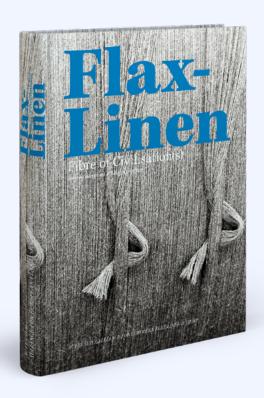


# FLAX-LINEN, THE FIBRE OF CIVILISATION(S)



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Aimed at the general public, this textile saga is unique in its multi-faceted approach.

A collective work edited by Alain Camilleri Co-published by ACTES SUD

co-published by ACTES SUD and the Alliance for European Flax-Linen & Hemp

Flax-Linen has signed a cultural pact with humanity. Through its distinct qualities, Flax-Linen allows us to learn about the civilisations that have cultivated Flax - including spiritually - and transformed it into Linen cloth through scutching, spinning and weaving or knitting, from the Neolithic to the present day. Linen is a sacred fabric with secular uses, a nexus between religious practices and textile innovations, agricultural expertise and technological revolutions.

A seemingly fragile material with multiple identities, Flax-Linen's course through the millennia is fully revealed through the lens of cross-analysis, exploring agriculture, anthropology, linguistics, technology and economics.

This is what we can learn from *Flax-Linen*, *the Fibre of Civilisation(s)*, an unprecedented collective work combining the expertise of archaeobotanists, archaeologists, historians, scientific laboratories, designers, industrialists, as well as European farmers, scutchers, spinners, and weavers. It is a richly illustrated saga whose editorial choices reflect the current and past experience of this textile fibre of plant origin, of which France is the world's leading producer today.

Flax-Linen, the Fibre of Civilisation(s), also reflects another phenomenon: Linen's popularity, inversely proportional to its share of the global textile market, which is less than 0.5%. International interest in Linen reflects the expectations of consumers, who have become much more interested in ethics and traceability, sustainable development and renewable resources.

### CHAPTER I: RESPONSIBLE AND CONSCIENTIOUS AGRICULTURE AND INDUSTRY

From 2010 to 2020, the growing area of Flax in Northwestern Europe increased by 132%, and France, with 9,269 farms dedicated to growing Flax, consolidated its position as a global leader. With the growing appeal of Linen in fashion, decoration and lifestyle through to high-performance bio-based composites, the Flax-Linen industry today faces a double challenge: increasing production and its current share of less than 0.5% of textile fibres produced in the world, and accounting for the impact of climate change, which will transform the geographical origins of Linen in the medium term. This is related to issues such as yields, increasing the growing area and making the crop more focused on agroecology.

The Flax agro-industrial sector was the first to measure its environmental footprint using a unique method established by the European Commission. This assessment accounts for the characteristics of producing and processing European Flax: it is part of a crop rotation cycle, GMO-free, produced with zero defoliant or irrigation (up to 99.9%); the plant fibre is obtained through 100% mechanical extraction (scutching), and the entire plant is used (long fibres, short fibres, shives and seeds).





### **Chapter contributions**

#### A EUROPEAN EXCEPTION

#BOTANY OF FLAX #A CROP OF TERROIRS #THE FARMER/GROWER PARNTERSHIP #VARIETAL RESEARCH #AN ECONOMICAL CROP #FLAX DISEASES #SOWING, PULLING, RETTING, TURNING, BALING

### SUSTAINABLY EFFICIENT, RESOLUTELY INNOVATIVE **AGRICULTURE**

#AGROECOLOGY #CROP MODELLING #GENETIC AND DIGITAL DESCRIPTION TOOLS

#### THE FLAX-LINEN ECONOMY TODAY

- 2010-2020. THE DECADE OF LINEN
- FROM FIBRE TO YARN #SCUTCHING HECKLING SPINNING
- DEDICATED AGRICULTURAL EQUIPMENT
- ANTICIPATING THE IMPACTS OF CLIMATE DISRUPTION
- THE LANGUAGE OF MOLECULAR GENETICS
- LINEN AT THE CHATEAU OF VERSAILLES



## CHAPTER II: LINEN THROUGH THE AGES: FROM PREHISTORY TO THE MIDDLE AGES



Bayeux Tapestry, woollen thread embroidery on linen canvas, 11th century, 0.5 × 70 m. Scenes 37, 53 and 54 (details). Musée de la Tapisserie de Bayeux, Bayeux.

If the chronology of expertise related to Flax processing, from fibre to Linen fabric, goes back to the Neolithic, it is its intimate relationship with the sacred that gives it a unique status in the history of textiles. Linen has always enjoyed proximity to the divine as a vehicle for ideas about purity and spirituality. In Hebraic and Biblical texts, Linen is synonymous with perfection. The Old Testament contains over 80 mentions of Linen, its purity guaranteed by a rule still in force, the "sha'atnez", which prohibits the manufacture and wearing of mixed wool and Linen fabrics. In fact, it has something to do with the mythical siblings Cain and Abel!

Clothing for the eternal realm, a central cloth of Egyptian funerary tradition, Linen is also an earthly symbol of wealth and power. Throughout the pharaonic period, from the Ancient Empire to the Ptolemaic Period (2700-30 BCE), as well as in Babylon from the 3rd to 1st millennium BCE, Linen was used in these societies as a store of value, as currency, and as diplomatic gifts. As for the Western Christian culture of the Middle Ages, its written texts enshrined and endorsed the sacred value of a broad range of garments and liturgical Linens, reflecting how widely the fabric was used. Linen kept the memory of God's coming as man: in the form of the Holy Face of Jesus on the Shroud of Turin, a divine iconography described as acheiropoieta, a Greek word that means "made without hands", "not created". The relationship between Linen and the realm of the sacred is even expressed in holy texts: when it comes to the relics found in the Dead Sea caves, only Linen was used to protect the precious manuscripts.

### **Chapter contributions**

#### LINEN: FROM WILD TO FARM-CULTIVATED

#EARLY AGRICULTURE #ARCHAEOLOGICAL FLAX #THE
DOMESTICATION OF FLAX #SPREADING BEYOND THE NEAR EAST

#### LINEN, A FABRIC OF FAITH

#SACRED #ABEL AND CAIN #LINEN AND THE DEAD SEA SCROLLS #LINEN AND THE COLOUR BLUE

#### **NEOLITHIC LINEN: AN EXCEPTIONAL MATERIAL**

#EARLY LINEN WEAVING TECHNIQUES #A SPECIALISED CRAFT #THE FIRST LOOMS

#### LINEN IN THE PHARAONIC ECONOMY

#EGYPT #GROWING AND HARVESTING #WEAVING LOCATIONS #ORGANISING PRODUCTION #EVERYDAY CLOTHING AND ACCESSORIES #A LUXURY FABRIC

#### FLAX IN THE LAND OF WOOL

#MESOPOTAMIA #LINEN WORN BY ELITES AND DIVINITIES #A SPECIALIZED CRAFT IN BABYLON

### FROM SHROUD TO BODY, WHEN LINEN BECOMES FLESH

#MIDDLE AGES #THE WHITENESS OF LINEN #CORPORAL LINEN: A SANCTIFIED CLOTH ON THE ALTAR

### THE DISCREET LUXURY OF THE COLOUR WHITE IN ARISTOCRATIC HOMES IN THE LATE MIDDLE AGES

#PROVENANCE, A RECOGNISED LABEL #TEXTILE NOMENCLATURES OF LINEN IN THE MIDDLE AGES #TABLE LINEN

- THE LINEN CLOTH OF THE DEAD SEA SCROLLS
- LINEN IN EGYPT: CLOTHING FOR THE DEPARTED
- THE INCREDIBLE LONGEVITY OF LINEN CLOTHING
- THE FINESS OF EGYPTIAN LINEN YARN
- THE LIBER LINTEUS ZAGRABIENSIS
- THE PRICE OF LINEN IN BABYLON IN THE 5th CENTURY BCE
- A REPLICA OF THE SHROUD OF TURIN
- LINEN UNDERGARMENTS IN THE MIDDLE AGES
- THE BAYEUX TAPESTRY
- READING THE FABRIC: TABLE LINEN OF THE ORDER OF THE GOLDEN FLEECE
- LINEN FOR EXCEPTIONAL TABLES

# CHAPTER III: THROUGHOUT HISTORY: FROM THE RENAISSANCE TO THE PRESENT

Linen was often positioned at the heart of the political and technical issues of the time. Signed by Henry IV in April of 1598, the Edict of Nantes was revoked by his grandson Louis XIV on 18 October 1685. This caused almost 200,000 Huguenots to flee, taking their expertise to areas outside the kingdom of France. At the end of the 17th century, the English Channel became the religious border between Catholic France, ready to punish believers of a "reformed" religion, and Protestant England, which was on the cusp of an industrial revolution.

This context did not go unnoticed by the Dublin Parliament: in 1698, it passed the first law on the development of local Flax industry to decrease the country's reliance on foreign imports. Louis Crommelin, a wealthy draper born in Armancourt near Saint-Quentin in Picardy, responded to this invitation in 1699 by proposing the establishment of a Flax spinning mill, which was eventually set up in Lisburn, southwest of Belfast. Another man from Picardy, Pierre Goyer, also living in Lisburn, started to produce batiste, an extremely fine Linen fabric, in 1698. This cloth, called "cambric", a word still in use today, was named after Cambrai, the city in which it originated. Today, Lisburn remains one of the most important textile manufacturing centres of the United Kingdom.

In July 1810, Philippe de Girard registered his patent for the construction of a Flax spinning machine. In 1801, Joseph-Marie Jacquard's design for an automatic loom had already put the textile industry on the path to Taylorism.



Secrets of Linen. Design: Studio GGSV, Gaëlle Gabillet et Stéphane Villard Photo: @Gaëlle Gabille.

### **Chapter contributions**

#### **LINEN IN BRITTANY**

#THE CONDITIONS OF FABRIC PRODUCTION #THE CRÉES FROM LANDERNEAU TO MORLAIX #THE BRETAGNES FROM SAINT BRIEUC #EXPORT PRODUCTS #ARCHITECTURAL HERITAGE

### LINEN IN WARDROBES: FROM THE 17<sup>TH</sup> TO 19<sup>TH</sup> CENTURIES

#DUTCH CLOTH #THE CORPORATION OF MULQUINIERS #PRODUCTION OF FINE FABRICS #THE LINEN SHIRT: AN OSTENTATIOUS ITEM #A LINEN DRESS FOR ALL CHILDREN

### **LINEN AND COLOUR: A HISTORICAL OVERVIEW**

#NATURAL DYEING TECHNIQUES #MEDIEVAL DYERS #THE POPULAR AESTHETICS OF EVERYDAY TEXTILES

### THE IMPACT OF LINEN THREAD IN THE HISTORY OF LACEMAKING (16<sup>TH</sup> TO 20<sup>TH</sup> CENTURIES)

#ORIGIN AND DEVELOPMENT #A MECHANICAL COMPETITOR: TULLE #RAW MATERIALS AND LABOUR #SOURCING AND QUALITY #YARNS, AESTHETICS AND FASHION #THE VALUE OF WHITE

### BETWEEN BELGIUM AND FRANCE: THE LYS, THE "GOLDEN RIVER" OF LINEN

#USES OF THE LYS IN FLAX PROCESSING #THE HISTORY OF INDUSTRIALISATION IN THE VALLEY

### LINEN IN MEN'S WARDROBESFROM 1800 TO TODAY

# WORKWEAR AS AN INSPIRATION FOR MEN'S FASHION # MADE-TO-MEASURE: SAVILE ROW # LINEN IN THE STRUCTURE OF SUITS # CASUAL CHIC

### **LINEN AND CONTEMPORARY STYLISTS**

#1960s, COMPETITION FROM SYNTHETIC MATERIALS #1990s: ITALIAN DESIGNERS BRING BACK LINEN #2020: A VOTE FOR LINEN

### **LINEN AND LIFESTYLE TODAY**

#HOUSEHOLD LINEN #WASHED LINEN #BRIDAL TROUSSEAU #UPHOLSTERY #INTERIOR DESIGN #NATURALNESS

- A BRIEF HISTORY OF LINEN IN IRELAND
- THE HERMIONE
- CRIN (HORSEHAIR) + LINEN = CRINOLINE
- BURANO LACE
- THE LINEN JEANS REVOLUTION
- LINEN KNITWEAR

### CHAPTER IV: THE SUBTLE THREAD

When the textile fibre is no longer just a component, it can become the very object of design. From Sheila Hicks's soft sculptures to the transgressive Claude Viallat, whose Supports/Surfaces movement that de-sacralised the Linen canvas by removing the frame, Linen varns and fabrics are lending themselves to different interpretations: creative wanderings by master pleater Pietro Seminelli, designer Pauline Esparon, artist and embroiderer Aurélie Mathigot, sculptor and couturier Sergio Roger, and the works of Simone Pheulpin, Agnès Sebyleau, Esther Shalev-Gerz and Sandrine Torredemer... Linen, a material with a wealth of linguistic and symbolic origins with a "hidden" usefulness in interfacing, enhances the strength, solidity and body of a fabric.



Selene, Sergio Roger, 2019. Courtesy Sergio Roger



### **Chapter contributions**

### FROM LINEN TO BED LINEN. SHROUDS AND LINES

#LINGUISTIC RICHNESS OF FLAX

#### **INSIDE OUT**

#MAD #LINEN IN GARMENT CONSTRUCTION #ASSEMBLY SEAMS #INTERFACING #AN ECONOMY BASED ON QUALITY

### THE USE OF LINEN IN HAND-WOVEN CARPETS. **TAPESTRIES AND LACE**

#MORILIER NIATIONIAL

### Inset

### LINEN-INSPIRED CREATIVE WANDERINGS

#PAULINE ESPARON #AURÉLIE MATHIGOT #SIMONE PHEULPIN #SERGIO ROGER #AGNÈS SEBYLEAU #ESTHER SHALEV-GERZ #SANDRINE TORREDEMER

### • THE COLOBIUM SINDONIS

#THE CORONATION OF BRITISH MONARCHS

### • THE SECRETS OF THE OLD MASTERS

**#PAINTING CANVASES** 

### CHAPITRE V: A FABRIC OF INVENTION AND A LABORATORY OF IDEAS

Flax fibres, long relegated to the status of a substitute for fossil-derived resources, are now used in highperformance composites offering a wide range of technical solutions. As a renewable European resource, they participate in the bioeconomy where their reliable properties are in step with sustainable innovation. Their low density appeals to industries seeking lightness, and their exclusive properties in the areas of vibration dampening, electromagnetic transparency and sound and heat insulation are helpful in the design of products whose specifications focus both on performance and eco-design.

- Zacatecas light by Constance Guisset, unidirectional Linen, 2016
- 2. Hammock range by Jean-Philippe Nuel for Saintluc, 2017 (Terre de Lin's Biorenforts)
- 3. Duales coffee table with polyester resin tray from natural origin (60% flax fibre reinforcement and 40% organic resin) on a solid oak wood base, created by Noé Duchauffour-Lawrance for Saintluc
- 4. Bcomp's ampliTex™ and powerRibs™

### **Chapter contributions**

### **COMPOSITES: THE ADDED VALUE OF NATURAL FIBRES**

#THE INTRINSIC PROPERTIES OF FLAX-LINEN IN THE COMPOSITES **INDUSTRY** 

#### **DESIGNER COMPOSITES**

#MECHANICAL PROPERTIES #ENVIRONMENTAL IMPACT #REINFORCEMENTS FOR THE COMPOSITES INDUSTRY #APPLICATIONS: SPORT AND LEISURE, THE AUTOMOTIVE INDUSTRY AND TRANSPORTATION, MUSIC AND SOUND, FURNITURE, AND INTERIOR DESIGN

- THE DENSITY OF FLAX
- THE LINOTHORAX: AN ANCIENT COMPOSITE
- BEYOND THE PLANET: THE AEROSPACE INDUSTRY



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### **FLAX-LINEN HIGHLIGHTS**

### FLAX AT THE PALACE OF VERSAILLES

In June 2022, with the involvement of the gardeners of the Domain of Versailles and young farmers from the Normandy-based agricultural cooperative Terre de Lin, a royal field of flax debuted at the Chateau! "It's a tribute to the botanical tradition of the estate," said Alain Baraton, head gardener of Trianon and the Grand Park of Versailles. "King Louis XV, who had a passion for agriculture, encouraged the establishment of experimental plots, and, in the written records describing some of the plants, Bernard de Jussieu states that Flax occupied its rightful place among these. A plant whose lilac flowers would later captivate Marie-Antoinette," - he added. "The Flax field set up by the Alliance for European Flax-Linen and Hemp near the Hamlet reminds us that while agriculture provides us with food, it also shapes our landscapes. In sum, people can enjoy the air, the view, and a feeling of well-being. Let us hope that this initiative will allow Flax to maintain a permanent presence on these premises."

Chapter I, "Responsible and conscientious agriculture and industry", p 55



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### **ABEL AND CAÏN**

Cain was the first child of Adam and Eve. According to Jewish thought, he was thus "born alone", and he settled down and farmed Flax, offering its seeds up as a sacrifice. His younger brother Abel could be perceived as an outsider, with whom Cain would have to share the fruits of Creation. Abel became a shepherd, tending to his sheep. One brother lived in the world of plants, and the other - in the kingdom of animals. After Abel's murder by Cain, the two kingdoms were destined to always remain separate; the ban on mixing wool and Linen, the shaatnez, has survived to this day. The prohibition of this specific blend appears in Leviticus 19:19 and Deuteronomy 22:11: "You shall not wear a fabric made of wool and Linen blended together."

Chapter II "Linen through the ages: from Prehistory to the Middle Ages", p 70-76

### THE DEAD SEA SCROLLS

The site known as Qumran is situated in the Judaean Desert, between Israel and the modern-day West Bank. It is in these grottoes along the arid banks of the Dead Sea that a group of ascetic Jews, the Essenes, who, following the destruction of the Temple in Jerusalem in 70 C.E., conceived of a way to protect the sacred texts from the vengeful Romans. Hundreds of manuscript cases were made exclusively of Linen and woven for the occasion, never identical from one piece of fabric to the next, never reused after serving as extremely worn garments, and are an exceptional example of textiles. Linen was already known for its ability to insulate against moisture damage, and pests dislike it just as much as they love eating wool. Just to be clear, Linen was not selected only for its insulating capacity: in this pious context, it embodied the primordial virtues of a sacred plant, a protective envelope for manuscripts regarded as highly as a living being, and even more highly if they contained the Tetragram, the name of God.

Chapter II "Linen through the ages: from Prehistory to the Middle Ages", p 74-76



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### **FINE FLAX YARN IN EGYPT**

Made up of 112 warp yarns and 32 weft yarns per cm, the Linen fabric from the tomb of Tutankhamun sometimes included linen yarn with a diameter of less than 50. This was made possible not only by the visual discernment and dexterity of the artisans who made it, but also by the various stages of the operational chain. In Ancient Egypt, the harvest could take place at different stages of plant maturity, depending on whether the goal was to obtain soft and fine fibres, but with low yields, or more ordinary fibres with higher yields. The green flowering stems pulled early would result in royal Linen, whereas mature stems were used to make sturdy fabric and very mature Linen that was more robust, used to make clothing, cords and twine.

Chapter II "Linen through the ages: from Prehistory to the Middle Ages", p 95-96

### A REPLICA OF THE SHROUD OF TURIN

Daring to replicate a Linen cloth as sacred as the Shroud of Turin takes courage and skills. Coordinated by Italian spinner Linificio e Canapificio Nazionale, the business brought together textile expertise from the Province of Bergamo and launched an original collaboration with Normandy-based seed producer Terre de Lin. The goal is to mimic the production chain of the relic as closely as possible by using ancient spinning and weaving practices at the end of a complex process of selecting the most suitable seeds for reproducing the technical properties of the original. Sowing took place in April 2020, and the 100% Flax yarn, available in November of the same year, was manufactured in the two densities of the original fabric: Nm 39 for warp and Nm 20 for weft, producing a fabric weight of about 230 gr par m2. The project was recognised and supported by the International Centre for the Study of the Shroud of Turin (CIELT), and the diocesan commission of Turin monitored every step of the process, going so far as to certify the copies as compliant, after which they were to be sent to churches and museums around the world.

Chapter II "Linen through the ages: from Prehistory to the Middle Ages", p 112

### REPLICA OF THE BAYEUX TAPESTRY

In 1885, Elizabeth Wardly, an embroideress from Staffordshire, decided to create a replica of the Bayeux Tapestry. With the help of 35 other embroiderers and after one year of hard work, the copy was displayed across Great Britain until finally finding its home at the Reading Museum in 1897. The replica was made on a Linen backcloth, and it was a carbon copy, or almost, save for one detail that was censored out: the naked men visible in the bottom part of the original had their modesty protected with underwear. This Victorian prudishness preceded the meticulous work of the embroiderers, who relied on photographs in which the men's bodies had already been covered up by staff at the South Kensington Museum, known today as the Victoria and Albert Museum of London.

Chapter II "Linen through the ages: from Prehistory to the Middle Ages", p 124

### FLAX-LINEN HIGHLIGHTS

### **EXCEPTIONAL TABLES**

Throughout the Middle Ages all the way to the 16th century, the table would be "set" in the original sense of the world: tables were transient, mobile pieces of furniture made up of trestles and a tray that would be set up and disassembled as meals were served. Guests would eat from a tablecloth that would drape down to the floor, concealing the structure of the table and allowing them to wipe their mouths and fingers. The tablecloth of white damask Linen was valued by city leaders for its symbolism: the sacred whiteness of Linen altar hangings was a sign of belonging to the same social elite. But those who stray and transgress must be forewarned. To indicate that they were at fault and to shame them publicly, the tablecloth would be cut in front of their seat at the table!

Chapter II "Linen through the ages: from Prehistory to the Middle Ages", p 127

### **CRIN + LINEN = CRINOLINE**

In the 19th century, the clean elegance of men's clothing stood in stark contrast with the exuberance of the female wardrobe. Crinoline, often used to make undergarments, whose volume changed with the fashion, codified the status of its wearers: it was a physical and social constraint, the symbol of a forced idleness, and an ostentatious manifestation of one's husband's wealth. Designed to support the weight of a skirt, this structured garment worn under dresses was made of hoops connected with strips of fabric held together by vertical straps. In 1856, the cage crinoline was invented. Its steel frame, with its greater flexibility and lightness, made it possible to eliminate the use of cumbersome petticoats. It is easy to forget that crinoline was originally a fabric made of horsehair weft and Linen warp; this thick and durable fabric was the answer to an aesthetic quest for volume and shape. The term "crinoline" will remain a classic term used to describe the shape of skirts with exaggerated fullness.

Chapter III "Throughout history: from the Renaissance to the present", p 150-151

### **HERMIONE**

Right before lending his support to the British colonists who rose up during the American Revolutionary War, the Marquis de Lafayette boarded the Hermione, a frigate with a sail area of 2,200 m2 on which construction began in December 1778. He disembarked in Boston on 28 April 1780. Work on creating a replica of this emblematic ship was launched on 4 July 1997 in Rochefort by the Hermione-Lafayette Association. Hermione sailmaker Anne Renault was based in Fouras, Charente-Maritime. Sailmaker's palm – a leather tool equipped with a thimble – in hand, she was able to hand sew the 770 meters of bolt rope (cords sewn at the edges of the sail to reinforce it) and the 1,600 eyelets in Hermione's 17 sails: "I begin work after the sails are cut and the strips has been assembled; to sew, I coat the Linen yarn in beeswax to make the process smoother." Anne Renault insisted on using Linen as part of the sail plan, as the 18th century original was historically made of hemp. "This is an ever-active textile sector, whose philosophy is compatible with the project." LATIME (THE waterproof fabric) supplied the 100% Linen sailcloth fabric for the Hermione, woven and ennobled in Houplines, in the Nord department, France. Finally, three fabric weights were developed: 950gr/m2 for the lower sails, 750gr/ m2 for the medium ones and 690gr/m2 for high sails in order to optimise the ship's "wind-powered" engine.

Chapter III "Throughout history: from the Renaissance to the present", p 140-141



©Hermione Association - La Fayette, 2013





Photo: @Royal Collection Trust

### **COLOBIUM SINDONIS**

The coronation of Elizabeth II as the queen of the United Kingdom took place on 2 June 1953 in Westminster Abbey. The entire world watched the event, in which one scene symbolized a rite of passage, striking in its simplicity. After the holy anointing, the "almost" sovereign donned the Colobium Sindonis, a sleeveless and collarless shirt open on the sides: a uniform of the sacred order, and the first article of clothing in which the sovereign is crowned. Its simplicity represents abandonment of all earthly vanity to stand bare before God. 70 years later, traditions related to the coronation protocol remained in place, and on 6 May 2023, King Charles III also wore the Colobium Sindonis.

Chapter IV "The subtle thread", p 249

### THE LINOTHORAX, A COMPOSITE FROM ANTIQUITY

The linothorax, armour made of Linen, was a breastplate that could be viewed as a composite material: it is made of a rectangular part that envelops the torso like a tube, and a neckline whose two top pieces cover the shoulders on both sides of the head and are tied down on the chest. There are 65 references to Linen armour in texts written by more than 40 authors of antiquity. It was used by civilisations such as the Egyptians, Assyrians, Nubians, Persians, Phoenicians, Romans, Carthaginians, Greeks, etc., with Alexander the Great being its most famous wearer. Research and tests performed by Gregory S. Aldrete suggest that not only was the linothorax surprisingly effective at protecting its wearer, but it also had practical advantages compared with metal armour. In hot climates, Linen is more comfortable, and its lightness helped soldiers maintain their endurance. A reconstruction of the linothorax weighed in at 4 kg, whereas bronze armour of the same size would have weighed about 10. Linothorax was made of common materials, widely available even to the poorest inhabitants of the ancient world.

Chapter V "A fabric of invention and a laboratory of ideas", p 271-273



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### **ABOUT**

The Alliance for European Flax-Linen & Hemp is the only European agro-industrial organisation that serves as a global reference and brings together all players in the European Flax-Linen and Hemp value chain.

A platform for reflection, market analysis, dialogue, and strategic orientation, the Alliance for European Flax-Linen & Hemp presides over an industry of excellence in a globalised context. It encourages dialogue with national and European public authorities.

The Alliance for European Flax-Linen & Hemp creates an environment that fosters competitiveness of industrial businesses as part of its three-fold mission of informing members, brands, and consumers, supporting the European ecosystem and European expertise, and promoting European Flax-Linen and Hemp as the preferred sustainable premium fibres worldwide.

It connects 10,000 businesses in 16 European countries and bases its work on the values of solidarity, innovation, scientific validation, and respect for people and planet.

It promotes, initiates, and organizes strategic reflections and research on its fibres to be able to provide all of its interlocutors with evidence-based economic data, environmental information, and reliable scientific evidence.

The Alliance for European Flax-Linen & Hemp strives to increase the international visibility of its fibres, whose technical and environmental properties inspire global creation and open new opportunities for industrial innovation. It guarantees the traceability of Flax fibre thanks to the EUROPEAN FLAX™ and MASTERS OF LINEN™ certifications.

The Alliance for European Flax-Linen & Hemp is the new name of the CELC, an association founded in 1951. Western Europe is the number one Flax-producing region in the world (France, Belgium, and the Netherlands account for 3/4 of production).

European Flax™: A traceability guarantee for premium Flax fibers grown in Western Europe for all markets. It is a plantbased fibre, the product of ecofriendly agriculture grown without irrigation\* or GMOs.

Masters of Linen™: Guarantee of traceability for linen made by European companies on European and Euromed 1 sites. A textile of excellence, local at all stages: from the vegetal European Flax<sup>™</sup> fibre to yarn and fabric.

\*Except in exceptional circumstances.

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