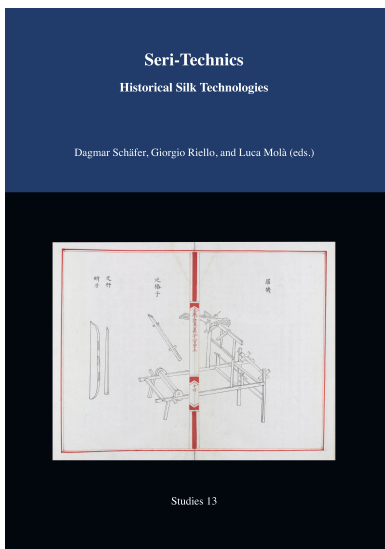


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Dagmar Schäfer, Giorgio Riello, and Luca Molà:

Introduction. *Seri-Technics: Historical Silk Technologies*



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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 [2003], 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 Hafer 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. Hafer 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 sericulturist with the historical figure of Xiling.

¹³ Pattern books and sample exchange played an important role for such exchanges, easily crossing cultural boundaries. Schäfer [2013], 107–18. See also the works by Silberstein [2013].

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

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¹⁸ Zhao et al. [2017](#).