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ECCLESIASTICAL GARMENTS OF MOUNT ATHOS: HISTORY, TYPOLOGY AND COLOURING MATTERS

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ABSTRACT

Mount Athos has been an Orthodox spiritual monastic centre and has enjoyed an autonomous statute since Byzantine times. Today the "Holy Mountain" has an outstanding universal value, according to the UNESCO, as it houses rich collections of artworks from various chronological periods (i.e. Classical, Hellenistic etc.) including Byzantine and post-Byzantine period, displaying icons, mural paintings, implements, metalwork's, wood carvings, manuscripts and textiles. The latter have been barely investigated in contrast to the other types of artworks which have received a considerable attention. The study focuses on selected (15th – 19th cent.) ecclesiastical garments (sakkoi) from Mount Athos and aims to elucidate several aspects of the history of the post-Byzantine textile art. In particular we focus on: (i) stylistic development, design (mainly from France and Italy) and constructional modifications over time leading to a dating typology, (ii) comparison of binding systems; exploration of possible 'signatures' leading to identification of provenance of specific workshops and finally (iii) techniques and materials employed for the production and decoration of the sakkoi. The latter were investigated by using FTIR and high performance liquid chromatography with UV-Vis photodiode array detection. The following organic dyes were identified in the silk extracts of the historical objects: dyer's broom (Genista tinctoria L.), young fustic (Cotinus coggygria Scop.), an indigoid dye source either indigo (Indigofera species) or woad (Isatis tinctoria L.), madder (most likely Rubia tinctorum L.), cochineal and lac (Kerria lacca Kerr). Also, the identification of a brazilein derivative indicates the presence of a Caesalpinia dye source in the samples. The chemical results obtained for the garment extracts are compared with corresponding analytical data collected for post-Byzantine icons from the area of Chalkidiki (including Mount Athos). The comparison leads to some very interesting conclusions regarding the use of natural organic dyes in the post-Byzantine dyeing industry and post-Byzantine iconography.

INTRODUCTION: *SAKKOI* – HISTORY, TYPOLOGY, CONSTRUCTION

Religious textiles of the post-Byzantine period have been scarcely studied, despite the relatively large and impressive textile collections which can be found in the several monasteries of the most important monastic centre of the Orthodox Church such as the Holy Mountain of Athos. Very limited data is available for these precious textile artworks of the eastern Euro-Mediterranean cultural heritage. Their origin, is usually not well documented or proven and therefore questionable. The colorants used to decorate these textiles, are highly unknown, as they have not been analyzed in detail by modern analytical equipment techniques. Our investigation focuses on selected ecclesiastical liturgical garments (late 15th – 19th cent.) known as *sakkoi* from Mount Athos.

The origin of the *sakkos*, primarily as a Greek garment adopted by the Romans (i.e. dalmatic) and later by the Byzantines as an imperial garment. The evolution of the shape of the specific garment is presented from its begging at the 11th and 12th cent. to the Fall of Constantinople (1453), influenced by the various trends from Eastern and Western culture. From there it becomes a liturgical garment in Orthodox Church worn by all the Bishops. The *sakkos* by the 11th-12th cent., had been adopted by the Patriarch to indicate his status and privilege. It was only after the fall of Constantinople, that this was extended to Bishops of the Eastern Orthodox Church. The collection which is investigated in the study includes seven garments from Patriarchs, Bishops and an Emperor. Examples of the artworks are provided in figure 1. According to the tradition the tested garments are linked to the following important historical figures: (I) Emperor Ioannis Tsimiskis, (II) St. Nifon, (III) Patriarch Dionysiou IV Mouselimi,

(IV) Bishop Velegradon Ieremiou, (V) Bishop Neilou Esfigmenitou, (VI) Patriarch Kiryllou V and (VII) Patriarch of Alexandria Mathews III. The artworks are housed in the monasteries of Iveron, St. Dionysiou, Simonos Petra, Koutloumousiou and in the Skete of St. Anna.

Figure 1. Selected artworks included in the study: (a) Sakkos of: Patriarch Dionysiou IV Mouselimi, (b) Sakkos of Bishop Neilou Esfigmenitou and (c) Sakkos of St. Nifon.

The cut and construction of the *sakkos* is a simple (T) shape consisting of two main sections, one front and one back, having a space for the head at the top and arms to both sides. The two sides are fastening with fabric bands or with bells [1] and buttons [2]. Many writers [3] refer to the Greek word *sakkos* meaning a liturgical garment as derived from the Jewish word *saq*, which, when translated into English became referred to as *sackcloth*, that is clothing worn in mourning or humiliation [4] because of its lowly character. Using this translation the words *sack* and *sackcloth* were found in many places in Genesis, Psalms, Lamentations and other Biblical literature. The word *saq* may originally come from the Phoenicians (*Foinikes*) and was then picked by the Jews, probably from the trade in corn. The need for members of the Church to differentiate themselves from other social groups and state their position within an empire, in which dress played the role of 'identity card', goes back to the first centuries of Christianity. Paintings of Bishops wearing *sakkoi* are commonly found and starting to be depicted in the 14th cent. in Christ figures depicted as a Great High Priest.

The survival of a garment, or even a fabric, as it is an object of culture, can provide evidence of a precise time, event or religious belief. Although the style of a garment has evolved/changed over time, the *sakkos* remains a male badge of honour: originally of political and later of ecclesiastical rank, but always appertaining to the highest status. The materials generally found in the manufacture and decoration of *sakkoi* in the Byzantine and post-Byzantine periods are mainly brocade silken fabrics with floral or religious patters using gold and silver threads with linen or cotton linings. Frequently, designs were embroidered or alternatively woven to produce geometric repeat motifs in rows or circular medallions. The patterns include single crosses within a circle, flowers and trees, such as the Root of Isaac or the Tree of Jesus with the Apostles. Jesus appears as a shepherd on the reverse of the garments and frequently figures of Saints. Painted figures on canvas or small enamel icons (i.e. *sakkos* of Patriarch Mouselimi) can also be attached to the original surface. Other *sakkoi* are decorated with sequins produced in a circular disc shape. These are easily recognised on Orthodox ecclesiastical textiles, where they are attached on the fabric with a backstitch.The colour of the garments is also significant, with certain colours being associated with particular services or parts of the Orthodox calendar. For instance, white and red are associated with Easter; black and purple with Good Friday and funerals; white, green and blue with baptism, feasts of the Virgin Mary and certain other Saints.

Like other Orthodox items, these historic *sakkoi* are more than just antiquities to believers; they symbolise a living spiritual embodiment of religious import. The relic garments-*sakkoi* [5] (i.e. *sakkos* of St. Nifon) are venerated by the faithful and, like portable icons, are touched, kissed and worshipped. In the past on-going repair was also common, leading to interesting alterations and additions. Evidence of the veneration afforded this garment is found in the cut, torn and shredded edges where worshippers have taken relics as part of their reverence.

The first stage of our work was to design a pro forma to record and document all details related to the component materials, cut and construction techniques and condition before any preventive or interventive treatment can be carried out. The records include detailed information regarding the component materials; alterations and repairs during use; previous restorations and condition assessment. This, together with systematic illustrative material, in the form of drawings, photographs and photomicrographs, has been designed to contribute to the preservation of these artefacts, serving also as a surrogate to reduce the need for future handling. Moreover, it facilitates access for female researchers to this important collection.

All the *sakkoi* are kept in the treasuries of the monasteries and some of them are still used for important religious ceremonies. The current environmental conditions of the storage and display areas of the monasteries of Mount of Athos are poor. The textiles are susceptible to damage by various pollutant agents such as acidic gasses released from the wooden showcases (VOCs), fluctuations of relative humidity and temperature, exposure to UV levels and pest infestation. There have been identified several old repairs and additional linings attached with running stitches to support the ground fabrics. The repairs appear to have been recently applied and are likely to coincide with the use of the garments in Liturgical services. Original buttons, button loops and braids have been replaced, probably in the early years. The garments are identified as vulnerable in its current storage and display and at risk from further handling. Several sweat staining around the collar opening were also identified. All the *sakkoi* exhibit the characteristic damage due to folding. It is apparent that there were standardised methods of folding *sakkoi* when not in use and this has obviously led to vulnerabilities and damage to the fold lines.

A major part of this initial work has been to record the fibre structure, dye presence and to identify metal elements. Examination was performed in various already damaged areas (i.e. splits, losses or holes), mainly from the inner side of the *sakkoi*. All samples examined were fibres of natural origin [6], the majority of which were made of silk [7] but also cotton and linen where found. Fibre identification based on the optical magnification shows that very high proportions of objects (82%) are constructed by silk fibres. This seems to be an honest expecting proportion, knowing already that silk is the main fabric for the Orthodox ecclesiastical textiles. The objects falling in the category of linen is the *sakkoi* which have been lined with linen fabric.

DYESTUFF IDENTIFICATION

Experimental

For liquid chromatography the following solvents were used: HPLC grade acetonitrile (CH_3CN, Merck), trifluoroacetic acid (TFA, Merck) and type I reagent grade water which was produced by a Barnstead EASYpure water purification system. Solvents utilized in the HPLC instrumentation were filtered through a 0.2 μm filter prior to use. Microsamples as those shown in figure 2 were extracted from the historical garments for dyestuff identification. Samples were treated with pro-analysis grade hydrochloric acid 37% (HCl, Riedel-de Haën), HPLC grade methanol (MeOH, Merck), type I reagent grade water and HPLC grade dimethylformamide (DMF, Riedel-de Haën) according to the known hydrolysis procedure. The latter utilizes a solution mixture of H_2O:MeOH:37%HCl (1:1:2, v/v) at elevated temperatures (100^{o}C) to extract the organic dyes. Then samples were evaporated (50-60^{o}C) under gentle nitrogen flow. The dry residues were dissolved in DMF, centrifuged and submitted to HPLC.

Liquid chromatography was carried out using Thermoquest (Manchester, UK) HPLC system consisted of P4000 quaternary HPLC pump, SCM 3000 vacuum degasser, AS3000 auto sampler with column oven, Reodyne 7725i Injector with 20μl sample loop and Diode Array Detector UV 6000LP. Chromatographic separation was carried out on an Alltima HP C18 5μm column with dimensions 250mm x 3.0mm (Alltech Associates, Inc., USA). The column was thermostatted at 33 ^{o}C. The gradient elution program utilized two solvents (A) H_2O-0.1% TFA and (B) CH_3CN-0.1% TFA and the flow rate was 0.5ml/min. Initial of 95% A evolved to 5% within a time period of 35min.

Figure 2. Samples extracted from object III (garment of Patriarch Dionysiou IV Mouselimi). Five samples are shown. The length of the bar is 1 cm.

Dyestuffs and Biological Sources

Natural dyestuffs identified in the extracted samples are summarized in table 1. The results are presented with respect to the macroscopic colours of the samples and are based on the detection of specific colouring compounds which were used as indices for the identification of the dyestuff sources. Specifically, carminic acid was used as an index for the identification of cochineal, a brazilein derivative (Bra′) and type C compound were indicative for the use of a soluble redwood (Nowik, 2001), laccaic acid A and indigotin were used as indices for the identifications of lac (*Kerria lacca* Kerr) and an indigoind dye source, respectively. Madder components such as alizarin and purpurin were detected in samples I.2 and III.2. Sulfuretin was used for the identification of young fustic (*Cotinus coggygria* Scop.). Finally, the identification of dyer's broom (*Genista tinctoria* L.) was based on the detection of genistein, apigenin and luteolin. It is noteworthy, that luteolin was detected not only in samples in which dyer's broom was found (table 1) but also in samples III.1 and III.2 along with several other colouring compounds, none of which, however, could be used for the assessment a particular dye source which could explain the presence of luteolin. The red colour of these two samples suggests that a luteolin-based yellow dyestuff was used during dyeing in limited quantities. This might be the reason for not detecting any secondary colouring compound which could be used for the identification of a luteolin-based dyestuff.

Table 1. Dyestuffs identified in the samples extracted from the garments. Example of nomenclature: "sample IV.4" is sample No 4 extracted from artwork IV i.e. sakkos of Bishop Velegradon Ieremiou (see Introduction)

Colour	**Sample (colour)**	**Identified dyestuff**
RED	IV.4 (red)	(1) Cochineal, (2) Redwood*
	VII.1 (red)	Redwood*
	I.2 (red)	(1) Lac, (2) Madder
	III.1 (red)	(1) Redwood*, (2) Young fustic, (3) Indigoid dye source
	III.2 (red)	Madder
YELLOW	II.1 (yellow)	Young fustic
	III.5 (yellow)	(1) Dyer's broom, (2) Young fustic
	IV.1 (yellow)	(1) Dyer's broom, (2) Young fustic
	IV.2 (yellow)	(1) Dyer's broom, (2) Young fustic
	IV.3 (yellow)	(1) Cochineal, (2) Redwood, (3) Dyer's broom
	V.1 (yellow)	Young fustic
	VI.2 (yellow)	(1) Redwood*, (2) Young fustic, (3) Dyer's broom, (4) Indigoid dye source
GREEN	III.3 (green)	(1) Dyer's broom, (2) Indigoid dye source
	III.4 (green)	(1) Dyer's broom, (2) Indigoid dye source
ORANGE	VI.1 (orange)	(1) Cochineal, (2) Redwood*, (3) Dyer's broom
BROWN	I.1 (brown)	(1) Redwood*, (2) Young fustic, (3) Indigoid dye source

* soluble redwood.

The chromatogram collected for sample III.1 is provided in figure 3 as an example. In the following the discussion focuses on dyestuffs for which the assessment of a specific biological source cannot be achieved directly from the analytical results. These dyestuffs are the indigoid dye source, the soluble redwood, cochineal and madder. Lac, young fustic and dyer's broom clearly correspond to *Kerria lacca* Kerr, *Cotinus coggygria* Scop. and *Genista tinctoria* L., respectively.

It is known that indigotin is contained in woad, *Isatis tinctoria* L. and in indigo, (*Indigofera* species e.g. *Indigofera tinctoria* L.). Woad and indigo were known since antiquity and have similar compositions. It is not possible to separate woad from indigo using historical or even chemical-analytical information, despite the use of highly sensitive techniques such as the HPLC. Consequently, in table 1 we only report the presence of an indigoid dye source which could be either indigo or woad. Any further comment on this rather general result is not possible.

The redwood dyestuff reported in table 1 belongs to the so called "soluble redwoods". The latter correspond to the family of the *Caesalpinia* trees, which includes *Caesalpinia sappan* (native to Asia), *Caesalpinia etchinata* (native to America) and several others. The various species of redwoods (many times are called brazilwoods) cannot be easily distinguished on the basis of their chemical compositions. To some extent this was achieved by Nowik (2001). It is noteworthy though that this study focused exclusively on reference redwood samples i.e. plant extracts of known origin. In our case, unknown samples extracted from historical artworks were investigated; the assessment/identification of the exact redwood plant was not possible.

Cochineal is obtained from three scale insects: (i) Mexican cochineal is obtained from *Dactylopius coccus* Costa, (ii) Armenian cochineal from *Porphyrophora hameli* Brandt and (iii) Polish cochineal from *Porphyrophora polonica* L. Mexican cochineal is native to America and apparently it was used after the discovery of the new world. Consequently, its use in artworks created before the 15^{th} century should be excluded. In the present study cochineal was identified in objects IV (samples IV.3 and IV.4) and VI (sample VI.1). Both objects are considered to be of the 18^{th} century and therefore the use of Mexican cochineal during dyeing is possible. Armenian and Polish cochineal were known since ancient times. In principle, the identification of the specific source of cochineal (*Dactylopius coccus* Costa, *Porphyrophora hameli* Brandt, *Porphyrophora polonica* L.) can be performed on the basis of the relative composition of the minor constituents of cochineal, accompanied by a detailed statistical analysis (Wouters and Verhecken, 1989). The results obtained from the analyses of reference (known origin) cochineal samples are quite clear and the distinction of the three species of cochineal can be obtained. The application of this analysis in historical samples, however, does not always lead to robust conclusions with respect to the exact source of cochineal. In historical samples several difficulties such as (i) the usually small available amounts of samples and (ii) the degradation of dyestuffs developed because of ageing effects and/or extensive use of the historical object, raise sometimes a considerable degree of uncertainty regarding the cochineal source found in the samples. We report that carminic acid was detected in sample IV.3 in small quantity. It was therefore impossible to detect any minor cochineal component. Consequently, sample IV.3 is not included in the following discussion; we focus only on the results obtained for samples IV.4 and VI.1. Distinguished (high) peaks which corresponded to carminic acid were clearly recorded in the chromatograms of both IV.4 and VI.1 samples.

The relative composition of four components is used as a rule for the identification of a cochineal source: dcII, carminic acid (CA), kermesic acid (KA) and flavokermesic acid (FL). According to Wouters and Verhecken (1989) *Porphyrophora polonica* L. (Polish cochineal) contains KA and FL at elevated concentrations. Performing measurements at 275nm the peak area of KA+FL should be within 12-38%. The remaining 62-88% corresponds to CA; dcII is contained in trace (Wouters and Verhecken). KA and FL were not detected in sample VI.1. This can lead to the speculation that the use of Polish cochineal during dyeing can be excluded. A similar conclusion can be drawn for sample IV.4. In this case KA+FL was found on the order of 2%, which is substantially lower than the corresponding composition (12-38%) reported for Polish cochineal samples (Wouters and Verhecken). We focus now on the two remaining candidates: *Dactylopius coccus* Costa (Mexican cochineal) and *Porphyrophora hameli* Brandt (Armenian cochineal). The distinction of the two can be done on the basis of the relative composition of dcII and CA. Mexican cochineal contains dcII (1.4-3.8%) at elevated concentrations in contrast to Armenian cochineal in which the concentration of dcII ranges from 0.1 to 1.2% (Wouters and Verhecken). The dcII compound was not detected in any of the samples IV.4 and VI.1. Therefore this is a strong indication that the use of Armenian cochineal during dyeing is more likely than the use of Mexican cochineal. In summary, we note the HPLC results provided indications that Armenian cochineal (*Porphyrophora hameli* Brandt) was most likely the dyestuff source used for the treatment of samples IV.4 and VI.1. However, this should not be considered as a robust result (only as a speculation) because degradation mechanisms developed in the historical samples might have altered the composition of the cochineal originally used by the dyers of the garments.

There are several madder species around the world. In the Mediterranean area, however, two species are dominant: *Rubia tinctorum* L. and *Rubia peregrina* L. Our discussion will therefore start with the assumption that only these two species should be considered as the dyestuff sources detected in samples I.2 and III.2. Previous studies, performed by Wouters (2001) suggested that detailed measurements of the relative areas of the peaks, which correspond to the colouring components of madder, are necessary for the identification of the exact madder source. Such quantitative measurements, performed at 255nm, have shown that the relative peak area ratio of alizarin versus purpurin is around 1.19 for samples extracted from yarns dyed with *Rubia tinctorum* and around 0.16 for samples obtained from yarns dyed with *Rubia peregrina*. For the samples of interest (samples I.2. and III.2) we report that: (i) alizarin was found in both samples, along of course with purpurin. (ii) The relative peak area ratios of alizarin versus purpurin for samples I.2 and III.2 were found to be 1.67 and 0.84, respectively. These measurements were performed at 250nm which is relatively close to the 255nm used by Wouters. The detection of alizarin at elevated concentrations may lead to the conclusion that the madder dye found in samples I.2 and III.2 was obtained most likely from *Rubia tinctorum* L.

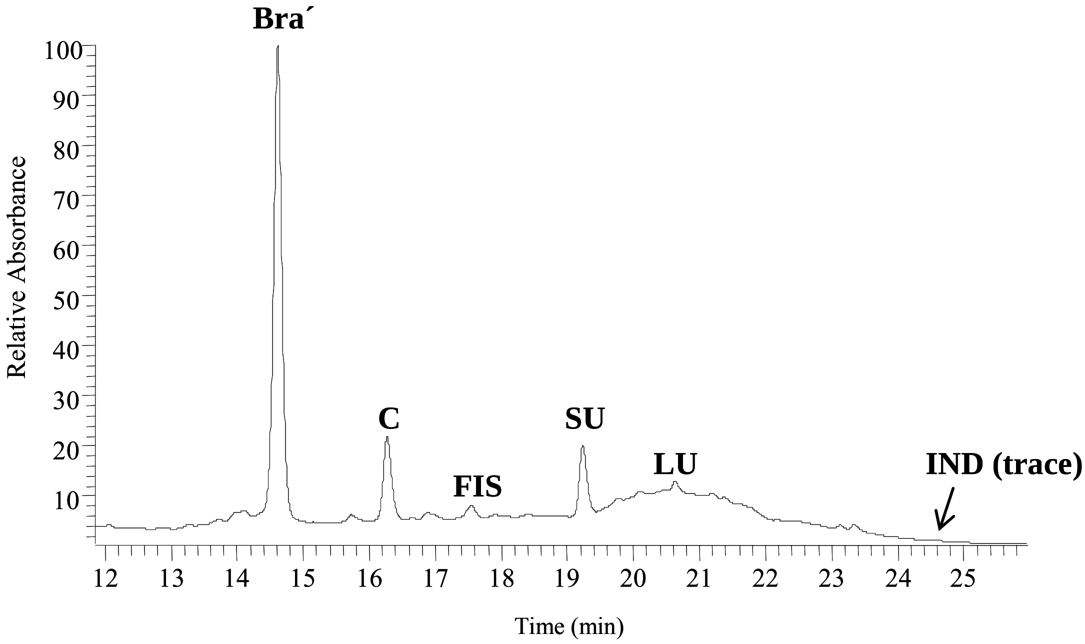

Figure 3. Chromatogram of sample III.1 collected in 300-600nm. Peaks which correspond to brazilein derivative (Bra´), type C compound (C), fisetin (FIS), sulfuretin (SU), luteolin (LU) and indigotin (IND) are shown. Indigotin was detected in trace; the corresponding peak cannot be distinguished in the presented graph.

Colours and Hues

In this paragraph we try to correlate the analytical results with the macroscopic colours of the samples. It is important to note that the colours of the samples reported in table 1 do not coincide necessarily with the colours that these textile samples used to have when they were dyed. Colour fading occurring because of ageing effects and/or extensive use of the object might have altered the original colours of the fibres. On the other hand some interesting comments can be done on the results of table 1, as follows.

The **red** colour was obtained from several combinations. For example the combination of redwood and the blue indigoid dyestuff resulted in the production of dark red (sample III.1 of figure 2). Madder was used to produce a lighter red colour (e.g. sample III.2 of figure 2). Other reddish samples contained redwood (sample VII.1), mixture of cochineal and redwood (sample IV.4) and mixture of lac and madder (sample I.2). Three samples which appeared to be **yellow** contained the same dyestuffs: dyer's broom in mixture with young fustic. This result corresponds to samples III.5, IV.1 and IV.2. Young fustic was found to be the exclusive colouring matter in samples II.1 and V.1. Finally, samples IV.3 and VI.2 appeared to be macroscopically yellow. However, traces of red (cochineal, redwood) and blue (indigoid dye) were detected in these samples. The amounts of the red and blue components were small according to relative ratios recorded at the HPLC chromatograms. Therefore their presence does not affect substantially the macroscopic (yellow) colour of these samples. Two samples (III.3 and III.4) appear to be **green**. Both were dyed with the yellow dyer's broom, and a blue indigoid dye. The **orange** colour of sample VI.1 was achieved by the combination of reddish (cochineal and redwood) dyes with a yellow one (dyer's broom). Finally, sample I.1 which appeared to be **brown** contained dyestuffs of all basic colours i.e. red, yellow and blue.

COMPARISON OF DYESTUFFS USED IN GARMENTS AND ICONS

Table 2 summarizes the dyestuffs detected in the samples which were extracted from the seven historical garments. For comparison, dyestuffs found in samples extracted from fifteen icons are included (Karapanagiotis *et al*., 2007). We note that the two artwork collections (garments and icons) have the same provenance (area of Chalkidiki, Greece), they correspond to the same historical period (icons: 14^{th} – 19^{th} cent.; & garments: late 15^{th} – 19^{th} cent.) and both are related to the Byzantine and post-Byzantine tradition and art. Table 2 suggests that similar red and blue dyestuffs were used by the dyers and iconographers of the artworks. However, yellow organic dyes were not detected in any of the tested icons, in contrast to the garments in which young fustic and dyer's broom were identified. Although, yellow dyes were known by the dyers and therefore iconographers, the latter preferred to use gold sheets and inorganic pigments (e.g. yellow ochre) to produce the yellow colour.

Table 2. Dyestuffs found in garments and icons

Colour	Garments	Icons
Red	Cochineal Soluble redwood Madder Lac	Cochineal Soluble redwood Madder
Blue	Indigo or woad	Indigo or woad
Yellow	Young fustic Dyer's broom	-

CONCLUSION

The following organic dyes were identified in samples extracted from seven historical garments (15^{th} – 19^{th} cent.) of Mount Athos (Chalkidiki, Greece): dyer's broom (*Genista tinctoria* L.), young fustic (*Cotinus coggygria* Scop.), an indigoid dye source either indigo (*Indigofera* species) or woad (*Isatis tinctoria* L.), madder (most likely *Rubia tinctorum* L.), cochineal (probably *Porphyrophora hameli* Brandt) and lac (*Kerria lacca* Kerr). Also, the identification of a brazilein derivative indicates the presence of a *Caesalpinia* dye source in the samples. Similar red (except lac) and blue dyes were identified in samples extracted from icons of the same historical period (and same provenance). On the contrary yellow dyestuffs, commonly found in garments, were not detected in any of the icon extracts.

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ENDNOTES

1. The tradition assigns that the *sakkos* is fastened with 12 bells representing the Apostles and their teaching. In some occasions one of the bells is silent representing Judas.
2. Buttons were always used on the long garments worn by men of the aristocracy in the Paleologian period. Most of the buttons used in these *sakkoi* are mainly Ottoman style, possibly taken from other garments. This modification can clearly indicate that the buttons and other removable motifs of the garments were often transferred by the monks or their tailor-restorers to other ecclesiastical textiles to improve the aesthetic appearance of the textiles.
3. See more Piltz, E. 1976. Troi Sakkoi Byzantins. Sweden: Acta Universitatis Upsaliensis and Sotiriou, G. 1949. The Liturgical Vestments of the Orthodox Greek Church (*Τα Λειτουργικά Άμφια της Ορθοδόξου Ελληνικής Εκκλησίας*). Athens: Republishing, Theology.
4. Danker, F. 2000. A Greek-English Lexicon of the New Testament and other Early Christian Literature. University of Chicago, Lewis, C and Short, C. 1879. A Latin Dictionary. Oxford: Clarendon Press.
5. Relics are divided into two subcategories the decorative fabrics and garments used by the Saints or fabrics to cover their relic bones. Relics as a general term can itself be categorised into three classes. The first class is the bodily remains of a Saint or a Martyr and the instruments of Christ's Passion, such as the True Cross or the Red Tunic worn before His crucifixion and the iron nails of the True Cross, some of which are kept today at Mount Athos. The second class is personal belongings of the departed Saint or Martyr such as the fabrics of garments. The last class comprises any object, which has come into physical direct contact with the relics of the first two classes. In this class there could also be new fabrics which have been woven specially to wrap the bones and bodily remains of a holy person.
6. Different types of microscopes were used for different reasons. A light well hand held distance monocular roof prism telescope Specwell® M0616 6 x 16 (field of view: 10° and near focus distance: 260mm to infinity) was used accompanied with adjusted digital cameras: Fuji® S700 (6.3MP), Canon® EOS (6.3MP), Codak® DC 3800 (2.1MP) and Aiptek® DV 3500 (3.1MP) examine the fibre, the metal manufacture techniques and signs of deterioration.The examination were carried out *in situ*. All the sample fibres were examined with the use of a trinocular Nikon® Eclipse E400 Fluoroescence Microscope. Under 400x magnification the shape and the surface of the threads were more discernable. Photographs were taken using Nikon® Coolpix 995 (3.34 MP). Leica® DM LP polarization system microscope with a modular design with colour view soft imaging camera used to examine the preservation state of the metal threads.
7. Silk was identified also by FTIR. The work is described in: I. Karapanagiotis *et al.*, “The Sakkos of the Emperor Ioannis Tsimiskis (?): A brief stylistic and analytical study”, submitted to the DHA proceedings for publication (25th DHA Romania, 2006).

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