

Silk and Cotton Textiles, the Principal Maritime Trade Commodities of Ancient India

Duraiswamy DAYALAN

India has had a rich and diverse textile tradition since the 3rd millennium BCE. The origin of Indian textiles can be traced back to the Harappan period. Owing to the hot and humid climate in most parts of India, cotton has remained India's favourite choice of fabric for normal use. Thus, India is supposed to be the first nation to have grown, woven, and patterned cotton fabrics. Moreover, India is one of the leading cotton-growing countries in the world. The earliest occurrence of cotton thread in India is roughly datable to 4000 BCE and of dyed fabrics to about 2500 BCE. Large numbers of needles and spindle-whorls found in Harappa and other early historic sites in India reveal the prosperous state of textile production and its trade in the early period. The textile producers used a wide range of skills to process raw materials and make regionally idiosyncratic dyes, weaves, prints, and embroideries. Additionally, the silk from wild indigenous forms of silkworms was known in the Indian sub-continent roughly contemporary with the earliest clear archaeological evidence for silk in China. The analysis of thread fragments found inside a copper bangle and ornament from Harappa and steatite beads from Chanhudaro, have yielded silk fibers dating to 2500–2000 BCE. Apart from other products, cotton and silk textiles were important export materials from India right from the Harappan period. Actually, the sea-borne trade had played an important role in the economic growth and prosperity of the Harappan civilization. Several ancient seaports in the entire coastline of India played a vital role in the maritime trade during the Harappan period and cotton and silk textiles of Indian origin have been found in various countries. The contemporary writings and epigraphy have also attested to the vast maritime trade network of India and the export of textile materials. The paper discusses in detail the origin and development

of cotton and silk textile production in India through the ages and its role in maritime trade networks.

Key Words: Cotton; Silk; Textile; Maritime Trade; Harappan; seaport

Introduction

India lies in geographical proximity to important maritime trade routes which has given a natural advantage to the country's seafaring activities from an early period. India features a long stretch of 7500-km coastline, including the coastlines of the Andaman and Nicobar Islands within the Bay of Bengal and the Lakshadweep Islands within the Arabian Sea, which is known for its seaports located at river mouths or outlets to the sea. The river deltas of India are favourable for navigation and therefore the distributaries related to estuarine mouths naturally led to the subsistence of many ports. A large number of ports developed in the sheltered water bodies provided by the large lagoons and lakes. Several ports of peninsular India are guarded by bars and spits, which provide much-desired natural breakwaters for safe anchorages. The coastal length of about 5422.6 km of the Indian mainland (except the Andaman and Nicobar Islands and Lakshadweep Islands) is bounded by the Arabian Sea in the west, the Bay of Bengal in the east, and the Indian Ocean in the south.

Maritime Trade Centres of Harappan Civilization

The maritime activities of India have a long history. In fact, sea-borne trade played a significant role in the growth and expansion of the economy of the Harappan civilization (3rd millennium BCE), one of the oldest civilizations in the world. There was an extensive maritime trade network between the Harappan and Mesopotamian civilizations as early as the 3rd millennium BCE. The seals and sealings, weights, beads, ivory items, pottery, and many other objects of Harappan make or having obvious Harappan influence are traceable in Oman, the United Arab Emirates, Bahrain, Iran, Iraq, and Central Asia. The Harappans constructed many big and small seaports and dockyards at Lothal, Dholavira, and Bhagatrav in India and at Sutkagendor, Mehgam, Shikarpur, and Sokhta Koh (also known as Sotka Koh) in Pakistan for maritime trade activities.¹ The port town of Lothal, located at the head of the Gulf of Khambhat, Gujarat, was the first high-tide dock in the world constructed for berthing and servicing ships.

¹ Dayalan, "Ancient Seaports."

Maritime Trade Network of Harappan People

The Harappan civilization was mentioned as Meluhha in Sumerian literature. The mention of ‘Meluhha’ is made for the first time in the cuneiform inscriptions of the Early Dynastic Period of the mid-third millennium BCE.² Sargon of Akkad, also known as Sargon the Great (2334–2284 BCE), the ruler of the Akkadian Empire of Mesopotamia, referred to the ships of Meluhha, Magan, and Dilmun that came up to Akkad (Agade). The Harappans had wide contact with Barbar (Bahrain), Umm-an-Nar, Ras al Jinz, Tell Asmar, Dilmun (Bahrain), Ur, Susa, Logas (in Mesopotamia), Kish, Lagash, Tall Abraq, Hili, Wadi Suq, Ras al-Hamra, Ras al-Hadd, Ras al-Jinz, as-Suwayh, Nippur, Tapa Garwa, Tell Djokha (Umma), Ashur, Ras-al-Qala (Bahrain), Rosal Junyaj, and other places.³ Seals of Harappan style are found at Ur (Iraq), Lagash (Iraq), Susa (Iran), Tell Asmar (Iraq), Umma (Iraq), and other places. Interestingly, a circular seal of the Dilmun-type or of the Persian Gulf was found at Lothal.⁴

The excavations at Ras al-Jinz, Sultanate of Oman have proved the existence of direct interaction between Lothal and other Harappan coastal sites and this maritime trade centre. Archaeologists have noticed at RJ-2 (Ras al-Jinz) the remains of the alleged Black Boats of Magan, which positively exemplify the connection of Mesopotamia with India through the coastal centres in the Arabian Peninsula during the Bronze Age.⁵ This fact is attested by the evidence of bitumen fragments of Indian origin from the coating of a boat and discovery of objects like ivory combs, seals and sealings, and painted potsherds of Harappan origin in the excavations at Ras al-Jinz. Fascinatingly, the shoulder of a painted jar found in Ras-al-Junayaz, Sultanate of Oman is inscribed with four Harappan characters.⁶ The large jar coated with a thick layer of black clay, which prevents the percolation of liquids, found in some of the sites in Oman is, in fact, a distinctive Harappan type of vessel.

The Mesopotamian texts mentioned that the products that came from Meluha were carnelian, lapis lazuli, copper, gold, ivory, pearl, shell objects, ebony, varieties of wood, and also perhaps textiles. Also, a Mesopotamian myth tells of Meluha: “May your bird be the *haja*-bird, may its call be heard in the royal palace.” The *haja*-bird may be considered a peacock. The Harappans probably brought copper from Oman, in addition to the local supply. The chemical analysis of both Omani copper and Harappan artefacts indicates traces of nickel and thus suggests a common origin. Harappan people also imported silver, wool, perfumes, and leather products from Mesopotamia.

² Possehl, “Meluhha.”

³ Ratnagar, *Encounters*; Tosi, “Possible Harappan Seaport;” Rao, *Lothal*, Vol. I; Possehl, “From Sumer to Meluhha,” 185; Possehl, “Seafaring Merchants of Meluhha;” Possehl, “Indus-Mesopotamian Trade,” 337.

⁴ Rao, *Lothal*, 228-238.

⁵ Cleuziou and Tosi, “Black Boats of Magan;” Cleuziou and Tosi, “Ra’s al-Jinz.”

⁶ Tosi, “The Proto Urban Cultures.”

Earliest Evidence of Cotton in Indian Sub-Continent

Cotton and its products have been important trade commodities ever since their production in India. In fact, India is one of the centres of the origin of cotton production in the world.⁷ The evidence of the long history of Indian cotton is revealed from sculptures, paintings, inscriptions, literatures, foreign accounts, and coins, in addition to the remains retrieved from the archaeological excavations. Cotton is the most important natural textile fibre, along with cellulosic textile fibre, in the world. Cotton fibres are the seed hairs of plants of the order Malvales, family Malvaceae, tribe Gossypieae, and genus *Gossypium*. The genus *Gossypium* comprises around fifty species that grow mainly in tropical and subtropical regions. There are four principal domesticated species of cotton of commercial importance: *hirsutum*, *barbadense*, *arboreum*, and *herbaceum*.⁸ Interestingly, the earliest known example of cotton (*Gossypium Sp.*) in the world came from a Neolithic site in the Indian sub-continent.⁹ The metallurgical analysis of a copper bead from an aceramic Neolithic burial (6th millennium BCE) at Mehrgarh (Pakistan) in the northern part of the Kachi Plain in central Baluchistan revealed several threads preserved by mineralization. The study of the threads through a reflect-light microscope and a scanning electron microscope indicates that they are cotton (*Gossypium Sp.*) threads. The outcome of the study demonstrates that the Neolithic people used cotton and also perhaps even domesticated cotton plants in the Kachi plain of central Baluchistan. Besides these fibres, a few seeds attributed to *Gossypium Sp.*, were found in Period II (Neolithic) context (5th millennium BCE) at Mehrgarh.¹⁰ Apparently, neither the fibres, nor the seeds from Mehrgarh clearly ascertain that cotton was domesticated in this area during the Neolithic period, but the remains of cotton seeds and fibres in this site at least indicate the existence of a wild variety of cotton, if not of a domesticated variety

Furthermore, the ancient sites known as Dhuweila in eastern Jordan also yielded fibres and impressions of a woven cotton (*Gossypium Sp.*) fabric in the 4th millennium BCE context.¹¹ Since the ecological factors of this area do not permit the cultivation of cotton, the specimen was most likely imported from elsewhere, most probably from the Indian sub-continent.¹² Perhaps this may be the earliest evidence of cotton export from the Indian sub-continent to other parts of the world.

⁷ The earliest known traces of cotton found in Peru are dated around 4000 to 3500 BCE. It is of *Gossypium barbadense*, one of several species of cotton. Dillehay, et al., "Preceramic Adoption;" Rossen, "Preceramic Plant Gathering, and Farming," 177-192.

⁸ Lewin, *Cotton Fiber Chemistry and Technology*, 1-2.

⁹ Moulherat, et al., "First Evidence of Cotton."

¹⁰ Costantini, "The Beginning of Agriculture."

¹¹ Betts, et al., "Early Cotton in North Arabia."

¹² Moulherat, et al., "First Evidence of Cotton," 1399; Potts, *Mesopotamian Civilization*, 270-271.

Evidence of Cotton Production During the Harappan Period

It seems that the Harappan people were the pioneers to cultivate, weave, and spin cotton. Notwithstanding, there is much indirect evidence about the prevalence of cotton and textile manufacturing during the Harappan Period, the material evidence of them is scarce. The reason may be that organic materials such as cloth, leather, wood, and reeds generally decompose, especially in tropical regions. However, a number of spindle whorls used to spin thread and eye-needles used for sewing cloth were found in many of the Harappan sites.¹³ The spindle-whorls are circular objects, with one or more central holes, used as a flying wheel in a spindle (*takli*). They may either be disc-shaped or plano-convex in section, made of materials like terracotta, bone, shell, faience, stone, metal, and wood. The one-holed whorls, fixed to metal or wooden spindles, were probably used in spinning cotton, whereas in whorls with more than one hole, as with many split wooden spindles, were used probably to spin coarse fabric such as jute. Harappa, Mohenjo-daro, Chanhudaro, Lothal, Surkotada, and Kalibangan are some of the Harappan sites that have yielded spindle-whorls. The needles, mainly used for stitching, are round and oblong pins of various sizes, with one end pointed and the other thick and perforated. The earliest evidence of needles in India is reported from the Neolithic context at Burzahom, Chirand, and Bagor.¹⁴ The needle with a hole at one end is found from the Harappan level at Lothal and a few other sites.

A stone statue known as the Priest-King found at Mohenjo-daro is shown wearing a cloth (shawl) over his left shoulder, leaving bare the right shoulder and chest. The cloth was exquisitely decorated with a trefoil pattern, which exhibits the prevalence of a sophisticated textile industry during the Harappan Period. Some of the Harappan terracotta images of men are shown wearing a cloth around the waist, somewhat resembling a modern dhoti, which often passed between the legs and tucked up behind, while the women's clothing seems to have been a knee-length skirt.

Cotton Material found at Mohenjo-daro

Interestingly, the excavations of the Harappan sites at Mohenjo-daro (Pakistan) by John Marshall between 1922 and 1927 found, in the Mature Harappan level (2600-1900 BCE), a small piece of woven material adhering to the lid of the silver vessel, which had been preserved by being impregnated with silver salts. Marshall mentions, "This fragment of cloth was submitted to Mr. James Turner, Director of the Technological Research Laboratory, Bombay, for examination, who remarks in his preliminary report that "The fibre was exceedingly tender and broke under very small stresses. However, some preparations were obtained revealing the convoluted structure characteristic of cotton. All the fibres examined

¹³ Tripathi, "Metals and Metallurgy."

¹⁴ Ghosh, *Encyclopaedia of Indian Archaeology*, Vol. I, 183.

were completely penetrated by fungal hyphae.”¹⁵ A.N. Gulati and Arthur James Turner, who seriously examined the specimen, concluded that all of them were made from cotton. The fabric was prepared from 34s counts and tentatively of *Gossypium Arboreum* species. The relevant portion of the research paper published by both the scholars is as follows, “Of the three samples, the first was a small fragment of fabric, very much tendered and penetrated by fungal hyphae, weighing 2 oz. per sq. yard (0.836 sq. m), made from 34s counts, and containing 60 ends per inch (2.54 cm) and 20 picks per inch. The fragment of fabric that was recovered had a dark creamy colour, and measured about one-tenth of an inch in one direction and one-third of an inch in the other direction. Unfortunately, no photograph was taken of the original fragment. The material was exceedingly tender, and the greatest possible care had to be exercised in its manipulation. In fact, in teasing the fibres of the yarns apart for the microscopic examination, it was impossible to avoid breaking them, so that all the microscopic observations were made on minute lengths of fibre.”¹⁶

Evidence of Cotton from Other Harappan Sites

Cotton, either in the form of fibres or flax seeds or the fabric impression on terracotta objects, has been reported from many sites in the Mature Harappan (2600-1900 BCE) and Late Harappan (1900-1400 BCE) levels.¹⁷ The remains of cotton string, preserved inside a carnelian bead, were found at Shahi Tump in southern Baluchistan (Pakistan) during the excavation of a grave datable to the 4th millennium BCE.¹⁸ In Balakot, Sindh region, Pakistan, Malvaceae pollen type comparable to *Gossypium* was reported in the Mature Harappan Period.¹⁹ The carbonized seed of cotton and terracotta objects with fabric impressions have been found in the Mature and Late Harappan levels at Harappa (Pakistan).²⁰ Kunal, a Harappan site in Haryana, India has yielded carbonized cotton seeds in the Early Harappan context.²¹ Carbonized seeds of cotton were also found at Sanghol (Punjab, India),²² Hulas (Uttar Pradesh, India),²³ Kanmar (Gujarat, India),²⁴ and other sites in the Late Harappan context. Indirect evidence of fabric has been traced from some of the terracotta sealings obtained from the warehouse in Lothal, the Harappan maritime trade centre in Gujarat. The sealings have a positive impression of the Harappan seal on one side and the packing

¹⁵ Marshall, *Mohenjo-Daro and the Indus Civilization*, Vol. II, 585.

¹⁶ Gulati and Turner, *A Note on the Early History of Cotton*.

¹⁷ Fuller, “The Spread of Textile Production.”

¹⁸ Moulherat, et al., “First Evidence of Cotton,” 1399.

¹⁹ McKean, *The Palynology of Balakot*; Dales, “Some Fresh Approaches to Old Problems.”

²⁰ Weber, “Seeds of Urbanism,” 818.

²¹ Saraswat and Pokharia, “Palaeoethnobotanical Investigations at Early Harappan Kunal,” 112.

²² Saraswat, “Plant Economy of Barans.”

²³ Saraswat, “Plant Economy of Late Harappans at Hulas.”

²⁴ Kharakwal, Rawat and Osada, “Kanmer: A Harappan Site in Kachchh, Gujarat, India.”

materials, including cloth, on the other side.²⁵ The excavator states that the bales used to be wrapped in mats and cloth.²⁶ The impression of the textile on a trough was also reported from the Harappan levels of Alamgirpur, Uttar Pradesh.²⁷ The impression of a thicker type of cloth with vertical stresses on potsherd has been noticed from the Painted Grey Ware (PGW) levels (1100 BCE- 800 BCE) of Atranjikhhera, Uttar Pradesh.²⁸

Apart from the Harappan sites, evidence of cotton was also found in the Chalcolithic (1600-700 BCE) and Early Iron Age (1000-500 BCE) sites located in various parts of India. Notable among them are: Imlidhi Khurd, Uttar Pradesh, Period II (Chalcolithic), 1300-800 BCE;²⁹ Waina (Uttar Pradesh), Period I (Chalcolithic), 1600-800 BCE;³⁰ Sringaverapura, Uttar Pradesh, Late Ochre-Coloured Pottery, 1200-700 BCE,³¹ and other sites. The fragment of a cotton seed found in the Early Iron Age (950-900 BCE) context at Hallur, Karnataka, South India seemed to be a part of an ovate seed. The seed is most likely of *Gossypium Arboreum* species.³²

Evidence of Cotton Export by the Harappan People

The Harappan civilization's economy appears to have depended significantly on trade, both inland and maritime trade. The material evidence demonstrates their active interaction with contemporary civilizations and also that their trade networks economically integrated a huge area, including major parts of the Indian sub-continent, Middle Eastern countries, Central Asia, and beyond. Apart from other materials, cotton products remained as an important export good of the Harappans. The sealing from Umma (modern Umm al-Aqarib, near Jokha in Iraq) is reported to have been found in association with a bale of cloth, which evidently was exported from India.³³

There existed a remarkable exchange and interaction between the Indus Civilization and the people in the Oman peninsula. The presence of pottery, especially the large black slipped storage jars, and painted vessels; seals and sealing; ivory objects; metal tools; cubical weights; semi-precious stone beads; beads made of high-fired dolomitic steatite, and other materials of Harappan origin, mainly in the coastal sites of the Oman peninsula, attest to the active interaction between both the regions.³⁴ Interestingly, a steatite bead retrieved from the excavations of Umm an-Nar coastal site at Ras al-Hadd in the Sultanate of Oman, has traces

²⁵ Rao, *Lothal*, 305, 322.

²⁶ Ghosh, *Encyclopaedia of Indian Archaeology*, Vol. I, 335.

²⁷ Ghosh, *Encyclopaedia of Indian Archaeology*, Vol. II, 11-12.

²⁸ Ghosh, *Encyclopaedia of Indian Archaeology*, Vol. I, 335.

²⁹ Saraswat, "Agricultural Background of the Early Farming Communities."

³⁰ *Ibid*

³¹ Saraswat, "Ancient Crop Remains from Sringeverapura."

³² Fuller, et al., "Early plant domestications;" Fuller, "The Spread of Textile Production," 5.

³³ Scheil, "Un Nouveau Sceau Hindou Pseudo-Sumerien," 55-56; Gadd, "Seal of Ancient Indian Style found at Ur," 15.

³⁴ Cleuziou and Méry, "In-between the great powers;" Cleuziou and Tosi, "Ra's al-Jinz;" Cleuziou Tosi, *In the shadow of the ancestors*; Possehl, "Meluhha;" Thornton, "Mesopotamia, Meluhha, and those in between."

of what looks like cotton fibre preserved on the interior of the bead drill hole.

The fibres have the symptomatic shape of cotton and their width range from 10 to 35 µm. It seems that they are all bunched up and tangled without any indication of twist direction. Most probably it happened due to some abrasion of the original cordage that was used to string the bead. The perforation in the bead was probably made by drilling from two directions which, however, did not meet exactly in the centre of the bead. Due to this, a slight ledge was created which might have facilitated the accumulation of the fibre inside the bead drill hole.³⁵ Notwithstanding that the fibres from the local date palm and other local plants were predominately used in the Oman peninsula for various purposes, the possible presence of cotton and jute would certainly indicate the links to the Harappan civilization.

Earliest Evidence of Silk in Indian Sub-Continent

The origin of silk production³⁶ and the diffusion of its production techniques is a long and fascinating history. Notwithstanding that it is generally considered that China was the land of origin of silk production, recent research has revealed that the occurrence of silk in the Indian sub-continent is almost contemporaneous with the earliest evidence for silk in China. The earliest tangible archaeological evidence for domesticated silk use in China came from Qianshanyang, a Liangzhu Neolithic site in Zhejiang province.³⁷ The silk samples of *Bombyx mori* (the domestic silk moth) found from the earliest cultural deposit of the site are dated between c. 3500 and 2700 BCE.³⁸ But the identification of sesame (*Sesamum indicum*) and peanut (*Arachis hypogaea*) from these deposits, if correct, raises the issue of contextual integrity, because sesame is thought to come from India and peanuts are a South American plant. The silk moth *Bombyx mori* was domesticated from the wild silkworm *Bombyx mandarina*, which existed almost throughout the whole of Asia, mainly in India, China, Korea, Japan, and the eastern regions of Russia.³⁹

The silk from wild indigenous varieties of silkworms has been identified in the Indian sub-continent more or less contemporary with the earliest clear archaeological evidence for silk in China. The microscopic analysis of thread fragments found inside a copper or copper-alloy bangle and ornament from Harappa (Pakistan) and steatite beads from other Harappan sites called Chanhudaro (Pakistan) have yielded silk fibres, dating to c. 2500–2000 BCE.⁴⁰

³⁵ Cattani, et al., “New excavations at the Umm an-Nar site,” 69-84.

³⁶ The protein fibre of silk is composed mainly of fibroin and is produced by certain insect larvae to form cocoons. There are four types of natural silk which are produced in the world. The best-known silk is obtained from the cocoons of the larvae of the mulberry silkworm *Bombyx mori* reared in captivity (sericulture). Three other types fall into the category of non-mulberry silks, namely: Eri silk; Tasar silk and Muga silk. There are also other types of non-mulberry wild silk known as Anaphe silk, Fagara silk, Coan silk, Mussel silk and Spider silk.

³⁷ Zhou, “Qianshanyang canjuanpian chutu de qishi,” Vainker, *Chinese Silk: A Cultural History*.

³⁸ Kuhn, “The silk workshops of the Shang Dynasty.”

³⁹ Good, Kenoyer and Meadow, “A Reply to Ji-Huan He;” Dayalan, “The Origin of Silk Production.”

⁴⁰ Good, Kenoyer and Meadow, “New Evidence for Early Silk in the Indus Civilization.”

This investigation reveals the earliest evidence in the world for any silk outside China and is more or less contemporaneous with the earliest evidence for silk in China.

During excavations of Mound E. at Harappa in 1999, preserved fibre forming a thread was noticed inside the hollow portion of the copper or copper-alloy bangle fragment. The bangle fragment was retrieved from the cultural deposit datable to the Period 3C (c. 2200–1900 BCE). Another thread sample from Harappa was found during the archaeological fieldwork in the year 2000. The thread was somewhat safely preserved inside a coiled wire ornament made of copper or of a copper-alloy, which was retrieved from the debris datable to the late phase of Period 3A or the early phase of Period 3B (c. 2450 BCE). The ornament looks like some sort of necklace made up of two strands of coiled wire strung with silk thread. On the basis of SEM image analysis, there are two types of thread forms identified.⁴¹ The specimen found inside the bangle is of wild *Antheraea* silk and seems to be from the *A. assamensis* species. Another sample inside the ornament is also of a wild *Antheraea* silk but seems to be from a different species, *A. mylitta*. It appears that both the species are indigenous to South Asia. It seems that the silk is not degummed but contains sericin-coated twinned *brins*, or filaments, of fibroin.

The thread specimen from the microbead recovered from Chanhu-daro, another Harappan site, was also analyzed. The thread comprises a single ply of approximately 40–50 strands, with a slight ‘S’ twist. SEM image analysis of the fibres from the thread showed that they appear partially gummed and partially twinned, characteristic of a reeled (but not degummed) silk. The fibres may be from *A. assamensis* or perhaps from a species of *Philosamia* (Eri silk), yet another South Asian moth species.

The variety in type, technology, and thread forms of these examples of silk provides a glimpse into the extent of knowledge about sericulture in the Harappan Civilization during the 3rd millennium BCE. Besides these sites, the silk might have been produced apparently in many Harappan sites. However, the evidence of them is not preserved due to the climatic condition in India. Moreover, there is evidence for silk from a bead thread found at Nevasa (Maharashtra, India) in the Chalcolithic Period (c.1500 – 1000 BCE).⁴² A. N. Gulati, who examined the thread, opined that it was of white silk, seemingly spun from cocoons on a cotton nep.⁴³

Cotton and Silk Products Referred to in the Vedic and Later Vedic Literatures

There are many references to cotton and silk textiles in the Vedic literature (c. 1500-1000 BCE). Although it is generally believed that the mulberry culture came to India from China, the references in the old literatures point out that India had cultivated some kind of wild silks independently and at a much earlier date. The *Rig Veda* mentions the word “*Uma*,” which is

⁴¹ Good, Kenoyer and Meadow, “New Evidence for Early Silk in the Indus Civilization.”

⁴² Gulati, “Note on the Early History of Silk in India.”

⁴³ Ghosh, *Indian Archaeology – A Review*, 28.

generally translated as “land of silk.” The term “*Tārpya*,” occurring in the Vedic texts, perhaps referred to a silk garment.⁴⁴ Silk was referred to as “*Kausheya*” in the Valmiki’s *Ramayana*, a Sanskrit epic, dated variously in the first millennium BCE, and cotton was mentioned as “*Karpasa*” in the ancient Sanskrit literatures. Vedic literature contains many details regarding textile fabrics manufactured in that period. In the Rig Veda, the weavers were described as “*Vasovaya*.” The male weavers were known as *Vaya* whereas the female weavers were called *Vayitri*. Warping and woofing, pulling and fastening the thread in the wickets, is mentioned in the Vedic literature.⁴⁵ The word “*Ksauma*” mentioned in the *Vedas*, *Upanishads*, and in many other ancient literatures as fibre from the bark of linseed is probably referring to linen.⁴⁶ Linen is a durable natural fibre derived from the flax plant. There are many references to *Ksauma* (probably linen cloth) in the Valmiki’s *Ramayana*.⁴⁷ The term *Patroma* mentioned in *Mahābhārata*, a Sanskrit epic (1st millennium BCE), and Kautilya’s *Arthasāstra* (4th century BCE) may probably denote mulberry silk.⁴⁸

Hemp is one of the sources for making fibres in India. Notable among the many varieties of hemp are sana hemp, jute, and true hemp. *Śaṇa* is mentioned in the *Atharvaveda* and the *Śathapatha Brāhmaṇa*. The Buddhist literatures of an early period mention that the *śaṇa* plant was cultivated and its fibres were spun into threads (*śaṇa suttam*) then woven into garments known as *sañjya*.⁴⁹ A variety of cloth mentioned as *dukūla* in *Mahābhārata*, *Arthasāstra*, *Jātaka* stories, and other texts, seems to be made of fibre extracted from the bark of a tree.⁵⁰ It is surprising to note that many etymologically related textile terms appear in the same syntagm both in the Vedic Sanskrit language and the Avestan language of ancient Iran. This probably demonstrates the close contact between these two regions during the Vedic period and also the busy textile trade between them.⁵¹

Indian Textile Remains of 2nd-1st Millennium BCE found Abroad

The discovery of textile fragments made of cotton in a double-jar burial at Uruk (Iraq) datable to the Neo-and Late Babylonian periods (first half of the 1st millennium BCE) raises the question of whether the cotton used there was being grown in Babylonia by this time or whether it was imported from India or elsewhere.⁵²

The remains of silk have been retrieved from the mummy of a female excavated in the

⁴⁴ Olivelle (translated and edited), *Dharmasūtras: The Law Codes of Āpastamba, Gautama, Baudhāyana and Vasīṣṭha*, 383.

⁴⁵ Pandey, “Technique of Cotton Textile in Ancient India.”

⁴⁶ Chandra, *Costumes, Textiles, Cosmetics and Coiffure*, 6-11, 34.

⁴⁷ Ritu Pandey, “History of Linen in Indian Subcontinent.”

⁴⁸ Gopal, “Textiles in Ancient India,” 63.

⁴⁹ Gopal, “Textiles in Ancient India,” 53-54.

⁵⁰ Gopal, “Textiles in Ancient India,” 58-60.

⁵¹ Andrés-Toledo, “Some Considerations.”

⁵² Potts, *Mesopotamian Civilization*, 270-272.

burial ground of the ancient Egyptian workmen's village (Deir el-Medina) at Thebes, Egypt dated to around 1000 BCE.⁵³ Since there is no evidence of silk production in Egypt at such an early period, the silk cloth might have come from somewhere else. India could have been the possible source of its export as Egypt had a long maritime trade connection with India and many commodities of Indian origin are reported in Egypt. The discovery of pepper in the mummy of Ramses II in Egypt, datable to 1200 BCE, is one of the indications of possible contact between Egypt and India.⁵⁴

The archaeological excavations of a boat like coffin of the Late Shang-Zhou period (2nd millennium BCE) during the 1980s in Wuyi Mountain, situated in the district of Chong'an in the northwestern part of Minbei in Fujian, China revealed that the dead body was wrapped in several layers of clothes made of jute, hemp, silk, and cotton. The rough kind of cotton identified by the experts seems to be the earliest specimen of cotton found in China. Most probably the cotton cloth might have been imported from India.⁵⁵

Cotton and Silk Production in the Early Historic Period

From the dawn of the historical epoch (6th-5th centuries BCE), the production of cotton as well as silk increased greatly and the textile manufacturing and trading of them, both inland and abroad, expanded extensively. It seems that the Greeks first learned for certain about the cotton plant through a group of explorers who visited India along with Alexander the Great and his immediate successors in Bactria. They had seen in India the fine muslins and robes embroidered in gold and they also described the cleaning, ginning, spinning, and weaving of cotton in detail.⁵⁶ While writing about India, Herodotus (450 BCE) mentioned that India has wild trees that bear fleeces as their fruits.⁵⁷ Ctesias, a Greek physician and historian of the 5th century BCE seems to be the first European who observed the spinning and weaving of the natives of India; however, his description does not necessarily mean cotton as the fibre. Theophrastus, a Greek scientist and philosopher of the 4th century BCE, gave perhaps the first definite conception of Indian cotton cultivation. He mentioned, "The trees, from which the Indians make cloths, have a leaf like that of the mulberry; but the whole plant resembles the dog-rose. They set them in the plains arranged in rows, so as to look like vines at a distance."⁵⁸ Following Theophrastus, Pliny the Elder (1st century CE), a Roman naturalist and natural philosopher and a naval commander mentions, "The tree from which the Indian make garments resemble the mulberry in its leaves...." Here Pliny uses the word "*Tineas*,"

⁵³ Lubec, et al, "Use of Silk in Ancient Egypt," 1.

⁵⁴ A. Plu, "Bois et grains;" Boivin, et al., "Archaeological, Linguistic and Historical Sources."

⁵⁵ Ziegler, "The Cult of the Wuyi Mountains," 262; *Encyclopedia of India-China Cultural Contacts*, Vol. I.

⁵⁶ Watt, *The Commercial Products of India*, 611.

⁵⁷ Watt, *The Commercial Products of India*, 571.

⁵⁸ Watt, *The Commercial Products of India*, 571.

but the context shows that he probably referred to cotton.⁵⁹

The *Sītādhyakṣa* (Superintendent of Agriculture) mentioned in the Kauṭilya's *Arthasāstra* (4th century BCE), an ancient Indian Sanskrit treatise on statecraft, economic policy, and military strategy, is known to have supervised the entire task of agricultural production of the kingdom. *Arthasāstra* of Kauṭilya further mentioned that the production of weaving was under the supervision of the *Sūtrādhyakṣa* (Superintendent of Weaving) during the Mauryan period (4th-3rd centuries BCE). The *Sūtrādhyakṣa* supervised the production of cotton-thread (*Sūtra*), coats (*Varma*), cloths (*Vastra*), and ropes. In this task, female labourers of various categories were employed. Their wages were fixed on the basis of the quality (i.e., the threads spun fine, coarse (*Sthūla*) or medium) and quantity of their production.⁶⁰ Kauṭilya's *Arthasāstra* mentions that the cotton fabrics produced in Madhura (Central India), Aparānta (western India), Kalinga (Odisha), Kāsi (Varanasi), Vaṅga (Bengal), Vatsa (Uttar Pradesh), and Mahisha (Karnataka) are the best.⁶¹ Megasthenes, a Greek historian and an ambassador for Seleucid king Seleucus I, Nicator to the court of the Mauryan King Chandragupta Maurya (321–297 BCE), mentioned in his book *Indika* that the Indians wear flowered garments made of the finest muslin and garments dyed of bright colours.⁶² The Jaina text *Brihatkalpasūtra* of Bhadrabahu (4th century BCE) mentions different stages of preparation of thread from the cotton, viz., *seduga*, *rūya*, *piṃjīya* (*piṃjīta*), and *pelu*.⁶³ In the commentary, these words are explained: *Seduga* means cotton; when this *seduga* is ginned, it gets detached from the seeds and is termed *rūta*; this *rūta* struck with the bow (*piṃjanikā*) called *piṃjīta*, this *piṃjīkā* (cotton roll?) twisted round a skewer is called *pelu*.⁶⁴ This text, perhaps indicates the different processes of preparing thread from cotton, viz., ginning, batting, and twisting. *Divyavadāna*, a collection of early Buddhist legends, dated sometime between the 2nd and 4th century CE, mentioned three stages of manufacturing cotton cloth, viz., the preparation (*parikarma*) of the cotton; the spinning (*kartana*) of the thread, and the weaving (*vāya*) of the stuff.⁶⁵ *Milindapañha* (a Buddhist text dated between 100 BCE and 200 CE) also records the various steps for the preparation of textile.⁶⁶ Kalidasa, a great poet of the Gupta period (4th-6th cent CE), describes weddings where both the bride and groom were attired in expensive fabrics termed *dukula*.⁶⁷ Amarasimha, another poet of the Gupta period explains *ksauma* and *dukula* both as linen in *Amarkosha*. His narrative probably indicates that *ksauma* and *dukula* are

⁵⁹ Menon and Uzramma, *A Frayed History*, 16.

⁶⁰ *Kauṭilya's Arthashastra*, (Translated into English by R. Shamasatry), 160-162.

⁶¹ *Kauṭilya's Arthashastra*, (Translated into English by R. Shamasatry), 110.

⁶² McCrindle, *Ancient India as Described*, 70, 97.

⁶³ *Brihatkalpasutra and Original Nirukti* of Sthavir Arya Bhadrabahu Swami, Vol. III, edited by Chaturvijaya and Sishya Punyavijaya, 842-846.

⁶⁴ *Brihatkalpasutra and Original Nirukti* of Sthavir Arya Bhadrabahu Swami, Vol. III, edited by Chaturvijaya and Sishya Punyavijaya, 846.

⁶⁵ *Divyavadāna*, edited by E.B. Cowell and R.A. Neil, 276.

⁶⁶ Schlingloff, "Cotton-Manufacture in Ancient India," 88.

⁶⁷ In Kalidasa's *Kumarasambhava* VII, 7, 26 and 73, (Translated by Hank Heifetz); in Kalidasa's *Raghuvamsam* VII, 18 and 19, (Translated by A.N.D. Haksar).

synonyms (*ksaumam dukulamasyat*). Hiuen Tsang (Xuanzang), a Chinese traveller who visited India between 630-645 describes that Indians used to wear varied types of clothes made of cotton, silk, wool, linen, and the animal's hair.⁶⁸

The excavations at Bairat, Rajasthan yielded a fragment of cloth in which eight punch-marked coins were found wrapped dating to the early historic period (1st-2nd century CE). The analysis of the cloth carried out by Gulati and Turner has revealed that it is true cotton and woven with 20s and 16s yarns. Since there was a muddy deposit on the cloth, these counts should be regarded as the lowest limit, the actual counts probably being somewhat higher. The number of strands to an inch (2.54 cm) is 50 in the lengthwise direction, and 34 in the other.⁶⁹ Traces of cloth, most probably used to wrap the coins, were also found in the excavations at Rairh, Rajasthan in the early historic levels. The analysis of the cloth revealed that it was of a heavy variety of true cotton, weighing 7.99 oz (226 g) per sq. yard (0.836 sq. m) with 31 threads of cotton in one direction and 26 in the other.⁷⁰ At Paithan (Maharashtra), the capital of the Satavāhana rulers (1st cent. BCE – 3rd cent. CE), also the traces of cloth identified with hemp have been noticed on a lump of coins.⁷¹ Potsherds from the pre-Common Era bearing textile impressions have also been recovered at Mathura (Uttar Pradesh).⁷² One of the potsherds with the impression (2nd cent BCE) of cloth reported from Kaundinyapura (Maharashtra) comprised of 32 threads in the warp and 28 in the weft; whereas another impression (2nd-1st cent BCE) found at the same site showed 30 and 28 threads.⁷³

Early Evidence of Cotton and Silk Products in South India

The *Saṅgam* literature (3rd cent. BCE – 2nd cent. CE) mentioned the remarkable skill development in the art of weaving cotton and silk cloths in Tamil Nadu, the southernmost part of India, at a very early period. In some of the *Saṅgam* literature, finely woven cloth has been compared variously with the slough of smoke, the foam of milk, the cast-off skin of a snake, the white torrent of water falling from a high hill, and so on.⁷⁴ The cotton and silk clothes were called variously as *Tugil*, *Ātai*, *Aṟuvai*, *Kaliṅgam* (apparently imported from Kalinga area, i.e., Odisha), and other names. *Silappatikāram*, a Tamil epic of the 4th-5th centuries CE mentions thirty-two varieties of cotton cloth.⁷⁵ The epic also describes the street exclusively

⁶⁸ Watters, *On Yuan Chwang's Travels*.

⁶⁹ Sahnī, *Archaeological Remains and Excavations*, 22-23.

⁷⁰ Puri, *Excavations at Rairh*, 39-40.

⁷¹ Syed, "Paithan Excavations," 42.

⁷² Ghosh, *Encyclopaedia of Indian Archaeology*, Vol. I, 335.

⁷³ Dikshit, *Excavations at Kaundinyapura*, 157.

⁷⁴ *Puraṇānūṟu*, 398:20, in *Pattuppāṭṭu*, edited by Mohan and Nagarajan, 2004; *Kuṟiṅcipāṭṭu*, line. 55, in *Pattuppāṭṭu*, edited by Mohan and Nagarajan, 2004; K. K. Pillay, *A Social History of the Tamils*, 1975, 203-205. Even making leeway for some poetic exaggeration in the literary works, it can be reasonably held that the quality of the clothes produced was of a high standard.

⁷⁵ *Silappatikāram*, Canto. VI: 88, (Translated by Iyer), 1950; K. K. Pillay, *A Social History of the Tamils*, 203.

for the cloth merchants in Madurai where several kinds of bundles of cloths woven of cotton, wool, silk, and even hair were piled up.⁷⁶ Embroidery work was often employed to decorate the cloth.⁷⁷ The main decorative motifs were flowers figured either on the body or the border of the cloth.⁷⁸ The dyeing of the cloth was done more efficiently. Interestingly, the structures datable to the 1st century CE excavated at Arikamedu near Pondicherry, an Indo-Roman Trading centre, are supposed to be the vats used for dyeing muslin.⁷⁹ Spinning the cotton yarn was mainly done by women and they were called *Paruttipeṇḍu* or *Paruttippēṇḍir*.⁸⁰ The *Saṅgam* literature also mentioned well-woven silk cloth. In one of the *Saṅgam* works, mention is made about a fine dress made of silk (*paṭṭu*) with well-designed borders.⁸¹ *Tari* (weaver's loom) is often mentioned in the inscriptions of the early historic period.⁸² The communities involved in the textile production were called as *Kolikā* (*Kaulikāb*),⁸³ *Tantravāya*,⁸⁴ *Cāliyar*, *Kaikkōlar*, and so on.⁸⁵

Trade of Cotton and Silk Products in the Early Historic Period

Since ancient times, India has been a major exporter of textiles. The literary, archaeological, and palaeobotanical sources provide ample evidence about the busy trade of cotton and silk materials in the early historical period. The *Periplus of the Erythrean Sea* (1st cent CE) mentions that silk and cotton cloth, mallow cloth, all kinds of muslins, and yarn were exported from the Indian seaports such as Barygaza (Bharuch, Gujarat), Tagara (Ter, Maharashtra), Bacare (Porakad, Kerala), Muziris (Kerala), and others to western countries.⁸⁶ Large quantities of cloth, as stated in the text, were brought to Barygaza from the metropolis of Minnagara, an important inland trade centre.⁸⁷ This text, further, states that the Roman traders found silk at the mouths of the Indus and Ganges, in the Gulf of Cambay, and in Travancore (Kerala).⁸⁸ Since the land route was blocked due to the war between Rome and Parthia, the

⁷⁶ *Silappatikāram*, Canto. XIV: 205-207, (Translated by Iyer), 1950.

⁷⁷ *Purāṇāṅṅūru*, 274:01, (Translated by Iyer), 1935; *Silappatikāram*, Canto. VI: 88 (*niṅam kīlar pūntukūl*), (Translated by Iyer), 1950.

⁷⁸ *Silappatikāram*, Canto. XXII:21, (Translated by Iyer), 1950.

⁷⁹ Wheeler, "Arikamedu," 26-29.

⁸⁰ *Purāṇāṅṅūru*, 125:01 and 326:5, edited by Iyer; The soft cotton prepared by removing the seeds is mentioned in *Purāṇāṅṅūru*, 393:12.

⁸¹ *Porunarāruppatai*, 155, edited by Mohan and Nagarajan, 2004; *Akanāṅṅūru*, 236:11, edited by Nattar and Pillai.

⁸² Hultzsch, *South Indian Inscriptions*, Vol. 1, 144-155; Hultzsch, *South Indian Inscriptions*, Vol. 2, 342-361; Hultzsch, "Rayakota Plates of Skandasishya"; Mahalingam, "The Pullur Plates of Nandivarman II Pallavamalla, Year 33."

⁸³ Buhler, G. "A Prakrit Grant of the Pallava King Sivaskandavarman."

⁸⁴ Krishnamacharlu, "Vilavatti Grant of Pallava Simhavarman."

⁸⁵ Dayalan, *Computer Application*, 920-93.

⁸⁶ Schoff, *The Periplus of the Erythrean Sea*, 42-45.

⁸⁷ The city named Minnagara may be a popular emporium of cloths near Barygaza.

⁸⁸ Schoff, *The Periplus of the Erythrean Sea*, 172.

sea route was the only option for the Roman traders.⁸⁹ Strabo (64 BCE-24 CE), a Greek geographer and historian, mentioned the richness of Indian fabrics in detail and Arrian of Nicomedia, another Greek historian of 1st-2nd centuries CE, mentioned the textile trade between Indians and Arabs in the 2nd century CE.⁹⁰ The *Indica* of Arrian mentions that the cotton in India is whiter and brighter than that of any other country.⁹¹ The textile woven exclusively from Z-spun yarn, the blue resist-dyed fabrics, and the sailcloth datable to the 3rd-4th centuries CE found at Berenike, a seaport on the Red Sea coast, are most probably of Indian origin.⁹² The fragments of Indian cotton textile, probably used as sailcloth, were also reported from the excavations at Berenike in the Pre-Flavian middens (i.e., not later than 70 CE) and in the 5th-century rubbish deposits.⁹³ Fascinatingly, Quseir al-Qadim (Myos Hormos), the other major seaport on the Red Sea coast has also yielded Z/Z-spun cotton sailcloth, probably of Indian origin.⁹⁴ It is interesting to mention that the potsherds inscribed with South Indian Tamil-Brāhmi scripts of the early centuries of the Common Era are found at Berenike, Quseir al-Qadim, and Khor Rori- Sumharam in Oman.

Cotton and Silk Products and Trade in the Medieval Period

The Indian textile industry grew as a leading textile industry in the world from the medieval period onwards and textile materials became a major trade commodity both for internal and foreign trade. Many centres of textile manufacture emerged throughout India. The chronicle of two Arabs, namely Sulayman al-Tajir and Abu Zayd al-Hasan al-Sirafi, who visited China and India in the latter half of the 9th century and the beginning of the 10th century CE, mentions that in the kingdom of King Dahmā (identified as Dharmapala, of the Pala dynasty, who ruled the Bengal region) the garments are made in so extraordinary a manner that nowhere else are the like to be seen. It was so light and fine that a robe made of that cloth could be passed through a signet ring.⁹⁵ Ibn Khordadbeh, a Persian geographer and bureaucrat of the 9th century CE, records that the textiles of Rahma were of velvety cotton.⁹⁶ The cloth merchants were known as *Aṛuvai vaṇikar* in the ancient Tamil literatures and epigraphy. The *Mānasollāsa*, also known as *Abhilashitartha Chintamani*, an early 12th century Sanskrit text composed by the Kalyani Chālukya king Somesvara III, gives a long list of fabrics for the

⁸⁹ Schoff, *The Periplus of the Erythrean Sea*, 172.

⁹⁰ Schoen, *The Fragile Fabric of Union*, 26-31.

⁹¹ McCrindle, *Ancient India as described*, 224; Chandra, "The History of Indian Costume," 189.

⁹² J.P. Wild and F.C. Wild, "Textiles"; J.P. Wild and F.C. Wild, "Rome and India."

⁹³ J.P. Wild and F.C. Wild, "Berenike and Textile Trade on the Indian Ocean."

⁹⁴ J.P. Wild, "Cotton in Roman Egypt," 290; Handley, "Quseir al-Qadim 2003: The Textiles"; J.P. Wild, F.C. Wild and A.J. Clapham, "Roman Cotton Revisited."

⁹⁵ al-Tajir, *Ancient Accounts of India and China*, 16-18; Kennedy and Toorawa, *Two Arabic Travel Books*; Faḍlān, *Mission to the Volga* 41.

⁹⁶ Majumdar, *The Age of Imperial Kanauj*, 403.

king's use after their places of origin. Some of the names in the list are: Nagapattana, the Cōḷa country (Tamil Nadu), Anilavada in Gujarat, Mulasthana (Multan), Kalinga, and Vanga.⁹⁷

According to Chau Ju-Kua or Zhao Rukuo (1170-1231), a Chinese historian and politician, Gujarat produced a large number of foreign cotton stuffs of every colour (*chintzes*) for export to Arabian lands (Ta-shi).⁹⁸ He mentioned that the cotton clothes in Malwa (Central India) were such a very common product to form the subject of a considerable export trade.⁹⁹ The products of Malabar (Kerala), according to him, included foreign cotton stuffs of all colours (*chintzes*) and white cotton cloth (*tou-lo mien*).¹⁰⁰ Chau Ju-Kua states that in the Cōḷa region, cotton stuffs with coloured silk threads and other such stuffs were produced.¹⁰¹ The documents from the Cairo Genizah, dated between the 11th and 12th centuries, mention many trade centres namely Broach (Gujarat), Kanbayat, Nahrwāra (Anhilwada or Anilavada, modern Patan, Gujarat), Tana (near Mumbai), Kulam (Quilon), Faknur (on Malabar coast), Mangalore, Baribatan (Balyapattanam near Cannanore), Darmattan (Dharmapattnam), Fandarayna (Pantalayini), and others in India and also the goods exported from India including Indian textiles such as *fūtas* (an untailed long piece of cloth), *lālas* or *lānas* or *lānis* silk (a kind of red silken stuff of a delicate texture), *furjyyas* (ropes), and other varieties. One of the documents mentions that the *lālas* silk garment was made in or exported from the city of Kulam (Quilon) in southern India.¹⁰²

Marco Polo (1254-1324), a Venetian merchant who travelled through Asia between 1271 and 1295, observed that fine buckram (cotton stuffs) was produced in the kingdom of Cambay (Gujarat). He also speaks about the manufacture of fine and delicate buckram in Malabar (Kerala) and fine cotton fabrics in the kingdom of Mutfli (Andhra Pradesh).¹⁰³ As quoted by Abu'l Fida (1273-1331), a geographer and historian of Syria, Ibn Sa'id mentioned that Ma'bar (Kerala) was famous for its arts of washing and dyeing and that it exported *lānas* (colour silk or cotton cloth).¹⁰⁴

Influence of Indian Textile Production in Southeast Asia and Sri Lanka

The influence of Indian textile technology and costumes is conspicuous in Southeast Asian countries.¹⁰⁵ The remains of cotton *Gossypium Sp.* from the Iron Age site (400 BCE) of Ban

⁹⁷ *Mānasollāsa of King Someśvara*, Vol. III, edited by G.K. Shrigondekar, 1017-1020.

⁹⁸ *Chau Ju-kua: his work*, translated by Hirth and Rockhill, 92.

⁹⁹ *Chau Ju-kua: his work*, translated by Hirth and Rockhill, 93.

¹⁰⁰ *Chau Ju-kua: his work*, translated by Hirth and Rockhill, 88.

¹⁰¹ *Chau Ju-kua: his work*, translated by Hirth and Rockhill, 96.

¹⁰² Goitein and Friedman, *Indian Traders of the Middle Ages*, 378.

¹⁰³ Marco Polo, *The Travels of Marco Polo*, 361, 389, 398.

¹⁰⁴ Nainar, *Arab Geographers' Knowledge of Southern India*, 55-56.

¹⁰⁵ Cameron, *Textile Technology*; Kahlenberg, "Who Influenced Whom?," in *Textiles from India: The Global Trade*.

Don Ta Phet, Thailand obviously indicates the contact between India and Thailand during that period.¹⁰⁶ The great spread of Indian philosophical, religious, and political influence during the early years of the first millennium CE into Southeast Asian countries paved the way for a busy trade link between India and those countries. In fact, Indian textiles figured as a dominant export product due to the plentiful production of cotton, adoption of advanced dyeing and designing technology, and skilled manpower. For example, in 430 CE, Ho-lo-tan in She-p'o (Java), a western Indonesian kingdom, sent a diplomatic mission to China with tribute comprised of a diamond ring, red parrots, white cloth from India, cloth from Gāndhara, and other items.¹⁰⁷

In addition, there is substantial evidence that the textiles produced in Southeast Asia had Indian influence in their designs, motifs, materials, and methods of production. One type of technique found in both Indian and Southeast Asian textiles is *ikat*, the tying of the warp or weft yarns before dyeing, to create a pattern. Some scholars' opinions that the weft ikat technique (resist-dyeing for the weft yarns) with Indian designs was introduced into some Southeast Asian countries during the Indianization period.¹⁰⁸ Although silk was probably introduced to Southeast Asia from China, it is referred to by a name derived from Sanskrit (*Sutera*) and thus its introduction was probably influenced by the Indian custom that prevailed in the Srivijaya Kingdom and flourished between the 7th and the 13th centuries CE.¹⁰⁹ The Srivijaya kings had maintained a dynamic trade with India. They also employed experts from India as scribes knowledgeable in Sanskrit, as musicians and dancers, and probably as textile producers too.

Funan, an Indianized kingdom in Southeast Asia that arose in the 1st century CE, was influenced markedly by Indian culture and tradition. It had active trade relations with India and China. Also, Khmer costume, design elements of Khmer clothes, dying and weaving technology, along with fabric and textile production terminology in Khmer clearly show Indian influence.¹¹⁰ Indian-inspired cloths were used in the religious ceremonies and in the courts and palaces to mark status, wall hangings, and so on. An Indian origin for cloth is also inferred in Khmer mythology. The incorporation of Indian techniques, materials, and motifs in locally produced textiles in Cambodia expresses the close link of textile tradition between the two countries. The traditional Khmer cloths, the *sampot hol*, strongly resemble Indian *patola*. Sampot are dyed using a resist technique called weft ikat.

Likewise, the double ikat *patola* of Gujarat (India) were highly valued and widely marketed in Southeast Asian societies.¹¹¹ The *pelangi* cloths are the luxury cloth used on ceremonial occasions in Indonesia. These are usually made of silk, which has been tied and sewn before dyeing to create multicoloured patterns. Both the technique and the design arrangements

¹⁰⁶ Glover, "Ban Don Ta Phet."

¹⁰⁷ Wolters, *Early Indonesian Commerce*, 150, 320; Goodrich, "Cotton in China."

¹⁰⁸ Wolters, *Early Indonesian Commerce*, 150, 320; Kerlogue, "Textiles of Jambi," 130-131.

¹⁰⁹ Kerlogue, "Textiles of Jambi," 130.

¹¹⁰ Kerlogue, "Textiles of Jambi," 130.

¹¹¹ Gittinger, *Master Dyers*, 152-153.

of *pelangi* cloths from Indonesia resemble those found in *odhani* (*bandhani*) cloths from India, especially Gujarat.¹¹² Another prominent textile used in ceremonial rites in Southeast Asia is *songket*, a cloth, usually composed of a silk tabby, ground with gold thread supplementary weft embellishments. This cloth perhaps also shows the impact of Indian influence. The sari, sarong, and other dress materials in Indonesia and other Southeast Asian countries are the greatest surviving examples of traditional Indian and Southeast Asian textiles, which demonstrate the remarkable exchanges of ideas, materials, and designs between the two great cultures over the centuries. As clear examples of this, spindle whorls, some of them exhibiting possible Indian influence in their making, were found in the excavations at Oc Eo, the famous port city, Lopburi, Ban Don Ta Phet, the Krek region, and a few other sites in Southeast Asia.

Finally, apart from Southeast Asian countries, Sri Lanka was one of the prime destinations for marketing Indian textiles. It is suggested that from Cambay (Gujarat) a special variety of cloth was exported to Ceylon, which was called “Cambaya” from the place of origin.¹¹³ The king of Ceylon presented valuable cloth imported from Gujarat to some Burmese monks at the end of the 15th century.¹¹⁴ *Kasi salu* or Benares silk was considered a luxury in Ceylon¹¹⁵ and it is mentioned in many Sri Lankan works of the 13th-14th centuries, such as *Saddharmaratnāvalī*,¹¹⁶ *Saddharmaratnākara*,¹¹⁷ and the *Dambadeni Asna*.¹¹⁸ The *Daladāsirita* (14th century) and the *Saddharmaratnāvalīya* (13th century) mention that Ceylon also imported textile goods from the Cōḷa country (Tamil Nadu).¹¹⁹

Conclusion

The textile industry has constituted the most important sector of the Indian economy and the Indian textile industry has been one of the leading textile industries in the world since antiquity. India has one of the finest textile traditions in the world with respect to weaving, dyeing, and surface decoration. The archaeological evidence and literary and epigraphical sources clearly indicate the prosperous status of cotton and silk textile production in India for centuries and these products have played a vital role in the maritime trade relations between countries all along the ancient silk routes. The ancient silk routes not only played a dynamic role in promoting maritime trade, but were also responsible for the transmission of religion, culture, tradition, language, technology, art, and architectural idioms from India to other countries and vice versa.

¹¹² Bühler, Fischer, and Nabholz-Kartaschoff, *Indian Tie-dyed Fabrics*, Plates. XI, 66, 67 A,B,C, D, 78.

¹¹³ Perera, “Foreign Trade and Commerce of Ancient Ceylon,” 21.

¹¹⁴ *Kalyāni Silālipi*, edited by Buddhadatta, Polwatte, 26-27.

¹¹⁵ *Saddharmaratnākara*, edited by Kalapaluvave Sugunasara, 20.

¹¹⁶ *Saddharmaratnāvalī*, edited by Jayatilaka, 976.

¹¹⁷ *Saddharmaratnākara*, edited by Kalapaluvave Sugunasara, 20.

¹¹⁸ *Dambadeni Asna*, edited by D.D. Ranasingha, 3.

¹¹⁹ *Daladāsirita*, edited by Vajira Ratnasooriya, 46.

Bibliography

- al-Tajir, Sulayman. *Ancient Accounts of India and China, by two Mohammedan Travellers, Who Went to those Parts in the 9th century; Translated from the Arabic, by the Late Learned Eusebius Renaudot, with Notes, Illustrations and Inquiries by the Same Hand*. London: Printed for Sam. Harding, 1733.
- Andrés-Toledo, Miguel Ángel. "Some Considerations about Vedic, Avestan and Indo-Iranian Textile Terminology." In *Textile Terminologies in the Ancient Near East and Mediterranean from the Third to the First Millennia BC*, edited by Cécile Michel and Marie-Louise Bech Nosch, 430-444. Oxford: Oxbow Books, 2010.
- Betts, A., K. van der Borg, A. de Jong, C. McClintock, and M. van Stryndonck. "Early Cotton in North Arabia." *Journal of Archaeological Science* 21 (1994): 489-499. <https://doi.org/10.1006/jasc.1994.1049>.
- Boivin, Nicole, Roger Blench, and Dorian Q. Fuller. "Archaeological, Linguistic and Historical Sources on Ancient Seafaring: A Multidisciplinary Approach to the Study of Early Maritime Contact and Exchange in the Arabian Peninsula." In *The Evolution of Human Populations in Arabia, Vertebrate Paleobiology and Paleoanthropology*, edited by M.D. Petraglia and J.I. Rose, 251-278. Heidelberg: Springer Dordrecht, 2009.
- Buddhadatta, Polwatte, ed. *Kalyāni Silālipi*. Colombo, 1924.
- Buhler, G. "A Prakrit Grant of the Pallava King Sivaskandavarman," In *Epigraphia Indica (EI)*, Vol. I, Archaeological Survey of India, edited by Jas Burgess, 2-10. Calcutta: Government Printing, 1892.
- Bühler, Alfred, Eberhard Fischer, and Marie-Louise Nabholz-Kartaschoff. *Indian Tie-dyed Fabrics*. Ahmedabad: Calico Museum, 1980.
- Cameron, Judith Anne. "Textile Technology in the Prehistory of Southeast Asia," Vol. 1. PhD diss., The Australian National University, Canberra, 2002.
- Cattani, Maurizio, Jonathan Mark Kenoyer, Dennys Frenez, Randall W. Law, and Sophie Méry. "New Excavations at the Umm an-Nar Site Ras al-Hadd HD-1, Sultanate of Oman (seasons 2016-2018): insights on cultural interaction and long-distance trade." *Proceedings of the Seminar for Arabian Studies* 49 (2019): 69-84.
- Chandra, Moti. *Costumes, Textiles, Cosmetics and Coiffure in Ancient and Mediaeval India*. Delhi: Oriental Publishers, 1973.
- Chandra, Moti. "The History of Indian Costume from the 1st century A.D. to the Beginning of the 4th century." *Journal of the Indian Society of Oriental Art* VIII (1940): 185-224.
- Chaturvijaya, Guru and Sishya Punyavijaya, eds. *Brihatkalpasūtra and Original Nirṣukti of Śhāvir Arya Bhadrabahu Swami*, Vol. III. Bhavnagar: Shri Atmanand Jain Sabha, 1936.
- Cleuziou, Serge, and S. Méry. "In-between the Great Powers: The Bronze Age Oman Peninsula." In *Essays on the Late Prehistory of the Arabian Peninsula Serie Orientale Roma*, 93n, edited by M. Tosi, S. Cleuziou and J. Zarins, 273-316. Rome: Istituto Italiano per l'Africa e l'Oriente (IsIAO), 2002.
- Cleuziou, Serge, and Maurizio Tosi. "Black Boats of Magan: Some Thoughts on Bronze-Age Water Transport in Oman and Beyond from the Impressed Bitumen Slabs of Ra's al-

- Junayz.” In A. Parpola and P. Koskiliop, eds., *South Asian Archaeology 1993*, Vol. 2, 745-761. Helsinki: Suomalainen Tiedakatemia, 1994.
- Cleuziou, Serge, and Maurizio Tosi. “Ra’s al-Jinz and the Prehistoric Coastal Cultures of the Ja’alan.” *Journal of Oman Studies* 11 (2000):19-73.
- Cleuziou, Serge, and Maurizio Tosi. *In the Shadow of the Ancestors. The Prehistoric Foundations of the Early Arabian Civilization in Oman*. Muscat: Ministry of Heritage and Culture of the Sultanate of Oman, 2007.
- Costantini, L., “The Beginning of Agriculture in the Kachi Plain: The Evidence of Mehrgarh.” In *South Asian Archaeology 1981*, edited by B. Allchin, 29-33. Cambridge: Cambridge University Press, 1984.
- Cowell, E.B., and R.A. Neil., eds. *Divyāvādāna, A Collection of Early Buddhist Legends*. Cambridge: Cambridge University Press, 1886.
- Dales, G.F. “Some Fresh Approaches to Old Problems in Harappan Archaeology.” In *Studies in the Archaeology of India and Pakistan*, edited by J. Jacobson, 117-136. Delhi: Oxford & IBH Publishing Company, 1986.
- Dayalan, D., “Ancient Seaports on the Western Coast of India: The Hub of the Maritime Silk Route Network.” *Acta Via Serica* 3, no. 2 (2018): 49-72, <https://doi.org/10.22679/avs.2018.3.2.003>.
- Dayalan, D., *Computer application in Indian Epigraphy (Pallava Period)*. 3 vols. Delhi: Bharatiya Kala Prakashan, 2005.
- Dayalan, D., “The Origin of Silk Production.” *SilkRoadia - The Silk- Road Universities Network’s Web Magazine* 1 (Winter 2019): 7-12. http://www.sun-silkroadia.org/board/view?bd_id=webzine&wr_id=561.
- Dikshit, M.G., *Excavations at Kaundinyapura*. Bombay, The Director of Achieves and Archaeology, Maharashtra State, 1968.
- Dillehay, Tom, D., J. Rossen, T. C. Andres, and D. E. Williams. “Pre-ceramic Adoption of Peanut, Squash, and Cotton in Northern Peru.” *Science* 316 (2007): 1890–1893, <https://www.jstor.org/stable/20036586>.
- Encyclopedia of India-China Cultural Contacts*, Vol. I. New Delhi: Ministry of External Affairs, Government of India, 2014.
- Fadlān, Ahmad Ibn. *Mission to the Volga*. Edited and translated by James E. Montgomery. New York: New York University Press, 2014.
- Fuller, Dorian Q. “The Spread of Textile Production and Textile Crops in India Beyond the Harappan Zone: An Aspect of the Emergence of Craft Specialization and Systematic Trade.” In *Linguistics, Archaeology and the Human Past* (Indus Project, Occasional Paper 3), edited by Toshiki Osada and Akinori Uesugi, 1-26. Kyoto: Research Institute for Humanity and Nature, 2008.
- Fuller, Dorian, Ravi Korisetar, P. C. Venkatasubbaiah and Martin K. Jones, “Early Plant Domestications in Southern India: Some Preliminary Archaeobotanical Results.” *Vegetation History and Archaeobotany* 13, no. 2 (2004):115–129, <https://doi.org/10.1007/s00334-004-0036-9>.

- Gadd, C.J. "Seal of Ancient Indian Style found at Ur." In *Proceedings of the British Academy*, Vol. XVIII. London: Humphrey Milford Amen House, E.C., 1932.
- Ghosh, A. *An Encyclopaedia of Indian Archaeology*, Vol. I. New Delhi: Munshiram Manoharlal Publishers Pvt. Ltd., 1989.
- Ghosh, A. *An Encyclopaedia of Indian Archaeology*, Vol. II, New Delhi: Munshiram Manoharlal Publishers Pvt. Ltd., 1989.
- Ghosh, A., ed. *Indian Archaeology – A Review, 1959-60*. New Delhi: Archaeological Survey of India, 1960. 1996 (Reprint): http://nmma.nic.in/nmma/nmma_doc/Indian%20Archaeology%20Review/Indian%20Archaeology%201959-60%20A%20Review.pdf.
- Ghosh, G.K., and Shukla Ghosh. *Indian Textiles (Past and Present)*. New Delhi: APH Publishing Corporation, 1995.
- Ghosh, S.S., "Study of Ancient Fabric and its Identification." *Bulletin of the Hyderabad Archaeological Survey* 17 (1953).
- Gittinger, Mattiebelle. *Master Dyers to the World Technique and Trade in Early Indian Dyed Cotton Textiles*. Washington, DC: Textile Museum, 1982.
- Glover, Ian. "Ban Don Ta Phet: the 1984-85 Excavation." In *Southeast Asian Archaeology 1986, Proceedings of the First Conference of the Association of Southeast Asian Archaeologists in Western Europe*, BAR International Series 561, edited by Ian Glover and Emily Glover, 139-183. Oxford: Archaeopress, 1990.
- Goitein, S.B., and Mordechai Akiva Friedman, eds. *Indian Traders of the Middle Ages: Documents from the Cairo Geniza ("India Book")*. Leiden: Brill, 2008.
- Good, I.L., J.M. Kenoyer and R.H. Meadow. "New Evidence for Early silk in the Indus Civilization." *Archaeometry* 51, no. 3 (2009): 457–66, <https://doi.org/10.1111/j.1475-4754.2008.00454.x>.
- Good, I.L., J.M. Kenoyer, and R.H. Meadow. "A Reply to Ji-Huan He." *Archaeometry*, 53, no. 6 (2011): 1257-1258, <https://doi.org/10.1111/j.1475-4754.2011.00591.x>.
- Goodrich, L.C. "Cotton in China." *Isis* 34 (1934): 408-410, <https://doi.org/10.1086/347858>.
- Gopal, Lallanji. "Textiles in Ancient India." *Journal of the Economic and Social History of the Orient* 4, no. 1 (1961): 53-69.
- Gulati, A.N. "A Note on the Early History of Silk in India." In *Technical Reports on Archaeological Remains*, edited by J. Clutton Brock, K. Vishnu Mittre and A. Gulati, 53-59. Poona: Deccan College, 1961.
- Gulati, A.N. and Arthur James Turner. *A Note on the Early History of Cotton*. Indian Central Cotton Committee Technological Laboratory Bulletin, No. 17, Technological Series, No. 12. Bombay, 1928.
- Handley, F.J.L., "Quseir al-Qadim 2003: the textiles." *Archaeological Textiles Newsletter* 38 (2004): 27-30.
- Hirth, Friedrich, and W.W. Rockhill, trans., and annotated. *Chau Ju-kua: his work on the Chinese and Arab trade in the twelfth and thirteenth centuries, entitled Chu-fan-chi*. St. Petersburg: Imperial Academy of Sciences, 1911.
- Hultzsch, E. "Rayakota Plates of Skandasishya," In *Epigraphia Indica (EI)*, Vol. V, Archaeological

- Survey of India, edited by E. Hultzsch, 49-53. Calcutta: Government Printing, 1959.
- Hultzsch, E. trans, ed. *South Indian Inscriptions (SII)*, Vol. 1, Archaeological Survey of India, Madras: Government Press, 1890, 144-155.
- Hultzsch, E. trans, ed. *South Indian Inscriptions (SII)*, Vol. 2, Archaeological Survey of India, Madras: Government Press, 1891, 342-361.
- Iyer, U. Ve., Saminatha, ed. *Puṛaṇāṅṁṛu*. Chennai: S.I.S.S.W. Publishing Society, 1935.
- Iyer, U. Ve., Saminatha, ed. *Silappatikāram*. Chennai: Kapir Accukkūttam, 1950.
- Jayatilaka, D.B., ed. *Saddharmaratnāvalī*. Colombo, 1930.
- Kahlenberg, Mary Hunt, “Who Influenced Whom? The Indian Textile Trade to Sumatra and Java.” In *Textiles from India: The Global Trade*, edited by Rosemary Crill, 135-50. Oxford: Seagull Books, 2006.
- Kalidasa, *Raghuvamsam*. Translated by A.N.D. Haksar, Gurgaon: Penguin Books, 2016.
- Kalidasa, *Kumarasambhavam*. Translated by Hank Heifetz, Gurgaon: Penguin Books, 2014.
- Kennedy, Philip F. and Shawkat M. Toorawa, eds. *Two Arabic Travel Books: Abū Zayd al-Sīrāfi, Accounts of China and India*, edited and translated by Tim Mackintosh-Smith; Aḥmad Ibn Fadlān, *Mission to the Volga*, edited and translated by James E. Montgomery. New York: New York University Press, 2014.
- Kerlogue, Fiona. “Textiles of Jambi (Sumatra) and the Indian Ocean Trade.” In *Textiles in Indian Ocean Societies*, edited by Ruth Barnes, 126-145. New York: RoutledgeCurzon, 2005.
- Kharakwal, J.S., Y.S. Rawat and T. Osada. “Kanmer: A Harappan Site in Kachchh, Gujarat, India.” In *Linguistics, Archaeology and the Human Past* (Indus Project, Occasional Paper 2), edited by Toshiki Osada, 21-46. Kyoto: Research Institute for Humanity and Nature, 2007.
- Krishnamacharlu, C.R. “Vilavatti Grant of Pallava Simhavarman,” In *Epigraphia Indica (EI)*, Vol. XXIV, Archaeological Survey of India, edited by N.P. Chakravarti, 296-303. Calcutta: Government of India Press, 1942.
- Kuhn, D. “The Silk Workshops of the Shang Dynasty 16th–11th Century BC.” In *Explorations in the history of science and technology in China*, edited by Hu Daojing, 367-408. Shanghai: Shanghai Classics Publishing House, 1982.
- Lewin, Menachem, ed. *Cotton Fiber Chemistry and Technology* (International Fiber Science and Technology Series). Florida: CRC Press, 2007.
- Lubec, G., J. Holaubek, J., C. Feldl, B. Lubec, and E. Strouhal. “Use of silk in Ancient Egypt.” *Nature* 362, no. 6415 (1993): 25, <https://doi.org/10.1038/362025b0>.
- Mahalingam, T.V. “The Pullur Plates of Nandivarman II Pallavamalla, Year 33,” In *Epigraphia Indica (EI)*, Vol. XXXVI, Archaeological Survey of India, edited by D.C. Sircar, H.K. Narasimhaswami and G.S. Gai. 144-163. Calcutta: Government of India Press, 1970.
- Majumdar, R.C., ed. *The Age of Imperial Kanauj*. Bombay: Bharatiya Vidya Bhavan, 1955.
- Marshall, Sir John. *Mohenjo-Daro and the Indus Civilization*, Vol. I. London: Arthur Probsthain, 1931.
- Marshall, Sir John. *Mohenjo-Daro and the Indus Civilization*, Vol. II, London: Arthur Probsthain, 1931.

- McCrindle, J.W. *Ancient India as described by Megasthenes and Arrian*. London: Trubner & Co, 1877. (Reprint.) Calcutta: Chuckervetty, Chatterjee & Co., Ltd., 1960.
- McKean, M.B. "The Palynology of Balakot, a Pre-Harappan and Harappan Age Site in Las Bela, Pakistan." PhD diss., Southern Methodist University, 1983.
- Menon, Meena and Uzramma. *A Frayed History: The Journey of Cotton in India*. Delhi: Oxford University Press, 2017.
- Mohan, R. and V. Nagarajan, eds. *Pattuppattu* Vol. 1 & 2. Chennai: New Century Book House (Pvt) Ltd., 2004.
- Moulherat Christophe, Margareta Tengberg, Jerome F. Haquet and Benoit Mille. "First Evidence of Cotton at Neolithic Mehrgarh, Pakistan: Analysis of Mineralized Fibres from a Copper Bead." *Journal of Archaeological Science* 29 (2002): 1393–1401. <https://doi.org/10.1006/jasc.2001.0779>
- Nainar, S. Muhammad Husayn. *Arab Geographers' Knowledge of Southern India* (Madras University Islamic Series 6). Madras: University of Madras, 1942.
- Nattar, Venkatasami Na. Mu., and R. Venkatachalam Pillai, eds. *Akanāṅṅūru* (Poem and Text). Chennai: S. I. S. S. W. Publishing Society, 1957.
- Olivelle, Patrick, trans., ed. *Dharmasūtras: The Law Codes of Āpastamba, Gautama, Baudhāyana and Vasiṣṭha*, New York: Oxford University Press Inc., 1999.
- Pandey, Ritu. "History of linen in Indian Subcontinent." Agropedia. <http://agropedia.iitk.ac.in/content/history-linen-indian-subcontinent>.
- Pandey, Suniti. "Technique of Cotton Textile in Ancient India (up to 6th century A.D.)" *Proceeding of the Indian History Congress*, Vol. 66, (2005-2006): 191-198.
- Perera, B.J. "Foreign Trade and Commerce of Ancient Ceylon, Part IV." *Ceylon Historical Journal* II, Nos. 1 and 2 (1952): 14-22.
- Pillay, K.K. *A Social History of the Tamils*. Madras: University of Madras, 1975.
- Plu, A. "Bois et grains." In *La Momie de Ramsès II. Contribution Scientifi que à l'Égyptologie*, edited by L. Balout and C. Roubet, 166-74. Paris: Éditions Recherches sur les Civilisations, 1985.
- Polo, Marco. *The Travels of Marco Polo: the complete Yule-Cordier Edition: including the unabridged third edition (1903) of Henry Yule's annotated translation, as revised by Henri Cordier, together with Cordier's later volume of notes and addenda (1920)*. New York: Dover Publications, 1993.
- Possehl, G.L. "From Sumer to Meluhha: Contributions to the Archaeology of South and West Asia in Memory of George F. Dales, Jr." In *Wisconsin Archaeological Report* 3, edited by J.M. Kenoyer, 179-86. 1994.
- Possehl, G.L. "Indus-Mesopotamian Trade: The Record in the Indus." *Extraitd'Iranica Antiqua* 37, (2002): 326-342. <https://doi.org/10.2143/IA.37.0.127>.
- Possehl, G.L. "Meluhha." In *The Indian Ocean in Antiquity*, edited by Julian Reade, 133-208. London: Routledge, 1996.
- Possehl, G.L. "Seafaring Merchants of Meluhha." *South Asian Archaeology 1995*, 87-99. New Delhi: Oxford & IBH Pub., 1997.
- Potts, D.T. *Mesopotamian Civilization: The Material Foundations*. London: The Athlone Press, 1997.

- Pruthi, R.K. (ed.). *The Indus Civilization*. New Delhi: Discovery Publishing House, 2004.
- Puri, K.N. *Excavations at Rairh during Samvat Years 1995 & 1996 (1938-39 & 1939-40 A.D)*. Jaipur: Department of Archaeology & Historical Research Jaipur State, 1941.
- Ranasingha, D.D. ed., *Dambadeni Asna*, Colombo: J.D. Pranandu, 1928.
- Rao, S.R. *Lothal: A Harappan Port Town, 1955-62*, Vol. I, Memoirs of the Archaeological Survey of India 78. New Delhi: Archaeological Survey of India, 1979.
- Rao, S.R., *Lothal - A Harappan Port Town 1955-62*, Vol. II, Memoirs of the Archaeological Survey of India, No. 78. New Delhi: Archaeological Survey of India, 1985.
- Ratnagar, S. *Encounters, the Westerly Trade of the Harappa Civilization*. Delhi: Oxford University Press, 1981.
- Ratnasooriya, Vajira, ed. *Daladāsirita*. Colombo: Government Press, 1949.
- Rossen, Jack. "Pre-ceramic Plant Gathering, Gardening, and Farming." In *From Foraging to Farming in the Andes: New Perspectives on Food Production and Social Organization*, edited by Tom D. Dillehay, 177-192. Cambridge: Cambridge University Press, 2011.
- Sahni, Rai Bahadur Dayaram. *Archaeological Remains and Excavations at Bairat*. Jaipur: Department of Archaeology & Historical Research Jaipur State, 1910.
- Saraswat, K.S. "Agricultural Background of the Early Farming Communities in the Middle Ganga Plain." *Pragdhara* 15 (2005): 145-177.
- Saraswat, K.S. "Ancient crop remains from Sringerapur, Allahabad, U.P. (ca. 1,050-700 B.C.)." *Geophytology* 16, no. 1 (1986): 97-106.
- Saraswat, K.S. "Plant Economy of Barans at Ancient Sanghol (Ca. 1900-1400 B.C.), Punjab." *Pragdhara* 7 (1997): 97-114.
- Saraswat, K.S. "Plant Economy of Late Harappans at Hulas." *Purattatva* 23 (1993): 1-12.
- Saraswat, K.S., and A.K. Pokharia. "Palaeoethnobotanical Investigations at Early Harappan Kunal." *Pragdhara* 13 (2003): 105-140.
- Scheil, V. "Un Nouveau Sceau Hindou Pseudo-Sumerien." *Revue d'Assyriologie et d'archéologie orientale* XXII, no. 2 (1925): 55-56.
- Schlingloff, D. "Cotton-Manufacture in Ancient India" *Journal of Economic and Social History of the Orient* 17, no. 1 (March, 1974): 81-90.
- Schoen, Brian. *The Fragile Fabric of Union: Cotton, Federal Politics, and the Global Origins of the Civil War*. Baltimore: Johns Hopkins University Press, 2009.
- Schoff, Wilfred H. *The Periplus of the Erythrean Sea -Travel and Trade in the Indian Ocean by a Merchant of the First Century*. New York: Longmans, Green, and Co., 1912.
- Shamasatry, R., trans. *Kautilya's Arthashastra*, Bangalore: Government Press, 1915.
- Shrigondekar, G.K., ed. *Mānasollāsa of King Someśvara*, Vol. III. Baroda: Oriental Institute, 1961.
- Sugunasara, Kalapaluvave, ed., *Saddharmaratnākara*, Colombo: Ratnakara Press, 1912.
- Thornton C.P. "Mesopotamia, Meluhha, and those in Between." In *The Sumerian World*, edited by H.E.W. Crawford, 598-617. London: Routledge, 2013.
- Tosi, Maurizio. "A Possible Harappan Seaport in Eastern Arabia: Ra's Al-Junayz in the Sultanate of Oman." Paper presented in the First International Conference on Pakistan Archaeology, Peshawar, 1982.

- Tosi, Maurizio. "The Proto Urban Cultures of Eastern Iran and Indus Civilization. Notes and Suggestions for a Spatio-temporal Frame to Study the Early Relation between India and Iran." In *South Asian Archaeology 1977*, edited by M. Taddei, 149-171. Naples: Istituto Universitario Orientale, 1979.
- Tripathi, V. "Metals and Metallurgy in the Harappan Civilization." *Indian Journal of History of Science* 53, no. 3 (2018): 279-295. <https://doi.org/10.16943/ijhs/2018/v53i3/49460>.
- Vainker, Shelagh. *Chinese Silk: A Cultural History*. New Jersey: Rutgers University Press, 2004.
- Watt, George. *The Commercial Products of India*. London: John Murry, 1908.
- Watters, Thomas. *On Yuan Chwang's Travels in India 629-645 A.D.* London: Royal Asiatic Society, 1904.
- Weber, Steven. "Seeds of Urbanism: Paleoethnobotany and the Indus civilization." *Antiquity* 73, no. 282 (1999): 813-826.
- Wheeler, R. E. W., A. Ghosh, and Krishna Deva, "Arikamedu: An Indo-Roman Trading Station on the East Coast of India." *Ancient India* 2 (1946): 17-124. https://asi.nic.in/Ancient_India/Ancient_India_Volume_2/article_3.pdf.
- Wild, J.P., "Cotton in Roman Egypt: Some Problems of Origin." *Al-Rāfidān* XVIII (1997): 287-298.
- Wild, J.P. and F.C. Wild. "Berenike and Textile Trade on the Indian Ocean." In *Textile Trade and Distribution in Antiquity- Textilhandel und distribution in der Antike*, edited by Herausgegeben von Kerstin DroB-Krupe, 91-109. Wiesbaden: Harrassowitz Verlag, 2014.
- Wild, J.P. and F.C. Wild. "Rome and India: Early Indian Cotton Textiles from Berenike, Red Sea Coast of Egypt." In *Textiles in Indian Ocean Societies*, edited by Ruth Barnes, 10-15. New York: RoutledgeCurzon, 2005.
- Wild, J.P. and F.C. Wild. "Textiles." In *Berenike '98: Report of the 1998 Excavations at Berenike and the Survey of the Egyptian Eastern Desert including Excavations in Wadi Kalalat*, edited by Willemina Wendrich and Stephen Sidebotham, 251-274. Leiden: Universiteit Leiden, 2001.
- Wild, J.P., F.C. Wild, and A.J. Clapham. "Roman Cotton Revisited." In *Purpureae Vestes II Symposium Internacional sobre Textiles y Tintes del Mediterráneo en el mundo antiguo*, edited by C. Alfaro and L. Karali, 143-147. Valencia: University of Valencia, 2008.
- Wolters, O.W. "Early Indonesian Commerce and the Origins of Srivijaya." PhD diss., University of London, 1962.
- Yule, Sir Henry, trans, ed. *The Book of Ser Marco Polo*, 2 Vols. London: John Murry, 1903.
- Yusuf, Syed. "Paithan Excavations." *Annual Report of the Archaeological Department of His Exalted Highness the Nizams's Dominions, 1936-37*. Calcutta: Baptist Mission Press, 1939.
- Zhou, Kuangming. "Qianshanyang canjuanpian chutu de qishi (Illuminating Remarks on the Fragments of Silk Excavated at Qianshanyang)." *Wenwu* 1 (1980): 74-77.
- Ziegler, Delphine. "The Cult of the Wuyi Mountains and its Cultivation of the Past: A Topo-Cultural Perspective." *Cahiers d'Extreme-Asie* 10 (1998): 255-286, <https://doi.org/10.3406/asic.1996.1116>.

