimbatore were, as I pointed out earlier, prime production centers of textiles in the medieval period. The nomenclature “*chetti*” in all the Dravidian languages (languages spoken in southern India) is given to the merchant caste.

Some of these self-imposed levies on textiles from Piranmalai are known:

Material/Goods	Measurement	Levy
yarn (cotton or silk not specified, presumably both)	<i>vandi</i> (cart load)	20 <i>kasu</i> *
	<i>podi</i> (hand cart load)	5 <i>kasu</i>
	<i>pakkam</i> (bag load)	2.5 <i>kasu</i>
	<i>talaichumai</i> (head-load)	2 <i>kasu</i>
<i>parum pudavai</i> (coarse sarees)	<i>podi</i>	10 <i>kasu</i>
	<i>pakkam</i>	5 <i>kasu</i>
<i>nen pudavai</i> (fine sarees)	<i>podi</i>	20 <i>kasu</i>
	<i>pakkam</i>	5 <i>kasu</i>
	<i>talaichumai</i>	5 <i>kasu</i>
<i>konikkai paṭṭu</i>	<i>podi</i>	2 <i>kasu</i>
	<i>pakkam</i>	1 <i>kasu</i>
<i>paṭṭavali paṭṭu</i>	<i>vandi</i>	30 <i>kasu</i>
	<i>talaichumai</i>	1 <i>kasu</i>

Table 1: Levies on different yarns, sarees and *paṭṭu* in early medieval Peninsular India. **Kasu* is a gold coin in currency in early medieval Peninsular India. The fact that the levy on *paṭṭavali paṭṭu* is fairly high suggests that this must have been regarded as an expensive variety of silk cloth which is logical seeing that it also involved the technology of tie-dye weaving.

The fact that the levy on *paṭṭavali paṭṭu* is much higher than *konikkai paṭṭu* suggests that the latter may have been an inferior variety of coarse silk.

The existence of similar corporations trading exclusively in textiles is borne out by inscriptions from other regions as well. Reference to *chilai chettis* also comes from Dharmapuri which is also in the Kongu region but very close to the Karnataka border.⁴⁰ An undated inscription belonging to the period of Vira Pandya (thirteenth - fourteenth century) from the Ramanathapuram district suggests that such traders were living and working together closely, as it mentions the “cloth merchants’ living quarters’ (*aruvai vaniya cheri*).⁴¹ Both *aruvai* and *chilai* are synonyms for cloth.

5.6 Conclusion

This chapter has endeavored to briefly delineate the history of silk and silk weavers during the Vijayanagar era, roughly from the fourteenth to the seventeenth centuries in Peninsular India. In particular the article has mapped the changes brought into sartorial habits as well as consumption patterns during the Vijayanagar era from the early medieval period till the

⁴⁰ Subrahmanya Aiyer 1933, no. 583; and *Annual Report on Indian Epigraphy* 1968, 165 and *Annual Report on Indian Epigraphy* 1969.

⁴¹ Ramanatha Ayyar [1962] 1986 no. 94 from Edikottai in Ramanathapuram district.

fourteenth century, largely due to the cultural residues of what has been termed “Islamicization.”

Consumption and production were closely linked. We can track a gradual shift from the purely courtly culture of silk-wearing around the fourteenth century to the fifteenth to sixteenth century onwards, when silk became the preferred material of affluent merchants, military chiefs and even wealthy craftsmen. This increase in the internal consumption of silk also led to the importation of cheap Chinese silk. Simultaneously there was a shift in the sartorial habits of the elite with special reference to coats or tunics, *kapayi*, and *kullayi* caps. In the early medieval period, up to the fourteenth century, such attire was worn only by soldiers, bodyguards and service groups. However, during the Vijayanagar period, as the result of Islamic influences coming both from the Arab world and the neighbouring Deccani Sultanates, royalty and the elite adopted both the tunic and the cap with the distinction that these were ornate and expensive. The attire worn by the service groups was marked by its inferiority both in its material which was usually coarse cotton and distinctive in terms of the cut which was usually above the knees.

During the Vijayanagar period weaver communities thrived on the increased commercial demand, but few communities could truly be called “silk weavers.” These were the “Silk Saliyar” (*Pattu Saliyar*; Saliyar identifies the inhabitants of Tamil Nadu) and “those who work with silk thread” (*Pattunulkarar*). In the South Kanara sub-region of Karnataka, there are references to a community of silk weavers called *Patvegar*.⁴² The weavers of the *Devanga* cast are not primarily identified as silk weavers, nevertheless they did a lot of silk weaving. The evidence suggests that all of these weaving groups moved between silk and cotton weaving depending on the historical exigencies. Religious implications further spurred them to develop new production techniques, mixing cotton and silk. Clearly though, those who could afford to invest in silk thread became weavers of silk cloth and many of them soon gained wealth and rank. Many poor, low cast, *paraiyah* weavers wove only coarse cotton, as did the communities of *Jedara* and *Janrewar*.

As many of the most revealing sources, inscriptions on trade and production, are on murals and stones scattered throughout the wide-spread regions in which silk played a role, This essay must perforce remain a work in progress in the continuing process of mapping the social, cultural and religious/ritual significance of silk. This article merely marks a modest beginning in the cultural history of Indian silk.

References

- Abraham, Meera (1988). *Two Medieval Merchant Guilds of South India*. New Delhi: Manohar Publications.
- Annual Report on Indian Epigraphy* (1968). No. 18. New Delhi: Director General, Archaeological Survey of India.
- Annual Report on Indian Epigraphy* (1969). No. 19. New Delhi: Director General, Archaeological Survey of India.
- Barbosa, Duarte (1918–1921). *The Book of Duarte Barbosa: An Account of the Countries Bordering on the Indian Ocean and Their Inhabitants*. Ed. by Mansel Longworth Dames. Vol. 2. London: The Hakluyt Society.
- (2000). *The Land of Malabar: The Book of Duarte Barbosa*. Ed. by Eṃ Gaṅgādharaṃ. Kottayam: Mahatma Gandhi University.
- Champakalakshmi, Radha (1973). Tanjore Frescoes in the Brahadisvaram Temple. *Journal of Indian History* Golden Jubilee Volume:349–359.
- Chandra, Moti (1950). *Prācīna Bhāratīya veśabhūshā [Ancient Indian Dress and Ornaments]*. Prayāga: Bhāratī-Bhaṇḍāra.
- (1961). Costumes and Textiles in the Sultanate Period. *Journal of Indian Textile History* 6:5–61.

⁴² Rao 2006, 27.

- Chandra, Moti (1973). *Costumes, Textiles, Cosmetics and Coiffure in Ancient and Medieval India*. Ed. by S. P. Gupta, K. N. Dikshit, V. P. Dwivedi, and Shashi Asthana. Delhi: Oriental Publishers on behalf of the Indian Archaeological Society.
- de Matos, Artur Teodoro, ed. (1999). *O Oramento de Estado da Índia 1571 [Budgetary Calculations for the Year 1571]*. Lisbon: Comissão Nacional (The National Commission for the Commemoration of Portuguese Discoveries).
- Johnson, Donald Clay (2010). “Silk in Mughal India.” Conference “The Culture of Silk in the Early Modern World (Fourteenth to Eighteenth Centuries)” at the Max-Planck Institute for the History of Science.
- Lu, You 陸游 (1966). *Lu Fangweng quan ji 陸放翁全集 [The Complete Writings of Lu Fangweng]*. Taipei: Taiwan zhonghua shuju.
- Mahalingam, Teralundur Venkatarama (1975). *Administration and Social Life under Vijayanagar*. Vol. 2: Social Life. Madras: University of Madras.
- Malekandathil, Pius (2010). City in Space and Metaphor: A Study on the Port-City of Goa, 1510–1700. *Studies in History* 25(1):13–38.
- Philips, George (1896). Mahuan’s Account of Cochin, Calicut and Aden. *Journal of the Royal Asiatic Society of Great Britain and Ireland* 28(2):341–51.
- Pires, Tomé (2005). *The Suma Oriental of Tomé Pires*. Ed. by Armando Cortesão. Vol. 2. New Delhi: Asian Educational Services.
- Ramanatha Ayyar, A. S., ed. [1962] (1986). *Pāṇḍya Inscriptions*. Vol. 14. South Indian Inscriptions. New Delhi: Archaeological Survey of India.
- Ramaswamy, Vijaya (2002). Interactions and Encounters: Indian Looms and Craft Traditions Abroad—A South Indian Perspective. In: *India’s Interaction with China, Central and West Asia*. Ed. by Abdur Rahman. New Delhi: Oxford University Press, 428–44.
- (2006). *Textiles and Weavers in South India*. Delhi: Oxford University Press.
- Rao, Nagendra E. (2006). *Craft Production and Trade in South Kanara: A.D. 1000–1763*. New Delhi: Gyan Publishing House.
- Raya, Krishnadeva (2010). *Amuktamalyada*. Ed. by Srinivas Sistla. Translated by Srinivas Sistla. Visakhapatnam: Drusya Kala Deepika.
- Reddeppa, Kandukuri (2000). *Material Culture Depicted in Vijayanagara Temples*. Delhi: Bharatiya Kala Prakashan.
- Riello, Giorgio and Prasanna Parthasarathy, eds. (2009). *The Spinning World: A Global History of Cotton Textiles, 1200–1850*. Oxford: Oxford University Press.
- Riello, Giorgio and Roy Tirthankar, eds. (2009). *How India Clothed the World: The World of South Asian Textiles, 1500–1850*. Vol. 4. Global Economic History Series. Brill: Leiden.
- Saraswati, Rangasvami (1925). Political Maxims of the Emperor-Poet Krishnadeva Raya. *Journal of Indian History* 4(3):61–88.
- Sewell, Robert [1900] (1970a). *A Forgotten Empire: Vijayanagar: A Contribution to the History of India*. Includes a translation of the *Chronica dos reis* de Bisnaga of Domingos Paes (ca. 1520) and Fernão Nunes (ca. 1535). New Delhi: National Book Trust.
- [1900] (1970b). Chronicle of Fernao Nuniz. In: *A Forgotten Empire: Vijayanagar: A Contribution to the History of India*. New Delhi: National Book Trust.
- Sivaramamurti, C. (1937). Paintings from Lepakshi. *Journal of the Indian Society of Oriental Art* (5):184–87.
- Subrahmanya Aiyer, K.V., ed. (1933). *Miscellaneous Inscriptions in Tamil, Malayalam, Telugu and Kannada*. Vol. 7. South Indian Inscriptions. Madras: Superintendent Government Press.
- ed. (1937). *Miscellaneous Inscriptions in Tamil, Malayalam, Telugu and Kannada*. Vol. 8. South Indian Inscriptions. Madras: Superintendent Government Press.
- Subrahmanyam, Sanjay [1990] (2002). *The Political Economy of Commerce in Southern India 1500–1650*. Cambridge South Asian Studies (45). New Delhi: Cambridge University Press.
- Subramaniam, T. N., ed. (1954). *South Indian Temple Inscriptions*. Madras Government Oriental Series (121). Madras.
- Varghese, Saumya (2011). Urbanization and Trade in Goa, 1510–1690. *Journal of the Institute for Research in Social Sciences and Humanities* 6(1&2).
- Vijayaraghavacharya, V., ed. (1936). *Inscriptions of Achyutaraya’s Time (from 1530 A.D. to 1542 A.D.)* Vol. 4. Tirumalai-Tirupati Devasthanam Epigraphical Series 112. Translated by V. Vijayaraghavacharya. Madras: Tirumalai-Tirupati Devasthanams Press.
- Wagoner, Phillip B. (1996). “Sultan among Hindu Kings”: Dress, Titles, and the Islamicization of Hindu Culture at Vijayanagara. *The Journal of Asian Studies* 55(4):851–80.

Chapter 6

Panni tartarici: Fortune, Use, and the Cultural Reception of Oriental Silks in the Thirteenth and Fourteenth-century European Mindset

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In recent years, interdisciplinary debate in art and textile history on theories of intercultural and cross-cultural interaction has strived to define the cultural processes that occur when different cultures meet, establish contacts and exchanges in a global historical context. Concepts such as “interaction,” “adoption,” “appropriation,” and “translation” are gradually replacing terms such as “influence” or “loan,” which were typical of earlier literature.¹

This revision has shifted the focus of investigation from products to cultural dynamics, expressing more clearly the relationship between the parties involved (“interaction”) and the active and creative role of a culture in adopting an external element (“appropriation,” “translation”). Baxandall’s well-known “Excursus Against Influence” (1985) is an early example of these tendencies. According to his work, the use of the word “influence” in the history of art is misleading, because it implies a sort of passivity in the subject who is “influenced” by an external agent and also because it seems to deny the subject his proactive approach in consciously choosing and selecting items to adopt, how something is adopted and, above all, for what purpose.²

It is worth considering these kinds of points when studying silk in the pre-modern age, because the history of the textile medium is set in an utterly Euro-Asian dimension. Most artistic, technological, and cultural phenomena connected to luxury textiles have their roots in a wider context than the locality of their manifestation. Innovations, original developments, and creative practices had as a background a widespread geographical and chronological network of exchanges, migrations, and interactions among people, objects, ideas, and solutions. In fact, economic, political, and commercial relations facilitated the long-distance circulation of objects and cultural practices connected to luxury textiles. These practices were similar in the different Euro-Asian civilizations that shared the use of silk in defining their identity and the symbolic meanings attributed to the textile medium (for instance the role of precious fabrics in the construction of the image of power). Precisely the similarity in the way fabrics were used stimulated phenomena of interaction and produced a sort of Euro-Asian continuum, referring to the culture of luxury and the consumption of this particular sort of “portable” sumptuary object.³ Thus this fluid global context of exchanges represents an ideal background to look into the different processes occurring at times of cultural meeting.

¹ For a synthesis of the debate on intercultural theory and its applications in pre-modern age studies, see Canepa 2010, with references. For a definition of the single intercultural processes, see Ashley and Plesch 2002; Bacci 2007; Walker 2010.

² Baxandall 1985, 58–62.

³ On the concept of portability, see Hoffmann 2007.

This chapter concentrates on the period between the thirteenth and fourteenth centuries, when silk circulation reached an unprecedented dimension both for the volume of the exchanges and their geographical extension from China to Europe. The different aspects referring to the arrival in the West of a specific typology of Asian textiles, the so-called *panni tartarici* (Tartar cloths), are used as an example to show the possible multilevel nature of processes of interaction and appropriation connected to silk as a luxury item.

6.1 The Culture of Silk Luxury in the Mongol Age: *Panni Tartarici*

From the end of the thirteenth to the first half of the fourteenth century many Asian silk textiles arrived in Europe. Although foreign silks had long been familiar to European elites, during this period world political events enabled a more extensive circulation of luxury goods all over Euro-Asia and the opening of new and stronger supply channels to the European markets. The Mongol conquest of a large part of Asia and the subsequent reorganization of that vast empire in satellite and vassal states created the conditions for European traders, primarily Italians, to get to and establish steady business relationships with international trading centers and places in the Middle and Far East where silk and textiles were produced.

European-language sources from this time often called these fabrics *panni tartarici*, a term used today to refer to a type of material (generally, but not only, lampas structures with metallic threads) that was made during the Mongol age in various workshops all over Asia, from the Yuan dynasty China (1279–1644) to Mamluk Egypt (1250–1517). After Anne Wardwell's work on the recognition and classification of still existing artifacts that could correspond to this type, it is now possible to return to the ambit of Tartar silks some of the most precious fabrics kept in Europe, such as Pope Benedict XI's (1240–1304) vestments in the church of San Domenico in Perugia, the funerary clothing of the Italian nobleman Cangrande della Scala (1291–1329) in Verona, and the burial textiles placed inside the tomb of the Spanish kings in Burgos.⁴ *Pannus tartaricus* refers consistently to the Mongol (or "Tartar" in medieval Europe renderings) Empire. It is still a suitable term today to describe various Asian products, precisely because the Mongol ambit was the origin of a new and substantial homogeneity in technical and decorative solutions, characterizing the sumptuary textiles of the time.

As well as territorial and political unification, the Mongol domination gave rise to a process of cultural unification in the conquered lands, through the creation and diffusion of a new shared language of luxury, in which precious fabrics played a fundamental role. In the costume of the Mongol dynasties many legacies of their nomadic tradition survived, for instance a large use of textiles not only for clothes but also in buildings and furnishings, and a predilection for transportable luxury goods, especially fabrics and precious metals. In Mongol cultural politics, this type of artifact became a key element in creating a new image of power and legitimizing their rule over the conquered lands: sumptuary fabrics were protagonists at official rites and, at the same time, objects of tribute, real economic resources and instruments to create bonds of loyalty to the khan through institutionalized moments of distribution, managed by the central government itself.⁵

⁴ Wardwell 1988; on the diffusion of oriental silks in Europe, see Rosati 2010 with references; von Fircks and Schorta 2016.

⁵ For more on Mongol cultural politics and the use of luxury silks, see Allsen 1997.

As they lacked any autochthonous tradition of processing silk, the Mongol sovereigns gradually improved their access to textiles by various means. At first, they depended on looting the recently-conquered Asian towns and on tributes from subject kingdoms. Realizing the potential of Eurasian trade routes, Mongols also encouraged the presence of merchants and foreign goods at their courts. Later they began to move forcibly large numbers of specialized craftsmen, holders of the technological knowledge of the most important Asian textile civilizations, the Islamic and the Chinese. These weavers were relocated in new textile colonies in Mongolia and China, specially created to satisfy court's needs. Here the production was under official state control, according to a centralized management model deriving from Chinese administrative structures or, perhaps, modelled on the Abbasid *tirāz*, known after the conquest of Baghdad (1258); the manufactures were supported by offices founded purely to coordinate different settlements, control production standards, supply raw materials, and collect finished products.⁶

In these ateliers, an original artistic language developed, as the technical and figurative cultures of Chinese, Islamic, and nomadic traditions merged into a new international style, oriented by the Mongol patron. In particular, the Mongolian preference for gold stimulated production of silk textiles with metallic thread. These textiles were of several different technical types, including the “cloth-of-gold” (*nasij* in Persian or *nashishi* in Chinese). European sources transcribed this term variously as *nassic*, *nach*, or *nak* (*nasicci*, *nacchi*, and *nachetti* in Italian).⁷

This new textile language did not only emerge in the Mongol imperial manufactures. In the following decades it spread all over the Euro-Asian continent, from the Yuan territories to the Persian Il-Khanate and Mamluk Egypt.⁸ There is no evidence that Chinese weavers were moved westward, as there is that Islamic weavers were moved to the East.⁹ However the close political and cultural relations between Yuan China and the other khanates, particularly between Khubilai Khan's (1215–94) Yuan Dynasty and Hülegü Khan's (1217–65) Iranian Empire, certainly contributed to the new style's dissemination to the West.

In this second phase, the circulation of precious artifacts and perhaps albums of models seem to have played a fundamental role in the international exchange.¹⁰ Mongol khans dispatched samples of gold cloth to satellite courts to seal their alliances and enhance loyalty. Moreover, the local textile industry imitated the Yuan prototypes, and silk patterns were also included in other artistic media, such as ceramics.¹¹

The imitation practices were motivated by the desire of the patron to follow the dictates of the new fashion developed in the Great Khanate, according to a mechanism of emulation and appropriation of the symbols of power. The Mongol textile language became part of the visual culture of their neighbors. Moreover, it was given an active contribution by other artistic civilizations that introduced new elements into the international style and altered for-

⁶ See Allsen 1997, 27–45, on ways of supplying luxury textiles and the Mongol manufacturers.

⁷ On different types of silks with patterns woven in gold, see Allsen 1997, 2–4; Watt and Wardwell 1997, 127–63; Kuhn 2012, 334–39.

⁸ On the diffusion of the Mongol style towards the West, see Allsen 1997, 71–98; Watt 2002.

⁹ According to Watt and Wardwell (1997, 130–31), Mongol rulers were supposed to relocate craftsmen from China to Samarkand and the neighbouring areas, while some Far Eastern presences have been found in the Central Asian town of Almaliq.

¹⁰ The problem of the existence of model albums is dealt with by Komaroff 2002.

¹¹ One example is the ceramic decorations in Takht-i Sulaiman Palace, built during the reign of Abakha Khan (1265–82) south of Tabriz. Komaroff 2002, 175–80.

eign forms to adapt them to their own knowledge. Thanks to the fluidity of the Euro-Asian context in the Mongol age, the so-called second-generation products remained in the channels of circulation the prototypes had come from. The international luxury culture was fed continuously by contributions from different traditions, sharing the same taste and attributing the same values to the textile medium.

6.2 The Outcome of the Euro-Asian *Koiné*

The various creative processes at the origin of the language of Tartar cloths reflect the inter-cultural nature of the Mongol empire and its management politics of the large controlled territories. We can consider this style as part of a Euro-Asian *lingua franca* or a common language (*koiné*) in the best sense of the word. The *koiné* includes an added value and an intrinsic creative potential: each tradition offers its wealth of expertise, creating a new pool of knowledge that is available for all members of the inter-cultural group to draw on. Different traditions lived together and were not flattened or homogenized.

In some Mongolian artifacts, technical and figurative motifs from many Asian traditions are mixed and find a new balance, as in a fragment kept in the Museo Nazionale del Bargello in Florence (figure 1). This fabric, from the second half of the thirteenth century, can be attributed to a Yuan-Chinese workshop (possibly a Daidu imperial laboratory) and corresponds to the *nasij* type.¹² Technically, it is a weft-patterned lampas (satin in the ground area) woven with metallic wefts consisting of flat strips of gilded animal substrate. Although made in China, the weave is closer to Islamic products, and this kind of gold thread also appears in other contemporary Central Asian artifacts. Hence, its material structure shows clear evidence of the intermingling of other textile traditions.

The mixture of different repertoires is even more original in the iconography. The general decorative pattern with different sized stripes brings to mind Islamic textiles and the practice of inserting bands with celebratory, well-wishing or generically ornamental inscriptions also derives from this culture. However, the usual Arabic script has here been replaced with *phags-pa*, the new alphabet required by the Mongols to unify the state bureaucracy. Moreover, within the larger band, two fierce panthers are depicted in an aggressive stance, reminiscent of the savage creatures in the metal artifacts of the Steppes. Even the decorative detail on the contorted bodies of the animals seems to refer to the lean, engraved strokes used by nomadic goldsmiths. However, the image's savagery is mitigated by, and imprisoned in, a botanical background of Chinese tradition, being sinuously interwoven with thin wave-like branches, blooming with exquisite lotus buds and delicate little curved leaves.

In other specimens one textile tradition dominates over a few subtly-inserted foreign details. Art historians have repeatedly stressed that mostly "Islamic" or "Chinese" iconographic features do not necessarily reveal the provenance of an artifact. For instance, one Yuan silk in the Musée Guimet in Paris (fourteenth century, traditionally attributed to China or Turkestan, figure 2) depicts medallions inhabited by pairs of symmetrical animals, which is a typical Islamic decorative structure, widely used by weavers east and west of the Eurasian continent.¹³ The prototype, known through weft-faced compound and lampas weaves, was translated into a Chinese-style weave, namely a single warp weft-patterned tabby *à liage repris*. The absence of a supplementary binding warp is reminiscent of

¹² Suriano and Carboni 1999, 44–8.

¹³ Lefèvre 2004, 70.



Fig. 1: Fragment of silk with panthers. Weft-patterned lampas, silk, and gold threads. Chinese manufactures, Yuan, second half of 13th century. Courtesy of the Ministry of Cultural Heritage and Activities, Museo Nazionale del Bargello, Florence, nn. 573-574 F.



Fig. 2: Fragment of silk with medallions inhabited by parrots. Weft-patterned tabby, silk and gold threads. Chinese manufactures, Yuan, 14th century. With kind permission from the Musée Guimet, Paris, n. MA 11122. bpk / RMN – Grand Palais / Thierry Ollivier.

tabby and twill with a supplementary brocading gold weft (*jinduanzi* silks 金緞), that were already being produced during the Liao (907–1125) and Jin (1115–1234) dynasties. Yet, the continuous gold pattern weft (flat strips of gilded paper) covering the whole surface of the cloth generates an effect similar to that of the *nasij* (technically lampas weave), so this specimen shows how, in the context of the *koiné*, technology interacted with the prevalent tastes, adjusting creatively to meet patrons' demands.

From an iconographic point of view, the process of appropriation is analogous, because the geometrical pattern of wheel converses with the lively Chinese sense of nature, maintaining the regular scansion of the composition but introducing some dynamic elements, such as the medallions' lobed outline and the tiny shoots of the inter-spaces. Finally, as for the animal motif, the pairs of symmetrical parrots might have entered the Yuan weavers' repertoire in different ways. This Middle Eastern subject had been used in gold-works and textiles since the Tang (618–907) dynasty. The retrieval of a heraldic pair of birds also suggests a renewed comparison with Islamic textiles from the thirteenth century.



Fig. 3: Dalmatic of Benedict XI, with kind permission from the Church of San Domenico, Perugia.

In contrast, the textiles of Benedict XI's cloak and dalmatic could be attributed to a workshop in Central Asia at the end of the thirteenth century, although both items show the decorative characteristics which are typical of the East Asian repertoire (figures 3–4).¹⁴ The cloak silk (weft-patterned lampas), the main cloth (weft-patterned tabby) and some of a small insert of the dalmatic (weft-patterned lampas) present three variations of a small vegetable decoration, called “tiny patterns” (*de opere minuto*) in Latin sources.¹⁵ Small golden leaves and inflorescences cover the surface in diagonal lines that produce a dynamic, sparkling effect and hide the modular nature of the composition. Single motifs clearly suggest a Chinese origin: peonies, round buds, small comma-shaped leaves and clover with curved tips renew the traditional vegetable repertoire of Islamic textiles. Moreover, the miniature decoration creates a lively sense of movement which is alien to the abstractly fixed and symmetrical styles of earlier Middle Eastern patterns.

¹⁴ On the problem of attributing Benedict's textiles, see Rosati 2016, 173–5.

¹⁵ That is, “una planeta de panno tartarico albo deaurato de opere curioso minuto per totum” in the Vatican inventory. Münz and Frothingham 1883, 36.

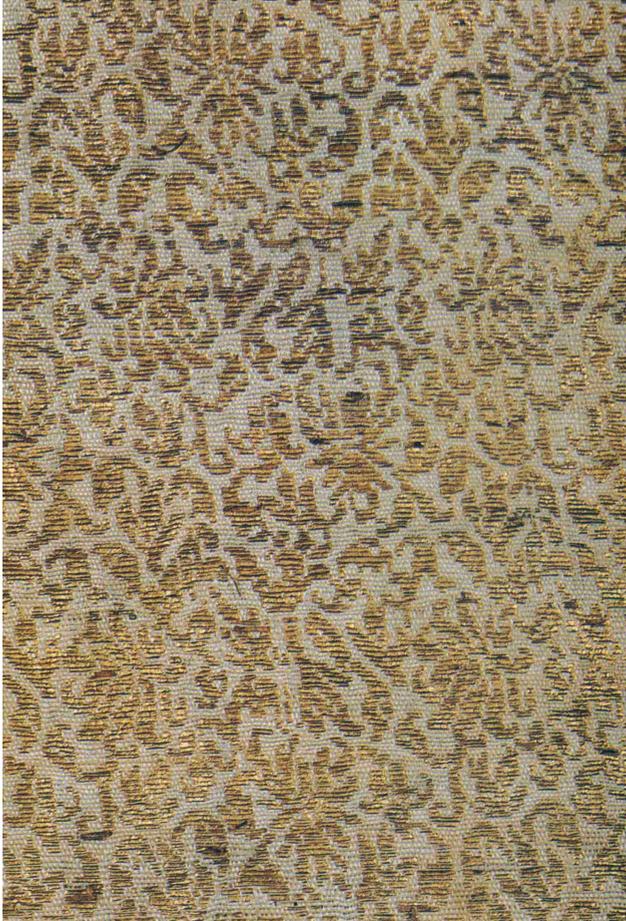


Fig. 4: Detail of the main cloth of Benedict's dalmatic. Weft-patterned tabby, silk and gold threads. Ilkhanid or central Asian manufacture, end of 13th century. With kind permission from the Church of San Domenico, Perugia.

6.3 Uses and Fortune of *Panni Tartarici* in Europe

Benedict XI's vestments exemplify the positive reception of Asian designs in Europe in the late Middle Ages. The different fabrics of the robes were probably from the Vatican treasure, where, according to the inventories written between the thirteenth and fourteenth centuries, more than a hundred *panni tartarici* were kept. Financially valuable and artistically well-executed, these Tartar cloths were treasured and associated with one of the most important authorities of the time, becoming privileged instruments of the representation of power. Through their material splendor, the objects demonstrated the superior condition of their owners, according to a practice of using silk typical of the whole Euro-Asian continent and shared also by the Christian West since the early Middle Ages.

In Europe, foreign fabrics were considered one of the greatest expressions of luxury and their very rarity nourished the desire. The Carolingian (seventh to ninth century) and Ottonian (951–1024) Empires had used silk as part of their imperial ceremonies, imitating traditions of the Byzantine Empire (330–1543). Following the same model, the Papacy introduced the use of precious fabrics into the Roman Church after the eighth century, both for liturgy and to display its spiritual and temporal authority. Moreover, silk was connected with the worship of relics, bringing the luxury textiles' semantic contents from the range of sacral royalty into the realm of sanctity.¹⁶

The practice of using silk during the Middle Ages shows a dialectical balance between perception of the cultural otherness of the objects' provenance and the process of adapting the meaning carried by the foreign textile into a new context of reception. It was recognized that the silk objects were made in "other" realities, as is confirmed by classifying fabrics according to their real or presumed geographical origin: "coming from the Byzantine Empire" (*panni de Romania*), Baghdadi silks (*panni de Bagadello*), or Levantine clothes (*de Outremer*). However, through a process of appropriation the same objects were used to embody and express the highest values of the emergent European identity. Sometimes the foreign silks were accepted and appreciated because of the taste for precious materials symbolizing excellence, a cosmopolitan taste shared with other civilizations. In other cases, the process of adoption might involve a complete subversion of the object's original meaning. This phenomenon is particularly evident in the use of oriental fabrics within the liturgy of the Roman Church. Islamic silks with inscriptions praising Allah were used for Catholic ecclesiastical clothes, or even in the Virgin's cloak, without any apparent contradiction. This was possible because, on the one hand, the Arabic characters were supposed to be already in use in the Holy Land at the time of the biblical histories. On the other hand, the pagan appearance of the inscriptions strengthened the idea of ecumenism and the superiority of the evangelical message that foretold its ultimate triumph, incorporating the expressions of other cultures.

Therefore, it is not surprising to find the same socio-cultural uses for the *panni tartarici* at the end of the Middle Ages. In fact, it is evidence of the very high esteem that these objects were held in. They were probably considered the most precious textiles of the time. Rather there was a wider diffusion of Asian fabrics than in the past. Between the thirteenth and fourteenth centuries, all the European courts displayed silk artifacts at their most important events, from weddings to funeral and coronation ceremonies, such as the clothes of Rudolph of Bohemia (r. 1298–1307) in Prague, which were probably used for his wedding (1281); or the royal shrouds of Burgos mentioned above, and the dalmatic of Ludwig the Bavarian (1282–1347), part of his coronation's robes.¹⁷

Indirect evidence further confirms an increase in the importance of Mongol cloths in the late Middle Ages. The Great Wardrobe, the English book of court expenses, includes many receipts for Tartar cloths (*nak*) and textiles from the Armenian city of Tarsus (*panni de Tars*) which were bought from Genoese and Florentine merchants for the coronation ceremony of Edward III (1312–77) in Westminster Abbey on 1 February 1327.¹⁸ A substantial familiarity with Asian textiles is also evident in the bookkeeping of other ruling European families. A

¹⁶ See Muthesius 1995 on the role of silk in the early Middle Ages.

¹⁷ For a survey of the surviving evidence of Tartar cloths in the European courts, see Jacoby 2004, Monnas 2004, Bravermanová 2004, all of which are in Marini, Napione, and Varanini 2004, 141–53; 123–39; 235–46. See also the essays in von Fircks and Schorta 2016.

¹⁸ Monnas 2001.

tartaire appears in the list of purchases made on behalf of the Count of Flanders by the chaplain Guillaume between the end of 1276 and June 1277; in 1299 some *dras tartarins* were bought for the lords of Hainaut while, three years later, a *tartare d'outramer vermel* was acquired for the House of Artois to cover a parade saddle. We know that master Giovanni of Florence bought two *panni tartarici* on 1 October 1323 in Paris for the Count of Hainaut's daughter.¹⁹ Finally, the number of *naques* and *tartaires* in the French sovereigns' wardrobes increased to the extent that they were provided with their own section, devoted to gold and silk fabrics, in 1317 and again in 1342.²⁰

The literature provides further evidence of the diffusion of Tartar cloths by mentioning the new Asian types. Since the twelfth-century, a typical topos in European courtly romances had the protagonists clothed with sumptuous garments, silk and precious foreign textiles, consistent with their moral and blood dignity. Between the thirteenth and fourteenth centuries Mongol productions appeared on the literary stage too. In Jacquemart Giélée's (c. 1288) poem "*Renart le Nouvel*," written in Lille, France, one of the ladies was described as wearing a "gold cloak" (*un mantel d'un drap de Tarse d'or blendè*).²¹ In Nicole de Margival's late thirteenth-century French poem "*Dit de la Panthère*," the main character inferred people's rank by noting whether they wore Tartar cloths (*bien avisai qu'il estoient de grant affaire, car de samit ou de tartaire ou de drap d'or de gran value avoit chascuns robe vestue*).²² The Umbrian poet Nerio Moscoli (active in the first half of the fourteenth century) metaphorically described Love as a textile so precious that it "exceeded even the splendor of the Mongol silks" (*niun tartaresco paregiar lo poria*).²³ In Geoffrey Chaucer's (1343–1400) *The Knight's Tale*, Emetreus, King of India, carried a coat of arms made with "cloth of Tars, couched with perles" and his battle steed was fitted into "cloth of gold."²⁴

If Chaucer's work proves the existence of a lively link between the Tartar textiles and the exotic worlds where those objects came from, the poet Nerio Moscoli shows how those artifacts had, by then, become part of European elite customs. Perhaps echoing the verses of Dante Alighieri (1265–1321) (*Inferno*, XVII, 14–18), where the monster Gerione's variety of colors exceeds that of a Tartar cloth, the poet uses textiles as a measure for comparison with no need to specify their nature, presumably well-known by his contemporary readers. In both cases, we can see the development of two clichés (silk as exotic clothing and pre-eminent luxury goods), which were connected to the diffusion of Tartar textiles in Europe and which illustrate the foreign objects' reception into the cultural horizon of the time.

6.4 Market Expansion and New Values Attributed to the Textile Medium

The effects of the wider diffusion of Asian silks can also be seen in the amplification of meanings given to luxury textiles, which, in its turn, is connected to the new conditions of the European market developing in the same decades.²⁵ New wealth gave the urban and merchant classes easier access to luxury markets, where a great deal of Asian sumptuary goods appeared at this time. The urban classes displayed their success by appropriating

¹⁹ Dehaisnes 1886, i, 70–1, 106, 123, 254.

²⁰ D'Arcq 1874, 1–36.

²¹ Giélée 1961, 254, verses 6242–6244.

²² de Margival 2000, 50–1, verses 208–13.

²³ Mancini 1997, 97, sonnet 78, verses 5–8.

²⁴ Chaucer 2008, 54, verses 2156–61.

²⁵ On the situation of the luxury market in the late Middle Ages, see Stuard 2006.

elite products, both as originals—as Tartar cloth from Asia—and in their local variations, often stimulated by the strong European demand for foreign textiles. Silk was no longer the privilege of the traditional ruling classes but, through a process of emulation, became an everyday component in the life of whoever was rich enough to own those precious objects. An unparalleled arrival of silk textiles on the market, due to the growth in both local industry and international trade, brought luxury to the houses of private citizens and their clothes. On the urban streets in the Middle Ages, the concept of fashion began to catch on for the first time.²⁶

As clothes were becoming an instrument of self-definition and distinction according to age, sex, and rank, it is significant to find a *pourpoint* made of Tartar cloth among the oldest surviving specimens of secular fourteenth-century costume. This item, today in Lyon Musée des Tissus, belonged to Charles de Blois (1319–64), would-be Duke of Brittany dead on the battlefield of Auray in 1364 (figures 5–6).²⁷ Its tailoring, which emphasizes the male upper body through padding, a tight waist cut, and countless rows of buttons, was common in this era among upper classes. The foreign silk was a further and recognizable sign of social distinction, being a material at the top of the contemporary luxury hierarchy. The increased use and wide diffusion of silk did not lead to a devaluation of those materials. On the contrary, the consciousness that silk was a symbol of excellence was amplified: gaining access to luxury meant taking possession of those tangible manifestations of power that were once peculiar to sovereigns by divine investiture. It meant acquiring an instrument of social ennobling to approach the elite and demonstrate one's own high standing through visible appearance, as the luxury goods, worn and flaunted, became a true status symbol.

When the merchant class had amassed enormous riches, and reached the top of political life of their towns, they began to think of themselves as princes, assuming a proper lifestyle to legitimize the new structure of power by the same symbolic display that for centuries had belonged to the royal and ecclesiastical hierarchies. This practice of ennobling and self-legitimation by the silk medium is found in the Italian Trecento cities, as in the case of the funeral equipment of the Verona captain Cangrande della Scala (1291–1329).²⁸ The sumptuous display of Tartar cloths wrapping his remains shows not only a huge wealth, but was also part of his family's political program of building a ritual tradition to legitimize their power over Verona. Using the same symbols as those of the European sovereigns, they asserted their intention of turning a municipal office into a permanent authority over the city, and the successors of Cangrande proceeded to do exactly that.²⁹

In the fourteenth century, Asian silks continue to embody values of excellence, but, as a consequence of the new social order, their message concerns both an already acquired status of royalty, power, or dignity, and the very aspiration to this condition. Those who could not afford an entire silk outfit, trimmed their clothes with silken sleeves, belts, and accessories, to approximate the lavish costumes of the upper classes. This was possible because of an unprecedented diversification of the luxury market, in which extremely expensive objects and more affordable accessories arrived from Asia. Silk bags, scarves, and ribbons are listed in the cargo of a Syrian merchant who arrived at Porto Ercole in 1338 and, according to the

²⁶ On fashion and the hierarchy of appearances, see Muzzarelli 1996; Blanc 1997.

²⁷ Lisa Monnas has attributed the fabric as being manufactured in the Middle East in the middle of the 14th century. Monnas 1992.

²⁸ On Cangrande's textiles, see Magagnato 1983; Marini, Napione, and Varanini 2004.

²⁹ Napione 2004.



Fig. 5: Pourpoint of Charles de Blois, with kind permission from the Musée des Tissus, Lyon, n. 30307, 924 XVI.2. © Lyon, musées des Tissus et des Arts décoratifs – Pierre Verrier.

chronicle of Agnolo di Tura del Grasso (active in the fourteenth century), the entire cargo was sold successfully in Siena.³⁰ So a desire to rise in society was met by the new products that helped to realize this ambition, even if only partially: everybody could buy the symbolic-goods in the city markets, legitimately, and in accordance with their own resources, while in the shops the craftsmen were able to make cheap versions of the more valuable artifacts simulating precious materials by tricks of their trade.³¹

³⁰ di Tura del Grasso 1931, 521.

³¹ For examples of cheap imitations, like gilding to imitate precious metals, see Stuard 2006, 53.



Fig. 6: Detail of the cloth of Charles de Blois's pourpoint. Weft-patterned lampas, silk and gold threads. Ilkhanid manufacture, 14th century. © Lyon, musées des Tissus et des Arts décoratifs – Pierre Verrier.

6.5 Forms of Cultural Appropriation

The various uses of Tartar cloths in Europe substantiate different aspects of cultural appropriation: some practices were common all over the Euro-Asian continent, while others seem peculiar to the European context. When items that were originally destined for Asian courts turned into a cultural component of European luxury, the silk's medium's meaning of excellence took on also new forms of social practices. These sometimes corresponded to the uses already common in Asia and sometimes reflected the expectations of western society in the fourteenth century.

For instance, the visual manifestation of royalty through the silk medium crossed the entire Euro-Asian continent to reach Europe in the end. Understanding the communicative power of precious textiles on the subject civilizations, the Mongols created their own language of silk, to express their authority. In the satellite courts the meaning of these objects was so clear that adopting them implied taking a more or less legitimate part of the same power. When Tartar cloths reached Europe, they were adopted as a royal attribute because of the medieval taste for precious materials and the already mature predilection for silk. In this case, there wasn't a clear will to emulate the Mongol sovereigns and the adoption went through further processes (appropriation instead of emulation). In the end the results were equivalent because they were based on the same premises, that is, silk meant as a symbol

of excellence. The textile medium, therefore, proves itself a typical “cultural migrant” of the pre-modern age, able to cross spaces and civilizations thanks to continuous semantic adaptations, disseminating in different realities a shared technical and figurative repertory and a similar attitude to silken luxury and its social uses.

The role played by Tartar cloths in the nascent European fashion demonstrates how foreign goods can be given absolutely new values when they became part of the cultural phenomena that were originating from the evolution of western social structure in the late Middle Ages. It wasn't the arrival of Asian textiles that caused the birth of fashion, but these objects were chosen by the receiving culture as a proper instrument to create forms of distinction in clothes, according to a need that was already evident at the time through other expressive means, not directly related to the international market of silk.³²

The same process of appropriation can be seen in the Italian manufacturers. Italian weavers actively developed a Euro-Asian *koiné* by imitating Asian fabrics and styles. Yet, at the same time, these artifacts also represent a typical Gothic art, in line with fourteenth-century studies on the effects of light and color, and the renewed interest in the natural world. Hence, Tartar style silks were a possible, but not unequivocal, solution for an existing demand from European society.³³

The modes of appropriation can be read as continuous processes of adaption and a creative re-elaboration of foreign elements within new cultural products, peculiar to the receiving context. The very name, *pannus tartaricus*, was the result of a process of appropriation, rooted in the perceptive and cognitive horizon of the European late Middle Ages. Actually, the name “Tartar cloth” was an invention, a sort of hypernym comprising several different Asian products, a descriptive category used to bring exotic objects into the scope of the known, the familiar and the identifiable. In the European sources the single textile types are sometimes called by their technical-commercial names (which often comprise the source language term translated into Latin or vernacular languages: e.g. *nasiccium* and *nassic* or *nasij*), or can be described with a generic term, later specifying their technical and decorative characteristics: “cloth-of-gold” (*pannus tartaricus ad aurum*), “velvet” (*pilosum*) or “plain silk” (*de attabi*).³⁴ Obviously, the word “Tartar” contains a certain amount of ambiguity due to its historical genesis—on the one hand it evokes China and *Cathai* and, on the other hand, it comprises all of Asia. Moreover, it is very unlikely that societies in the West were fully conscious of the cultural processes behind the new international style. However, the word was strongly evocative for contemporary people. Specific, well-defined characteristics were associated with Tartar textiles to the point that, over the decades, any object corresponding to those parameters could be called *tartaryn* or *tartarino* in Italian, *nach* and *camoca*, whether the artifact had been made overseas or been woven in laboratories in Lucca or Venice. Therefore, the perception of what was truly Tartar gradually became disengaged from the actual provenance of an artifact, opening the way for future invention of the “exotic,” which was typical of Modern Europe.

³² For similar discussions about the relationship between oriental textiles and fashion in the Crusade period, see Snyder 2002.

³³ On the developments of Italian manufactures, see Rosati 2010 with references.

³⁴ These examples are from the 1295 inventory of Bonifacius VIII. Molinier 1885, 43–44.

References

- Allsen, Thomas T. (1997). *Commodity and Exchange in the Mongol Empire. A Cultural History of Islamic Textiles*. Cambridge: Cambridge University Press.
- Ashley, Kathleen and Véronique Plesch (2002). The Cultural Processes of Appropriation. *Journal of Medieval and Early Modern Studies* 32(1):1–15.
- Bacci, Michele (2007). L'arte: circolazione di modelli e interazioni culturali. In: *Storia d'Europa e del Mediterraneo. Dal Medioevo all'età della globalizzazione*. Ed. by Sandro Carocci. Vol. IX: Strutture, preminenze, lessici comuni. Rome: Salerno, 581–632.
- Baxandall, Michael (1985). *Patterns of Intention: On the Historical Explanation of Pictures*. New Haven: Yale University Press.
- Blanc, Odile (1997). *Parades et parures. L'invention du corps de mode à la fin du Moyen Age*. Paris: Gallimard.
- Bravermanová, Milena (2004). Rodolfo I re di Boemia e il suo corredo funebre. In: *Cangrande Della Scala. La morte e il corredo di un principe nel Medioevo europeo*. Ed. by Paola Marini, Ettore Napione, and Gian Maria Varanini. Venice: Marsilio, 235–46.
- Canepa, Matthew P. (2010). Theorizing Cross-Cultural Interaction among Ancient and Early Medieval Visual Cultures. *Ars Orientalis* (38):7–29.
- Chaucer, Geoffrey (2008). *The Riverside Chaucer*. Ed. by Larry Dean Benson. 3rd ed. Oxford and New York: Oxford University Press.
- D'Arcq, Louis Douet (1874). *Nouveau recueil de comptes de l'argenterie des rois de France*. Paris: Librairie Renouard.
- de Margival, Nicole (2000). *Le dit de la Panthère*. Ed. by Bernard Ribémont. Paris: Honoré Champion.
- Dehaisnes, Chrétien Cesar Auguste (1886). *Documents et extraits divers concernant l'histoire de l'art dans la Flandre, l'Artois & le Hainaut avant le XV^e siècle, par M. le chanoine Dehaisnes*. Lille: Imprimerie L. Danel.
- di Tura del Grasso, Agnolo (1931). Cronaca Maggiore. In: *Cronache Senesi*. Ed. by Alessandro Lisini and Fabio Iacometti. XV. *Rerum Italicarum Scriptores* part VI. Bologna: Zanichelli.
- Giélee, Jacquemart (1961). *Renart le Nouvel*. Ed. by Henri Roussel. Paris: Société des anciens textes français.
- Hoffmann, Eva R. (2007). Pathways of Portability: Islamic and Christian Interchange from the Tenth to the Twelfth Century. In: *Late Antique and Medieval Art of the Mediterranean World*. Ed. by Eva R. Hoffmann. Oxford: Blackwell, 317–49.
- Jacoby, David (2004). Dall'oriente all'Italia. Commercio di stoffe preziose nel duecento e nel primo Trecento. In: *Cangrande Della Scala. La morte e il corredo di un principe nel Medioevo europeo*. Ed. by Paola Marini, Ettore Napione, and Gian Maria Varanini. Venice: Marsilio, 141–53.
- Komaroff, Linda (2002). The Transmission and Dissemination of a New Visual Language. In: *The Legacy of Genghis Khan: Courtly Art and Culture in Western Asia*. Ed. by Linda Komaroff and Stefano Carboni. New York: Metropolitan Museum of Art, 168–95.
- Kuhn, Dieter (2012). *Chinese Silks*. New Haven and London: Yale University Press.
- Lefèvre, Vincent (2004). *Lumières de soie: soieries tissées d'or de la collection Riboud*. Paris: Musée national des arts asiatiques Guimet.
- Magagnato, Licisco (1983). *Le Stoffe di Cangrande: Ritrovamenti e ricerche sul Trecento veronese*. Florence: Alinari.
- Mancini, Franco (1997). *Poeti perugini del Trecento. Nerio Moscoli*. Perugia: Guerra.
- Marini, Paola, Ettore Napione, and Gian Maria Varanini, eds. (2004). *Cangrande Della Scala. La morte e il corredo di un principe nel Medioevo europeo*. Venice: Marsilio.
- Molinier, Émile (1885). Inventaire du trésor du Saint Siège sous Boniface VIII. *Bibliothèque de l'École des chartes* (46):16–44.
- Monnas, Lisa (1992). The Cloth of Gold of the Pourpoint of the Blessed Charles de Blois: A Pannus Tartaricus? *Bulletin du CIETA* (70):116–29.
- (2001). Textiles for the Coronation of Edward III. *Textile History* 22(1):2–35.
- (2004). L'origine orientale delle stoffe di Cangrande: Confronti e problemi. In: *Cangrande della Scala. La morte e il corredo di un principe nel Medioevo europeo*. Ed. by Paola Marini, Ettore Napione, and Gian Maria Varanini. Venice: Marsilio, 123–39.
- Münz, Eugenio and Arthur L. Frothingham (1883). Il tesoro della basilica di S. Pietro in Vaticano dal XIII al XV secolo con una scelta di inventari inediti. *Archivio della R. Società Romana di Storia Patria* (6).
- Muthesius, Anna (1995). *Studies in Byzantine and Islamic Silk Weaving*. London: Pindar Press.
- Muzzarelli, Maria Giuseppina (1996). *Gli inganni delle apparenze: disciplina di vesti e ornamenti alla fine del Medioevo*. Torino: Scriptorium.

- Napione, Ettore (2004). Cangrande della Scala: Il funerale, le traslazioni, le tombe. In: *Cangrande della Scala. La morte e il corredo di un principe nel Medioevo europeo*. Ed. by Ettore Napione Paola Marini and Gian Maria Varanini. Venice: Marsilio, 23–45.
- Rosati, Maria Ludovica (2010). Migrazioni tecnologiche e interazioni culturali. Chinoiserie ed esotismo nell'arte tessile italiana del XIII e del XIV secolo. *OADI Rivista dell'Osservatorio per Le Arti Decorative in Italia* (2):40–63.
- (2016). 'De Opere Curioso Minuto' The Vestments of Benedict XI in Perugia and the Fourteenth-Century Perception of 'Panni Tartarici'. In: *Oriental Silks in Medieval Europe*. Ed. by Juliane von Fircks and Regula Schorta. Riggisberger Berichte 21. Riggisberg: Abegg-Stiftung, 173–183.
- Snyder, Janet E. (2002). Fashion in French Crusade Literature: Desiring Infidel Textiles. In: *Encountering Medieval Textiles and Dress: Objects, Texts, Images*. Ed. by Désirée G. Koslin and Janet E. Snyder. New York: Palgrave Macmillan, 103–19.
- Stuard, Susan Mosher (2006). *Gilding the Market: Luxury and Fashion in Fourteenth Century Italy*. Philadelphia: University of Pennsylvania Press.
- Suriano, Carlo M. and Stefano Carboni (1999). *La seta islamica: temi ed influenze culturali*. Florence: S.P.E.S.
- von Fircks, Juliane and Regula Schorta (2016). *Oriental Silks in Medieval Europe*. Riggisberg: Abegg-Stiftung.
- Walker, Alicia (2010). Patterns of Flight: Middle Byzantine Appropriation of the Chinese Feng-Huang Bird. *Ars Orientalis* (38):188–216.
- Wardwell, Anne E. (1988). Panni Tartarici: Eastern Islamic Silks Woven with Gold and Silk (13th and 14th Centuries). *Islamic Art* (3):95–173.
- Watt, James C. Y. (2002). A Note on Artistic Exchanges in the Mongol Empire. In: *The Legacy of Genghis Khan: Courty Art and Culture in Western Asia*. Ed. by Linda Komaroff and Stefano Carboni. New York: Metropolitan Museum of Art, 63–73.
- Watt, James C.Y. and Anne W. Wardwell (1997). *When Silk was Gold: Central Asian and Chinese Textiles*. New York: Metropolitan Museum of Art.