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# Preservation and reduction stains strategies of plush embroidered dyed tablecloth by cross-linked polymers embedded with green materials, applied on a selected textile

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**Abstract**

This paper explores a successful treatment to reduce stains from embroidered dyed tablecloth which is on stock of Prince Mohammed Ali Palace, Egypt. Removing stains from dyed embroidered heritage textiles requires a novel alternatives to traditional cleaning systems. Textiles have a long history of exposure to deterioration factors caused by humanity factors that have compromised the appearance and the condition of these unique embroidered textiles. Removing Ink-Pen and aged animal glue stains from dyed textiles continues to be a major conservation challenge. Before carrying out any cleaning or conservation treatments and processes always take a close look at how the different components might react with textiles as bleeding dyes are a principle concern to textile conservators, some of cleaning treatments can cause extensive damage to dyed textile objects so any cleaning methods or process require a lot of attention and patience to prevent any loss or damage , tests were carried out by using Scanning electron microscopy-EDX to identify the type of fiber and to determine degradation Caused by changes in the surface morphology of the textile sample and FTIR spectroscopy allowed the identification of animal glue stain . The digital microscope demonstrated that gellan gum poultice of 2% solid content is successful in reduction ink and animal glue stains after 90 min of application time in room temperature. Since cross-linked gel cleaning methods and green materials were combined and introduced to the cleaning treatment systems, innovative and safe opportunities are especially provided for cleaning dyed textiles.

**Keywords**

Embroidered Textiles; Gellan gum; Gel Poultice; Protease Enzyme; Decamethylcyclopentasiloxane (D5); Ink stain; Animal glue stain.

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# استراتيجيات حفظ وتقليل البقع من مفرش مائدة مصبوغ ومطرز بواسطة استخدام المواد البوليمرية التوصيلية المحملة بمواد تنظيف صديقة للبيئة، تطبيقا على أحد المنسوجات

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**الملخص**

يهدف هذا البحث إلى إلقاء الضوء على واحدة من أهم طرق التنظيف الحديثة التى إستخدمت بهدف تقليل البقع على أحد المنسوجات المصبوغة المطرزة المحفوظة في متحف قصر محمد علي بالمنيل ،حيث تتطلب إزالة البقع من المنسوجات الأثرية المصبوغة والمطرزة بدائل جديدة لأنظمة التنظيف التقليدية نظرا لما تعرضت المنسوجات اليه بمرور الزمن لعوامل تلف مختلفة منها الناجمة عن العوامل البشرية والتي بدورها أضرت بمظهر وحالة هذه المنسوجات المطرزة الفريدة. ولا تزال إزالة بقع أقلام الحبر والغراء الحيواني القديم من المنسوجات المصبوغة تمثل تحديًا كبيرًا فى مجال ترميم المنسوجات ،حيث تحتاج عملية تنظيف المنسوجات إلي دقة عالية وبحث علمي ممنهج قبل القيام بها حيث أن مواد التنظيف يمكن أن تتفاعل مع النسيج المصبوغ مسببه نزيف الصبغات وتعتبر الصبغات مكون أساسي يحاول المرمم دائما الحفاظ عليه أثناء ترميم المنسوجات المصبوغة. وتم إجراء الاختبارات باستخدام الميكرسكوب الإلكتروني الماسح المزود بوحدة EDX للتعرف على نوع الألياف وتحديد التلف الناجم عن التغيرات في الشكل السطحي للنسيج وأتاح التحليل الطيفي بإستخدام FTIR التعرف على صبغة الغراء الحيواني التى كانت ملتصقة بالمفرش. كما أوضح الميكرسكوب الرقمي أن كمادة gellan gum 2% المحملة بمواد التنظيف كان لها تأثير واضح وفعال في تقليل بقع الحبر المختلفة وبقع الغراء الحيواني من المفرش المصبوغ وذلك بعد مده تطبيق زمنيه حوالى ٩٠ دقيقة في درجة حرارة الغرفة العادية.وأخيرا، فإن إستخدام المواد البوليمرية فى صورة كمادات محملة بمواد التنظيف المصاحبة للبيئة وإدخالها في أنظمة معالجة التنظيف ، أتاحت فرص مبتكرة وآمنة بشكل خاص لتنظيف المنسوجات المصبوغة.

**الكلمات الدالة**

المنسوجات المطرزة؛ الجيلان؛ كمادة الجل؛ انزيم البروتيز؛ مذيب D5؛ بقع الأحبار؛ بقع الغراء الحيواني.

## I. Introduction

Dyed textiles occupy a unique position in palaces and museums historic If not taken care of correctly cared for, they become faded, stained, holey, unstable and this effect on its value, as one of the essential properties of textiles is that of authenticity and aesthetic value (Brooks, M.,2016) Art of embroidery technique dates back to ancient wears and garments in human history. Embroidery plays a significant role in a variety of decorative techniques in textile works. It is created using needle or crochet on leather cloth or any other material such as felt woven by various threads or fibers (Göksel.N& Kutlu.N,2016).

Cleaning is generally the first step of many processes in a protection and conserving through conservation plan and it has more advantages, as stain controlling one of the most important step in textile conservation as it may contribute to the long-term preservation of textiles by removing stains as it impacts both visual and functional aspects of the textile (Djordjević.D,et al.,2017) Some of stains are often left to tell the tale of the textile and its encounter with the stain as it is a part of the life history of textile but in the case the stain is an unwanted, can effect on the fabric and dye, it will be removed only to the extent it does not harm the fabric and dye (Loh.J,2002) Conservation treatments aim at localized or non-aqueous treatments of fabrics to avoid further damage to the fabric (Sachdeva.K & Suri.M, 2009) moreover, aqueous immersion one of treatments which can cause the potential impact on the dye bleeding (Ringgaard.G,2011) Also a variety of additional fabric susceptibilities that have lain dormant in the dry environment may become active in response to water (Sachdeva.K, et al.,2020) For similar reasons, the main limitations of applying solvent using the compress technique are controlling the volatility and the toxicity of organic solvent used in non-aerated place (Carretti.E, et al.,2005) Additionally, the majority of organic solvents commonly used in textile conservation are thought be toxic to some degree demand careful precautions for safety and health, including the right personal protection, ventilation, and disposal (Benner.J, & Lennard.F,2013) Also free solvents can produce the swelling or solubilization of sensitive original components, such as dyes. Moreover, any solubilized soiling and adhesives can be re-transported by solvents within the pores of the artifact (Baglioni.P, et al.,2015)

The first gel-systems employed in the cleaning of paintings were “thickeners”, polysaccharide-based and synthetic polymers, the most commonly used in restoration that are able to swell in the solvent increasing the viscosity of the solution by thickening the solution, reducing of solvent diffusion is achieved and creating a poultice (Volpi.F,2017).Hydrogels have been used in the cleaning of textiles because they permit a controlled release of water while also absorbing any water-soluble degradation products (Malinka.C, 2023). Gellan gum is a high molecular weight polysaccharide generated by the bacterium Sphingomonas paucimobilis and S. elodea during the fermentation procedure additionally, it is one of the most fermentation materials which can form transparent gel in the presence of multivalent cations, providing a solution to many of the problems (Prajapati.V, et al., 2013) Gellan gum one of the physical gel due to their double helix structure, they form semi-rigid, Peelable films (Giraud.T, et al.,2021) It has have a wide range of many applications in the food as thickening, pharmaceuticals and other industries due to their unique structure and physical properties (Raghunandan.K, et al.,2018) It is biodegradable and environment friendly materials (Agarwal.N, et al.,2023) It is able to contact with textured surfaces, also it can draw out soluble soiling and degradation products (Peranteau.A, 2013)Gellan gum has been widely used in textile conservation (Burg.J, & Seymour.K,2022) and has proven to be an essential in removing polysaccharide and rust stain from silk fabric (Tasiouli.N, et al.,2021) As it is easy preparation, delivers moisture in a very regulated approach, preserve dimensional and textures qualities of the treated object, it is flexible and applicable in cleaning uneven or multi-dimensional surfaces, Recommended for local application, it can deliver several chemical materials, no residue and transparency

characteristics of gellan gum gives more visibility of the surface is possible during application. (Maheux.A, 2015) Gellan gum is effective in removing stains and tidelines (Hassan.R, & Mohamed.W,2024) To this purpose, the use of gelled systems has become an effective cleaning strategy since they are able to contain the solvent within the gel matrix. This ensures a more controlled release of solvent than would be possible with a simple liquid solvent wash (Napoli.B, et al., 2019) the article aims to present the strategies for the cleaning and conservation of dyed textiles. It shows new techniques in the cleaning of historic textiles, at least in Egypt.

## 2. Description and condition

### 2.1 Historical context

The case study is plush embroidered dyed tablecloth stored in prince Mohamed Ali Manial Palace, Cairo, Egypt, with Sr.no 78/4 and according to the official palace records its mention that it's one of prince Mohamed Ali collections. The object is decorated by different colors and mixed techniques such as Embroidery and Patchwork with dimension 77.5*76.5cm Figure (1).

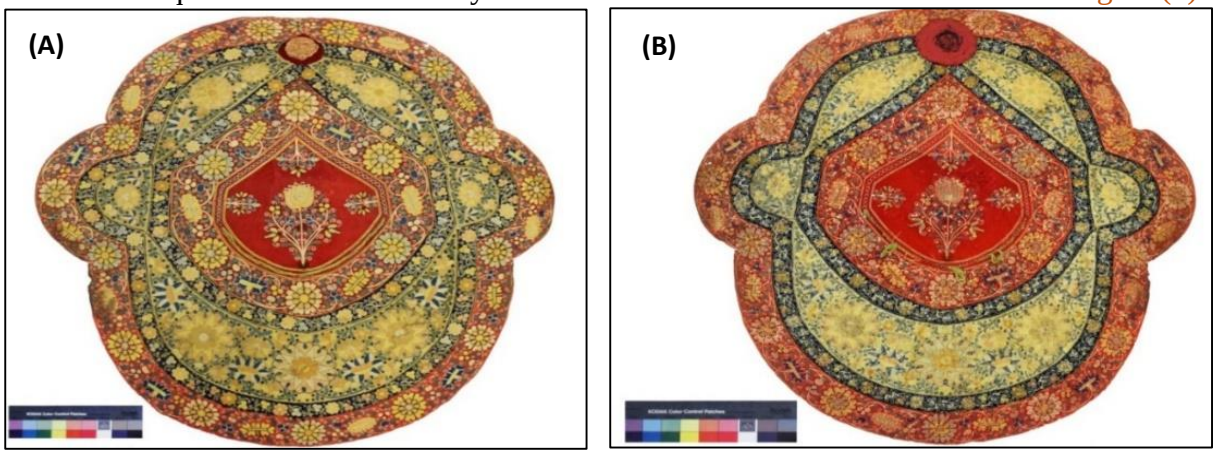



Fig1: The studied plush embroidered dyed table cloth. **A** Front view; **B** Back view.

The design of plush embroidered dyed tablecloth is embroidery technique complexed with patchwork technique (felted Woollen fabric) was used as ground (Yastrebova.O, 2020) which depend on cut into specified shape separately and stitched together along their selvages to accommodate the size of design plus owing to design complexity and execution (Hepworth.P&Tezcan.H, 2009) This kind of patchwork was popular in 19$^{th}$-20$^{th}$ centuries (Dimand.M.S, 1930) In the 19$^{th}$ century tablecloth, luggage cover and other items were decorated by embroidery (Nasirova.S,2021).

The dyed tablecloth decorative elements, arranged in a particularly spacious as the flowery garden, as the ground is decorated with rosettes and leaves in different shapes on plain weaving structure 1/1 (Elnemr.A, & Abd Elwahab.M, 2021).

Motifs also is embroidered in silk chain stitch executed in in different colors on the plain weave wool background as chain stitch used widely in Islamic 9$^{th}$-16$^{th}$ centuries (D. Ekhtiar.M, & P. Soucek.P, 2011) and also used as a filling stitch in Byzantine and Coptic tunic (Thomas.T, 2007) Moreover, "oversewing stitch" whip stitch it is used for holding two edges together (Grimm.M, 2002).

### 2.2 Visual investigation

Conservators consider the visual examination is the first step in documentation of historical textiles. By naked eyes can see the deterioration of the object without depending on microscope or other methods. It is shown that many signs of damage of the object, lost parts, previous repairs of stitches that were inappropriate, insects holes, fading and The creasing in some parts

because of the folding and storing it in small box. On the second face, this embroidered flower ground is obscured not only by layers of soiling which contributing degradation of fabric but also by a ged crusts of some adhesive in a dirty and dark brownish and black also the object is susceptible to deterioration caused by humanity deterioration, On the both side of tablecloth it is noticed that the word (78//العدد٤) has been written in blue and red ink pen(Arabic and English language) the Arabic word means" the record number of tablecloth in the official records and its count" This happened when the curator want to document the object (numbering system ) but unfortunately it is happened in wrong way, resulting in disfiguration and staining problem Figure (2).

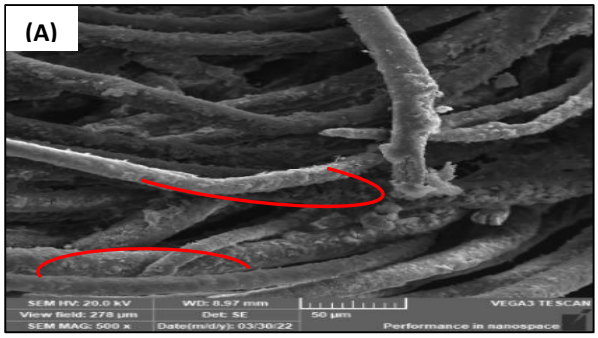
Fig 2: The stains such as aged adhesive, blue, red ink and the effective change in the visual impact of object surface.

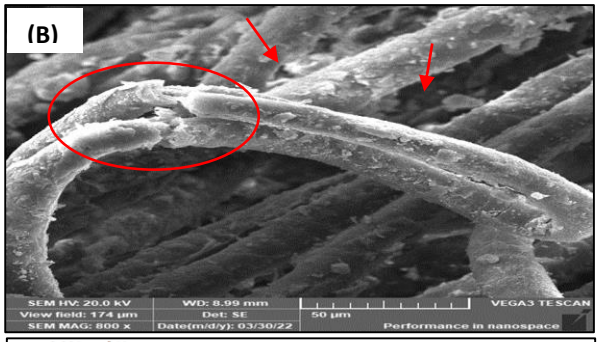
### 2.3 Examination and Analysis Methods

**Scanning electron microscopy (SEM-EDX)**

The surface of the studied object is investigated by Scanning Electron Microscopy (SEM-EDX) to understand the morphology of the fabric (Fahim.N, & Badway.M, 2017). Also it can show various types of damage present on the surface and between the fibers, as well as it provides valuable insights into the extent of dirt and stain penetration between the fabric fibers (Mohie.M, et al, 2023).

Small four samples are taken from ground and embroidered motifs and investigated under SEM. The wool fiber that are identified from red fibers of object's ground also noticed that the fiber degraded as scales on the wool not fully appeared (Abdel-Kareem.O, & Nasr.H, 2021), EDX chart indicate to presence sulfur of wool as cystine linkage of the sulfur containing amino acid able to make disulfide cross linkage which is liable towards best chemical stability and cystine contains sulfur, which gives the fiber high elasticity and high resistance to breakage (Tegegne.W,2023) and silk fibers that are identified from blue, yellow and green fibers of object's embroidered motifs. The fibers are extremely roughened, broken with transverse cracking and longitudinal splitting characterized by scratches, small slits and holes Moreover, The dust and metal ions spreading on the fiber. Examined samples are illustrated in Figure (3-4).




(C)

| Element | At. No. | Netto | Mass [%] | Mass Norm. [%] | Atom [%] | abs. error [%] (1 sigma) | rel. error [%] (1 sigma) |
|---|---|---|---|---|---|---|---|
| Calcium | 20 | 1366 | 8.19 | 40.66 | 22.51 | 0.38 | 4.58 |
| Carbon | 6 | 103 | 4.32 | 21.47 | 39.65 | 2.16 | 49.99 |
| Oxygen | 8 | 122 | 3.62 | 17.99 | 24.94 | 1.70 | 46.88 |
| Sulfur | 16 | 1504 | 1.12 | 5.56 | 3.85 | 0.08 | 7.07 |
| Potassium | 19 | 265 | 0.88 | 4.39 | 2.49 | 0.09 | 10.31 |
| Copper | 29 | 104 | 0.44 | 2.19 | 0.77 | 0.07 | 16.33 |
| Aluminium | 13 | 132 | 0.40 | 1.98 | 1.63 | 0.07 | 17.96 |
| Sodium | 11 | 42 | 0.38 | 1.89 | 1.82 | 0.10 | 26.51 |
| Silicon | 14 | 251 | 0.37 | 1.85 | 1.46 | 0.06 | 15.59 |
| Iron | 26 | 91 | 0.32 | 1.61 | 0.64 | 0.06 | 19.03 |
| Chlorine | 17 | 77 | 0.08 | 0.40 | 0.25 | 0.04 | 43.69 |
| | | Sum | 20.13 | 100.00 | 100.00 | | |

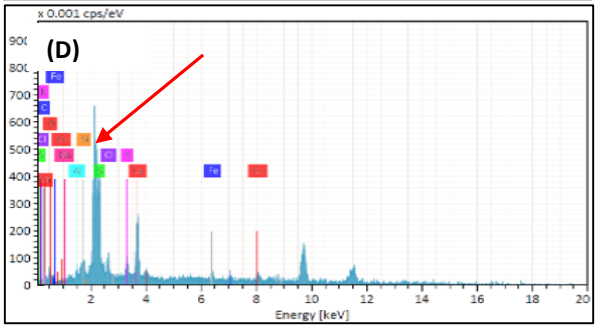
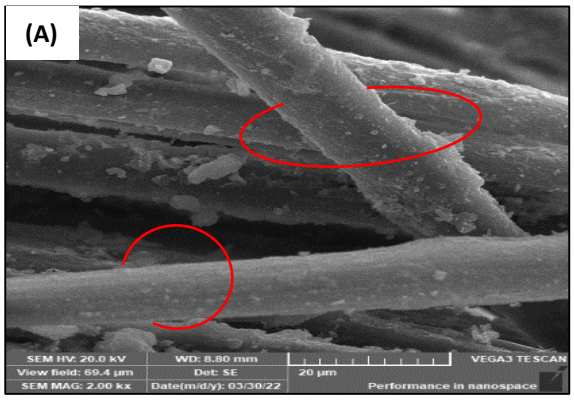
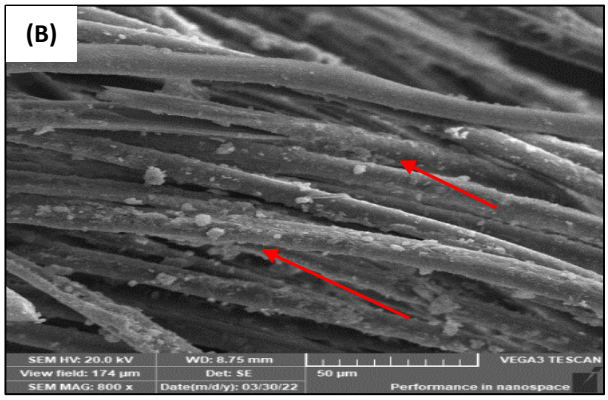



Fig 3: Shows the SEM image of the red ground
**A** Scales of wool fiber; **B** Deterioration signs of fabric; **C** EDX elements including percentage of sulfur; **D** EDX chart including sulfur




(C)

| Element | At. No. | Netto | Mass [%] | Mass Norm. [%] | Atom [%] | abs. error [%] (1 sigma) | rel. error [%] (1 sigma) |
|---|---|---|---|---|---|---|---|
| Carbon | 6 | 317 | 3.62 | 53.07 | 67.18 | 1.20 | 33.17 |
| Oxygen | 8 | 126 | 1.73 | 25.31 | 24.05 | 0.81 | 47.07 |
| Chlorine | 17 | 276 | 0.35 | 5.12 | 2.20 | 0.05 | 14.84 |
| Calcium | 20 | 140 | 0.30 | 4.40 | 1.67 | 0.05 | 17.92 |
| Potassium | 19 | 189 | 0.30 | 4.38 | 1.70 | 0.05 | 16.92 |
| Copper | 29 | 64 | 0.21 | 3.02 | 0.72 | 0.05 | 25.49 |
| Aluminium | 13 | 60 | 0.15 | 2.20 | 1.24 | 0.05 | 32.51 |
| Magnesium | 12 | 27 | 0.10 | 1.51 | 0.94 | 0.05 | 47.26 |
| Chromium | 24 | 26 | 0.07 | 0.99 | 0.29 | 0.04 | 57.31 |
| | | Sum | 6.82 | 100.00 | 100.00 | | |

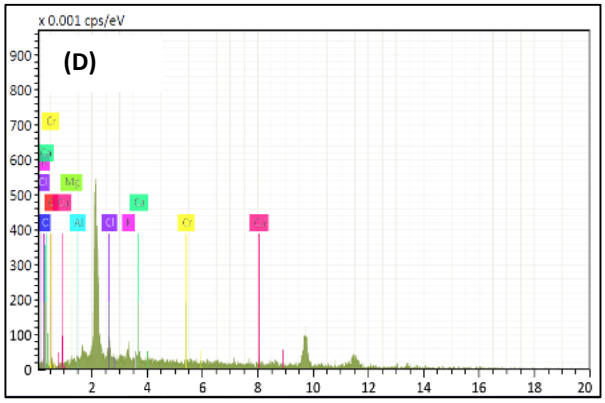



Fig 4: Shows the SEM image of the green embroidered yarn **A** The morphology structure of silk fiber; **B** Signs deterioration of fabric; **C** EDX elements of silk fiber; **D** EDX chart of silk fiber

**Attenuated total reflection Fourier transform infrared (ATR - FTIR) spectroscopy**

The FTIR spectrum revealed that animal glue is stuck with dyed tablecloth through samples is taken from the object. The vibrational bands that appear in the infrared spectra provide information about chemical groups of Animal glue sample which is stuck with tablecloth-study case, the characteristic bands of animal glue are amide I (peptide carbonyl group C=O stretched at ˜1630 $cm^{-1}$), amide II (C-N stretched together with the N–H in plane bending at 1515 $cm^{-1}$) (Afifi.H, & Mansour.M, 2023) Figure (5).

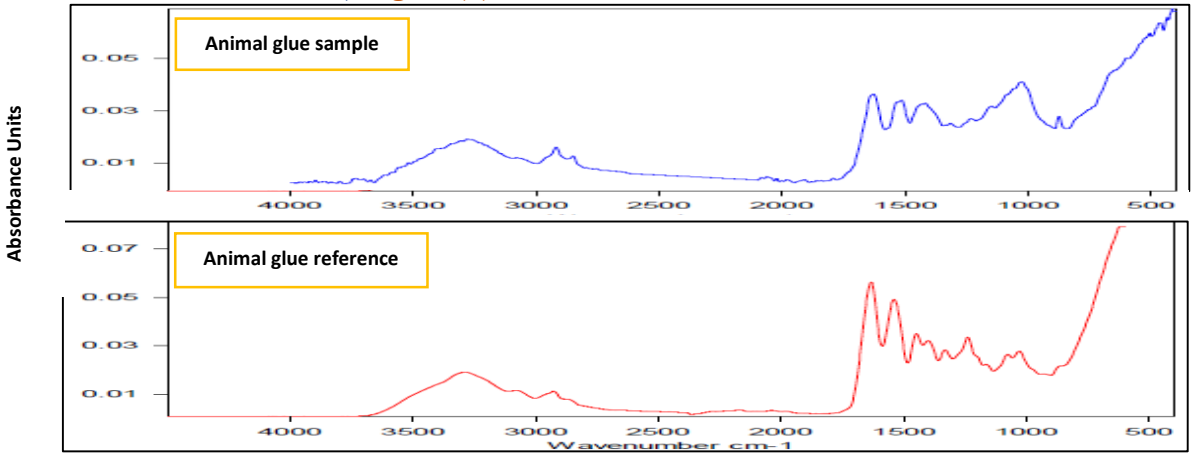



Fig 5: FTIR−ATR analysis show that the adhesive sample is Animal glue

## 3. Conservation strategy of case study

### 3.1 Cleaning treatment

**Mechanical cleaning**

The purpose of mechanical cleaning to remove dust and the remains of insects which may be can cause physical or chemical damage to the fiber. Free surface dust and accumulations is removed by using various types of fine brushes, sponges and vacuum cleaner with low suction (Ahmed.H, & Mansour.M, 2018).

**Stains reduction by gellan gum gel poultice**

There are several techniques for removing stains like mechanical cleaning, chemical cleaning and wet cleaning but it can cause critical drawbacks to the fabric and not always effective (Ringgaard.G, 2011) So a promising alternative to these techniques is gel cleaning treatment with aqueous cleaning solutions which is based on two main ideas: first, increasing the viscosity of a cleaning solution with the addition of a gelling agent allows for better control over the cleaning solution when applied on treated surface; second, chelating agents, enzymes, or surfactants can optimize the cleaning capacity of water (Cremonesi.P., 2013),this is to avoid traditional methods direct contact with fibers and dyes.

The current study focuses on cleaning dyed textiles stained with animal glue and ink stains using gellan gum loaded with enzyme and green solvent. This is type of technique aims to professional cleaning with the least amount of cleaning agents, therefore the polysaccharide molecules are working as a carrier for the efficient cleaning substances (Signorini.E, 2013).*The produced gel poultice is prepared at Polymer Department National Research Centre in Dokki, Giza, Egypt.*

**Animal glue stain reduction by Protease enzyme gellan gum poultice**

According to FTIR analyzation adhesive stain appears to be darkened aged animal glue and it has a limited solubility but research by (Ahmed.H, Kolisis.F) suggested the use of protease from Aspergillus oryzae for their efficiency (Ahmed.H, & Kolisis.F, 2012).

**Preparation of protease enzyme gallen poultice**

The cleaning treatment developed of the protease enzyme suspended in gellan gel (Otto Chemie pvt. Ltd., Mumbai, India)., 2% gellan gum with N,N,methylenebisacrylamide (0.1g)(Fluka-Aldrich Chemical GmbH, CH-9471, Switzerland) as a cross linker were added to avoid wetting out and to allow the Protease enzyme (Protease from Aspergillus Oryzae P-4755 Type II ,Sigma, Aldrich Munich, Germany) macromolecules to move freely 90% of the water was used with the gel and the remaining 10% water was added to the enzyme (1% to the total water content) in the polypropylene petri dish. Once the gel had reached 90°C, it was removed from the heat, allowed to cool by at least 10°C, before adding it to the petri dishes of enzyme, swirling the petri dish to mix the solution and trying to avoid bubbles, This enzyme is most active from pH 4.5 to 5.5, and the optimum temperature for activity is 55-60°C so treatment at room temperature was ideal also the enzyme gel effective for 24 hours so the cleaning was completed in one day of work (Orfeur.K, & Farmer.B, 2019).

**Application of the enzyme gallen poultice**

The cleaning was performed by direct application of the enzyme gel onto the aged adhesive stains, After 5 minutes approximately the gel being applied it is appeared that animal glue was viscous and the adhesive being dragged into the blotter paper and gel poultice, after 90 minutes the time application of gel, the stained surface seems to be partially free of adhesive (Gorel.F, 2010).Agar gel with 2% deionized water was prepared and applied to the treated area with the same application time to remove the enzyme from the textile (Smets.A, et al., 2019). Figure (6)

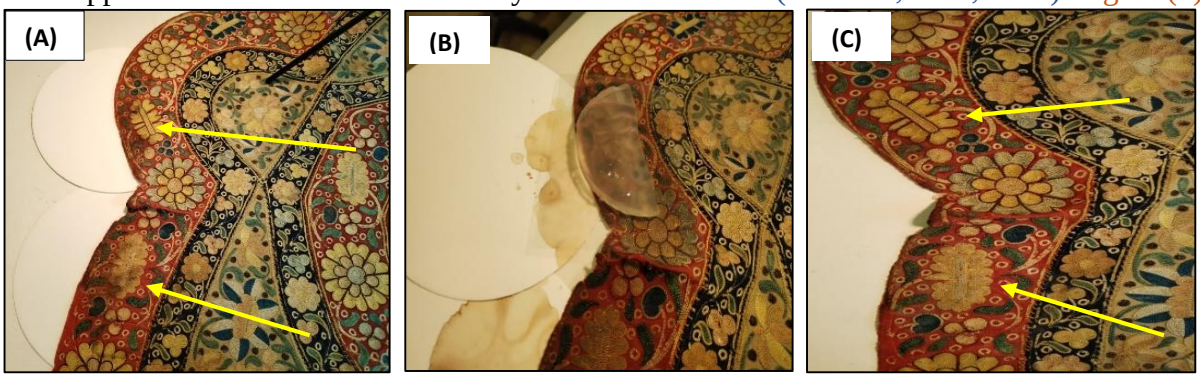



Fig 6: Shows the cleaning of animal glue stain using enzyme gel. **A** The stain of animal glue before cleaning; **B** Verify the amount of animal glue released from the fabric by using blotter paper during the gel poultice application; **C** The effective of gallen gum in reduction animal glue stain.

**Ink Pen-reduction by siloxan D5 - gellan gum poultice**

Prof. Richard Wolbers suggested replacing the cyclododecane with siloxanes D4 and D5 to prevent bleeding of dyes and protect embroidery and textile (Smets.A, et al., 2019).

**Preparation of the siloxan D5 - gellan gum**

The cleaning treatment developed of 2% gellan gum with N,N,methylenebisacrylamide (0.1g) as a cross linker were added to avoid wetting out was used with the gel and the remaining 10% water was added to the siloxan D-5 (Hangzhou silway new material technology Co., Ltd,China) (1% to the total water content) in the polypropylene petri dish. Once the gel had reached 90°C, it was removed from the heat, allowed to cool by at least 10°C, swirling the petri dish to mix the solution and trying to avoid bubbles (Orfeur.K, & Farmer.B, 2019).

**Application of the siloxan D5 - gellan gum poultice**

The glass weights with the gel was placed on the ink stain to encourage the contact of the gels with the textile also the covering prevented dehydration of the gel pads. The gel pads were left on the textile for around 90 minutes, and after that removed from the tablecloth Figure (7-9).

**Results of gel poultice cleaning**

Through the visual inspection of the gel poultice and stained area after application time it is clear that animal glue, blue and red inks stain were totally reduced as the visual appearance of the tablecloth is completely improved. Additionally, shadow lines could not be noticed after treatment with gel. Also, no discoloration of the dyed textile could be observed this may indicate that the gel treatment do not cause dye bleeding. Transparence of gel pads changed after treatment to opaque visual. Additionally, the microscopic inspection revealed good results of reduction stains Figure (10).

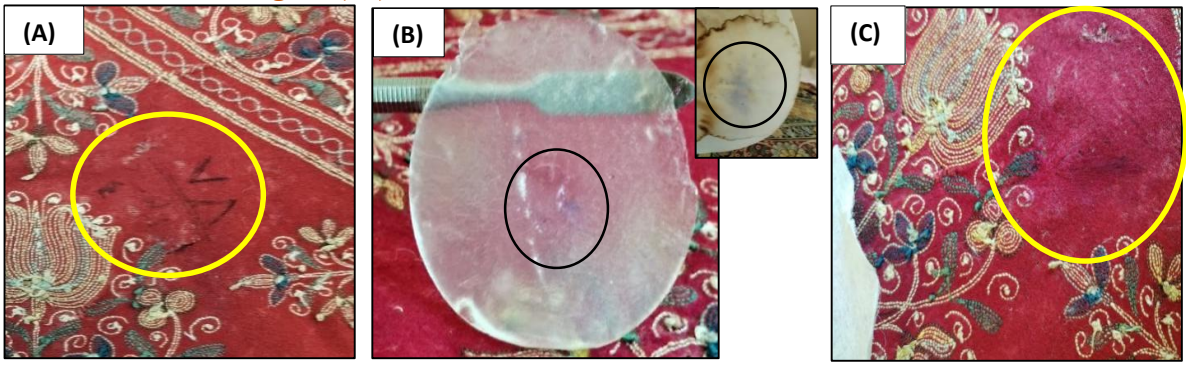



Fig 7*:* shows the cleaning of blue ink pen stain on wool yarn using gel poultice. **A** Blue ink pen stain before cleaning; **B** Verify the amount of blue ink released from the fabric during the cleaning procedure to gel poultice and blotter paper; **C** The effective of gallen gum in reduction blue ink stain.

**Note:** we used digital microscope as the only available Non-destructive & Non-motility method available for archeological artifact.

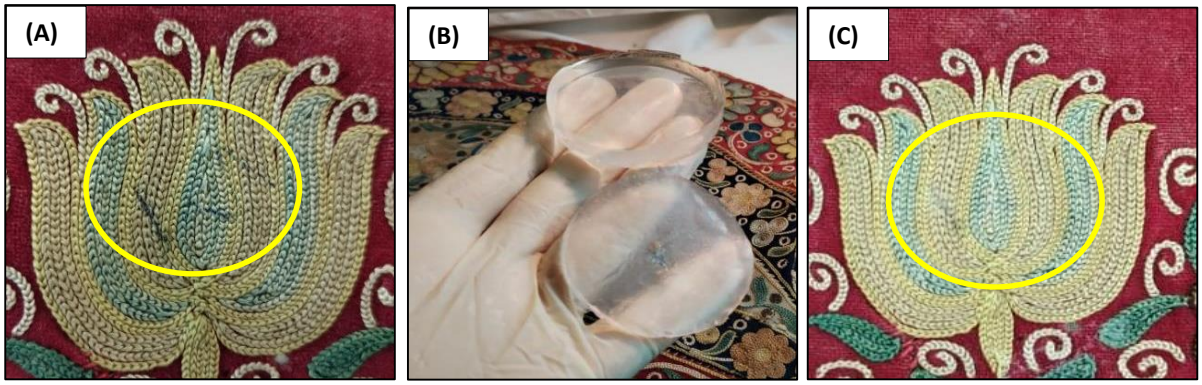



Fig 8: shows the cleaning of second blue ink pen stain on silk yarn using gel poultice. **A** Blue ink pen stain before cleaning; **B** A pale color of used gel pads in comparison to transparent color of new one can be observed**; C** The effective of gallen gum in reduction blue ink stain.

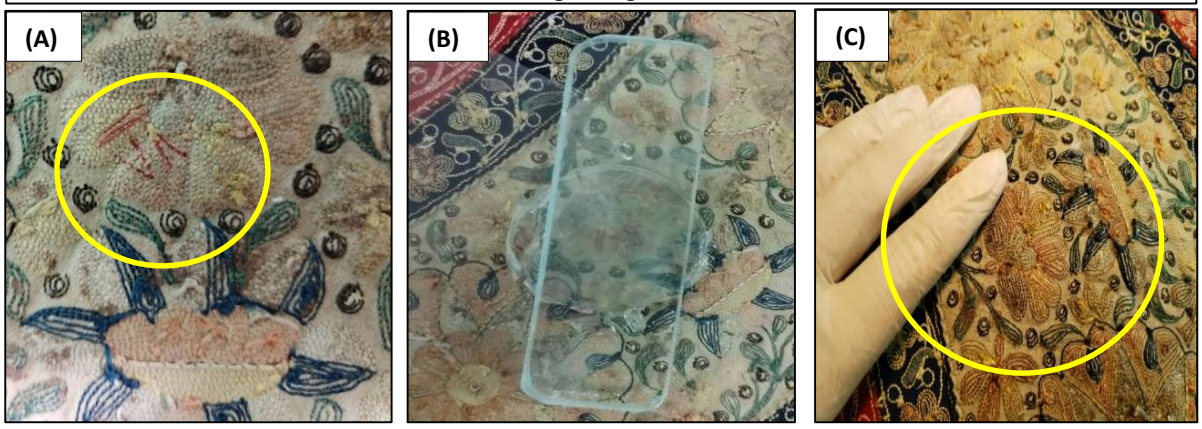



Fig 9: shows the cleaning of red ink pen stain on silk yarn using gel poultice. **A** Red ink pen stain before cleaning; **B** The gel poultice during cleaning procedure; **C** The effective of gallen gum in reduction red ink stain.

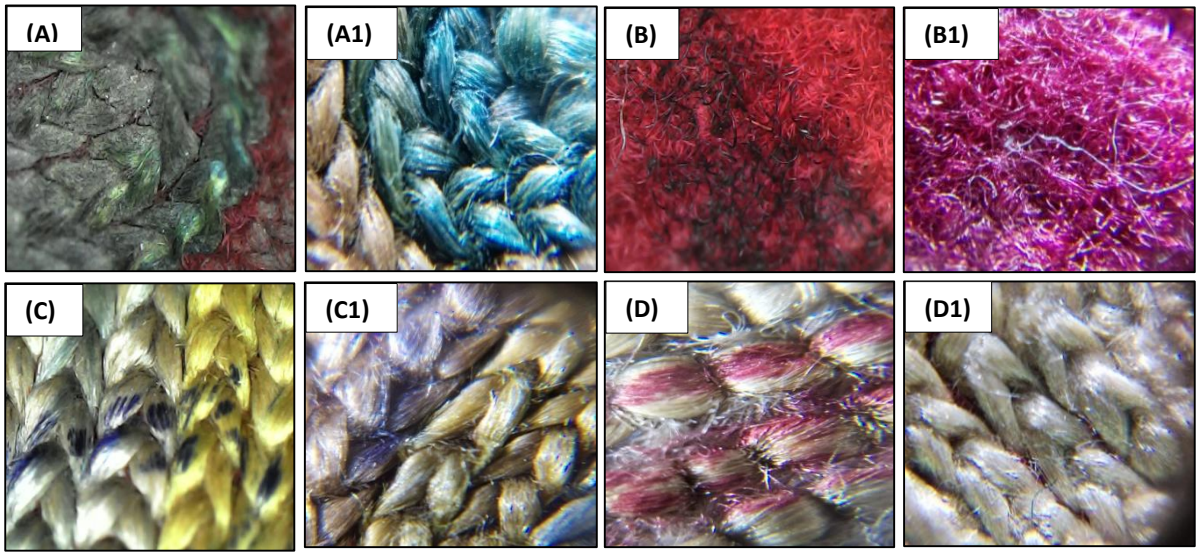



Fig 10: shows microscopic graphs before and after application of gallen gum poultice. **A,A1** The animal glue stain before and after gel treatment **B,B1** Blue ink pen stain on wool yarn before and after gel treatment; **C,C1** the blue ink pen stain on silk yarn before and after gel treatment; **D,D1** The red ink pen stain on silk yarn before and after gel application.

### 4.4 Supporting of holes tears areas

**Supporting by using the needlework**

Stitches that have been sewn by black, red and yellow thread, designated as old repairs or inappropriate interventions, these sewing threads are removed because they are causing unnecessary tension to the surrounding textile and to reduce the tightness of old stitches which caused the wrinkles (Tonkin.L, 2020). Stitches is made with fine silk threads and cotton threads with colors match with each fabric color furthermore, medical curved thin stainless needles are used Figure (11).

Fig 11: Shows the Final Display of the Embroidered Tablecloth.

## 5. Conclusion

This study included treatment and conservation of an archaeological embroidered dyed textile belongs to Prince Mohamed Ali collection. The design of plush embroidered dyed tablecloth is embroidery technique complexed with patchwork technique as this kind of patchwork was popular in 19$^{th}$-20$^{th}$ centuries. Plush dyed tablecloth decorative elements, arranged in a particularly spacious as the flowery garden, as the medallion are decorated with rosettes and leaves in different shapes, It is consider one of the most precious pieces in the palace. The artifact suffers from missing areas, weakened fibers, separated yarns, temporary restoration with different color of yarns and critical spots as red and blue ink pen ( represents the serial number of the object in the official records) it happened due to man deterioration moreover, animal glue stains which is covered the decoration of the artifact. The artifact was analyzed by using (SEM-EDX)which clear that the red thread is wool and the embroidered threads are silk and the EDX also was used and the results showed that the sulfur element is one of the component of red yarn sample (red wool fabric). Portable microscope is a crucial tool in documentation process since it provides clear images with more details about object deterioration. The FTIR spectrum revealed that animal glue was stuck with dyed tablecloth through crust samples was taken from the object as the vibrational bands that appear in the infrared spectra provide information about chemical groups of Animal glue. Treatment processes carried out to the object reflects conservation strategy of techniques, materials and

approaches that currently in use of the stabilization and cleaning of embroidered dyed textiles. This includes vacuum cleaner, fine brushes, sponges, a controlled gel system during cleaning process to safely clean a large embroidered textile and reduction the stains to satisfaction rate without any side effects as tidelines and dye bleeding. The techniques are simple, applicable and it succeeded in the removing the dust and accumulations moreover, The digital microscope demonstrated that gellan gum poultice of 2% solid content does not effect on fabric structure and no residue was left behind the gellan gum poultice after application time. It was noticed also no color change happened when using the poultice. We recommended also using blotter paper to verify the amount of stain released from fabric to watch treatment. This suggests that gellan gum poultice provided better results which can may be give recommendation for gel poultice cleaning in room temperature to avoid drawbacks can happen with wet and dry cleaning as it has the best performance of stains reduction also application time of 90 minutes can be circumvented with longer dwell times. After all treatments, the dyed tablecloth has retained his integrity, while improving in stability, cleanliness, and coherence.

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