The conservation of a Samurai armor[1]

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Armura de samurai prezentată în lucrarea de față se află printre primele obiecte colectate de către Museum of World Culture, Gothenburg, Suedia, în 1882. Armura a fost împrumutată către City Museum, Gothenburg, cu ocazia organizării unei expoziții temporare, necesitatea valorificării expoziționale impunând astfel efectuarea unor tratamente de conservare activă. Având în vedere faptul că armura urma să fie expusă pe durata unui întreg an, a fost proiectată construirea unui manechin care să corespundă particularităților obiectului per ansamblu, dar şi a diferitelor sale materiale constituente.

Cuvinte cheie: armură de samurai, tratamente de conservare, manechin, expunere
Keywords: samurai armor, conservation treatment, mannequin, display

The Japanese armor was donated to the Museum of World Culture, Gothenburg, by Oscar Dickson, in 1882. As one of the first objects in the museum's collections, the suit of armor (fig.1) was loaned to the City Museum, Goteborg, for the temporary exhibition, titled *Om 150 år - en jubileumsutällning (150 years - a commemorative exhibition)*, on display from November 2011 to November 2012.

Fig. 1- The mounted Japanese armour
Fig. 1 - Armură japoneză, montată pe manechin

General description: Designed first of all for practical reasons, the aesthetic aspect of a Japanese suit of armor is also important; a Samurai armor typically includes several individual parts, which are, in turn, constructed out of different organic and inorganic materials, combined so that the armor itself would fulfill its purpose, i.e. to protect the warrior's body.

The face mask (fig. 2): iron mask covering the entire face from forehead to chin, following the contours of the face, with small, overlapping lacquered throat guards laced together with green silk braids; on the upper part, a green silk braid has been attached for tying around the head; the inside of the mask was covered in red lacquer in order to protect the face.

[1] The conservation of the Samurai armor was performed while I was an intern at the National Museum of World Culture, Gothenburg, as part of the Master Programme in International Museum Studies at Gothenburg University, under the coordinatorship of textile conservator, Anna Javer.

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Fig. 2 - The face mask
Fig. 2 - Mască de faţă

The shoulder blades (fig. 3): metal and lacquer shoulder blades; the lacquered blades have been secured together with green silk braid; the metal is covered in rich golden ornaments; the upper part of the blades, reinforced around the neck, was decorated with silk embroidery, rich golden metal ornaments and impressed leather; a purple silk rope was attached to the back side of each shoulder blade, which would have been fastened on the ring on the back plate of the chest armor, while worn by the warrior.

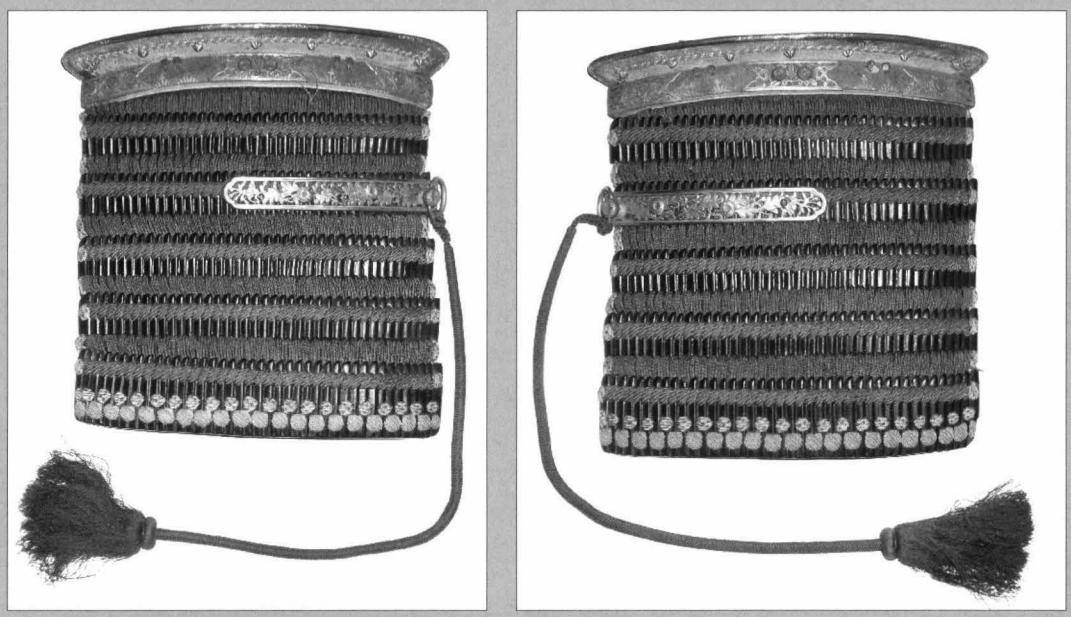


Fig. 3 - The shoulder blades
Fig. 3 - Apărători de umeri

The helm (fig. 4): iron helmet with neck guards; the helmet itself (the dome) was made of 16 plates of iron riveted together vertically, reinforced with ridges and ornaments on the brim; from the edge of the helm, four layers of small, overlapping lacquered strips, tied together and decorated with silk strips, were attached; the inside of the helm was lined with green velvet (on the rim) and red silk; the edge of the brim is decorated with rick golden metal ornaments on four parts, and silk tassels at the back, a metal rosette on the pick of the dome, and two curved metal plaques on each side of the face (with rich metal golden decorations, impressed leather and silk embroidery); the front of the dome has a detachable decoration consisting of two metal lacquered leaves (the same as on the curved plates on the side of the helm); two silk ropes were attached on each side on the inside of the helm for tying around the head.

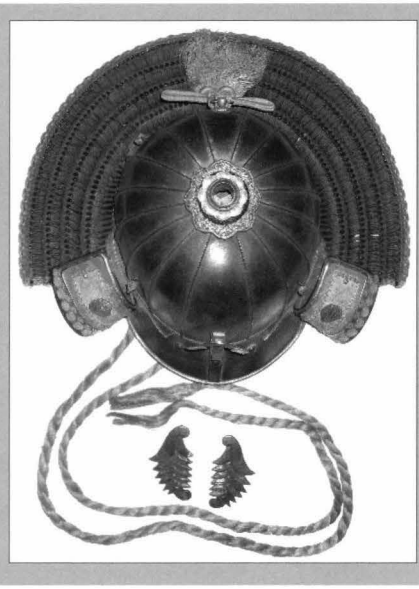


Fig. 4 - The helmet
Fig. 4 - Coif

The greaves (leg guards) (fig. 5): the leg guards were made of 8 iron plates riveted together vertically, 5 longer ones at the front, and 3 shorter ones at the back which are, in turn, attached to gilded leather (at the back of the leg); the plates are sewed onto a heavily padded cloth (black linen, probably, covered with hexagons of golden silk threads with a green silk button in the middle that reinforce small circular plates of metal), on the top front of the leg, for knee protection; the edge of the cloth, as well as of the gilded leather, are covered with a silk and metal threads braid; the entire greave was lined with the same blue fabric as the sleeves; the greaves were attached to the leg with two strips of green silk against a linen (probably) support, one on the upper, the other on the lower part.

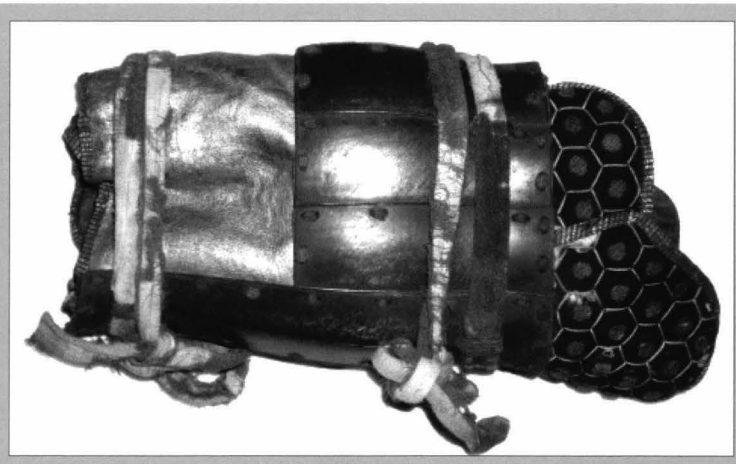


Fig. 5 - The left greave
Fig. 5 - Apărătoare pentru gambe şi genunchi – piciorul stâng

The armored gloves (fig. 6): armored gloves, like sleeves, extended from the fingers to the shoulders; the sleeves were made of a green silk and metal threads fabric, attached on a silk support (padded with a bast fabric and a blued lining), armored with iron plates (on the hand, forearm, from the elbow to the wrist, and the upper arm, while the elbow was protected by a circular plate) and a chain armor; the sleeve would have been attached with silk straps over the shoulder; the inside of the sleeve was fastened with a silk cord, tied around the arm, all the way from the elbow to the hand; each of the iron plates protecting the hand and upper arm were decorated with a golden metal rosette.

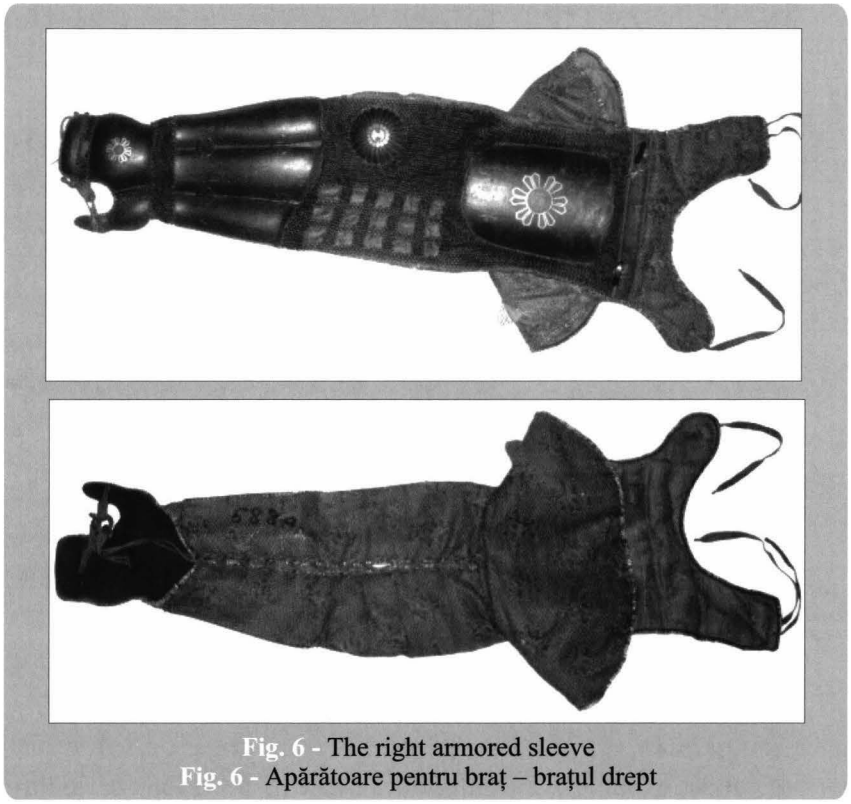


Fig. 6 - The right armored sleeve
Fig. 6 - Apărătoare pentru braţ – braţul drept

The thigh guards (fig.7): armored thighs tied around the waist with two strips of green silk against a linen (probably), support, made from cloth (green silk and metal threads fabric against a bast support, with a blued lining) with small iron lacquered plates and leather strips (a vertical and a horizontal one on each leg); the metal plates were sewn together with green silk on the front of the upper leg; the edges of the thighs were fastened against the leg with silk strips sewn inside in a pocket of silk fabric; a braid of silk and metal threads covers the edges of the outer opening of the thighs.

Fig. 7. - The thigh guards
Fig. 7. - Pantaloni bufanţi

Fig. 8 - The chest armor
Fig. 8 - Armura-cuirasă

The chest armor (fig. 8): covering the body from the neck to the lower body and upper leg, the chest armor was made of iron and leather plates with small lacquered metal blades hanging from the front and the back. The chest armor itself was made from large iron plates covering the four sides of the body, laced together with leather cords, with the opening for dressing the body on the side; the breastplate is ornamented with stripes of golden metal threads and silk, with a second smaller plate on top, covered with an impressed leather guard, and has two hooks onto which the back plate would have been secured; the left-side plate was fastened against the back and front plates with hinges and silk cords, with the upper part covered in impressed and embroidered leather and the lower part decorated with green silk strips; the right-side plate consists of three smaller plates, with the opening also decorated with leather guards and silk strips, tied with silk cords to the breastplate; the back plate was reinforced at the top with a second plate, richly ornamented with impressed leather, colored silk and golden metal ornaments, the center of which being the point from which the ring (that holds the ornamental silk cord and tassels) was secured; on the second plate of the back, a larger plate, a heavily padded cloth (black linen covered with hexagons made of golden silk threads with a green silk button in the middle that reinforce small circular plates of metal on a bast fabric support, lined with blue silk- the same as the one covering the knee area on the greaves) and stripes of leather were fixed, with cords and loops for fastening it against the front plate. A series of small plates hung from the chest plates, constructed of overlapping strips of metal, tied tighter with green silk straps and fastened to the main plates with leather cords; the lacquered strips were laced together so that they could form four individual plates on the front and four on the back of the chest armor, forming a kind of protective skirt.

Dimensions:

Mask:	length - 200 mm	width – 210 mm	high - 130 mm
Shoulder blades:	length - 250 mm	width – 240 mm	high - 65 mm
Helm:	length - 420 mm	width – 350 mm	high - 250 mm
	base circumference (dome and neck guards) – 1240 mm		
Armored gloves:	length - 850 mm	width – 360 mm	
Greaves:	length - 300 mm	width – 170 mm	high - 90 mm
Thigh guards:	length (from waist down) – 800 mm		
	waist line (hip to hip) – 500 mm		
	width (one pant leg) – 300 mm		
Chest armor:	length (from shoulder to the waist line) – 460 mm		
	circumference (maximum) – 1060 mm		
	length (of the plates) – 310 mm		
	width (of the plates - maximum) – 200 mm		
	width (of the plates – minimum) – 100 mm		
Sword:	length - 980 mm	width – 40 mm	high - 70 mm

General condition. Because of the mix of organic and inorganic materials, but also due to wear, and to storage and display micro and macro environment, the armor presented various deteriorations, on each individual component part. The combination of textiles, metal, leather and lacquer, each material responding to the environmental conditions differently, together with some of the component materials' predisposition to damage (especially the silk and the lacquered layers), produced various deteriorations:

The mask: dust and dirt deposits on the entire surface of the mask (fig. 9), including on the inner red lacquer; chips, crack and lacunas in the lacquered layers; corrosion, scratches and dust deposits on the iron elements; discoloration and frailty of the silk elements.

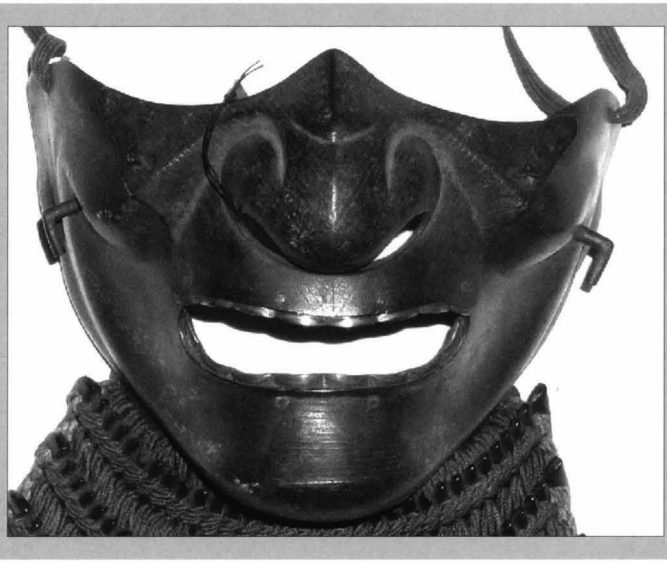


Fig. 9 - The metal face mask; degradations: dust and dirt deposits, corrosion marks, scratches
Fig. 9 - Masca de față din metal; degradări: depozite de murdărie şi praf, pete datorate produşilor de coroziune, zgârieturi

The shoulder blades: dust and dirt deposits on the entire surface; chips, crack and lacunas in the lacquered layers; discoloration and frailty of the silk elements; oxidization marks and scratches on the metal elements (fig. 10).

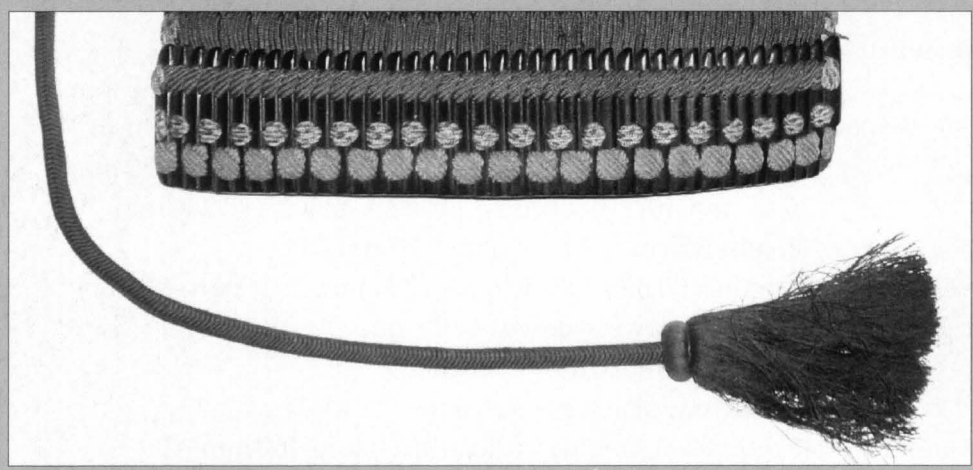


Fig. 10 - The left shoulder blade; degradations: chips and cracks in the lacquered layer, dust and dirt deposits, discoloration of the silk lacing and tassel
Fig. 10 - Apărătorea pentru umărul stâng; degradări: fisuri şi aşchieri în stratul protector, depuneri de praf şi murdărie, decolorarea şireturilor şi canafilor de mătase

The helm: dust and dirt deposits on the entire surface of the mask, including on the interior; chips, crack and lacunas in the lacquered layers; corrosion, scratches and dirt deposits on the iron elements (fig. 11); discoloration[2], thinning and fraying of the silk elements.

The armored gloves: dust and dirt deposits on the entire surface; oxidization marks and scratches on the metal elements; discoloration, tears, lacunas, thinning and fraying of the silk and metal threads fabric[3] and blue lining, as well as oxidation stains and holes[4]; loose threads, from an old museum marking system; the two upper braids of the left sleeve are missing (fig. 12 and 13).

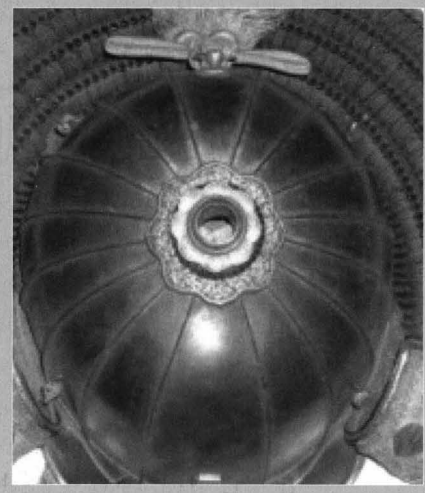


Fig. 11 - The helm dome; degradations: corrosion, scratches, dirt deposits
Fig. 11- Domul metalic al coifului; degradări: produşi de coroziune, zgârieturi, depozite de murdărie

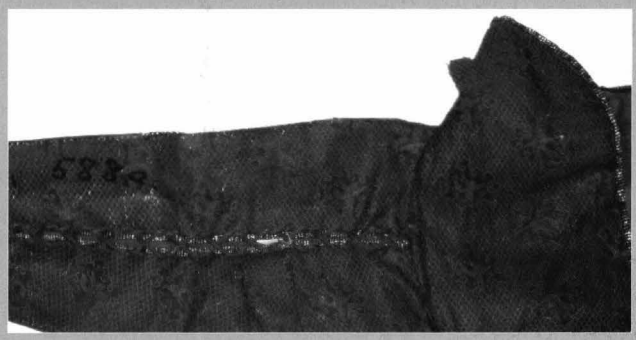
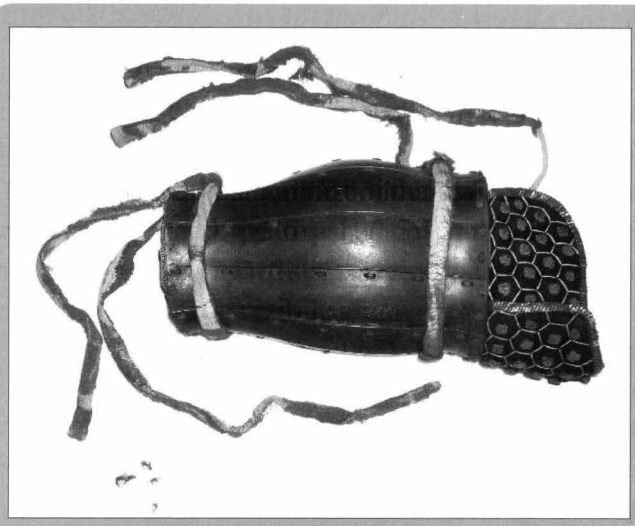


Fig. 12 - The right armored sleeve – inner side; degradations: discoloration, dirt deposits, tears, lacunas, thinning and fraying of the silk and metal threads fabric
Fig. 12 - Apărătoarea pentru braţul stâng – partea interioară; degradări: decolorări, depuneri de murdărie, sfâşieri, lacune, subţieri ale firelor de mătase şi metalice din ţesătură

Fig.13 - The right armored sleeve – inner side; degradations: discoloration, thinning, dirt deposits, oxidation stains and holes in the blue lining
Fig. 13 - Apărătoarea pentru braţul stâng – partea interioară; degradări: decolorări, depuneri de murdărie, subţierea ţesăturii, pete şi lacune datorate produşilor de coroziune, prezente pe dublură

The greaves: dust and dirt deposits on the entire surface; oxidization marks and scratches on the metal elements; discoloration of the textile elements; oxidation stains; creases, loose fragments of green silk; lacunas[5] in the black fabric; the seam joining the green silk, the blue lining and the strips of silk and metal threads, is missing; deterioration of the strips which tied the greaves to the leg[6] (fig. 14 and 15).

[2] Caused by direct exposure to light during a prolonged period of time.
[3] The deterioration of the textile elements occurred particularly in areas which were most exposed to wearing, i.e. on the outer surface of the sleeve and at the armpits.
[4] Due to the direct contact of the textile with metal elements.
[5] Probably due to a biologic attach.
[6] The strips of green silk against a white linen (probably) support are extremely deteriorated; the silk layer covering the white strips of linen became extremely fragile, due to the exposure to direct light over a long period of time and variations of temperature and humidity, because of their functional use, and also because the greaves were exhibited and stored the same way they would have originally been worn, i.e. with the strips tied twice around the leg, which put extra pressure on the braids; in the areas where the braids were most tensioned, i.e. the knots, fragments of the fragile green silk are missing, while the threads of the remaining fragments have lost their proprieties, so that single silk threads and small fragments are no longer supported against the linen, but instead got loose.



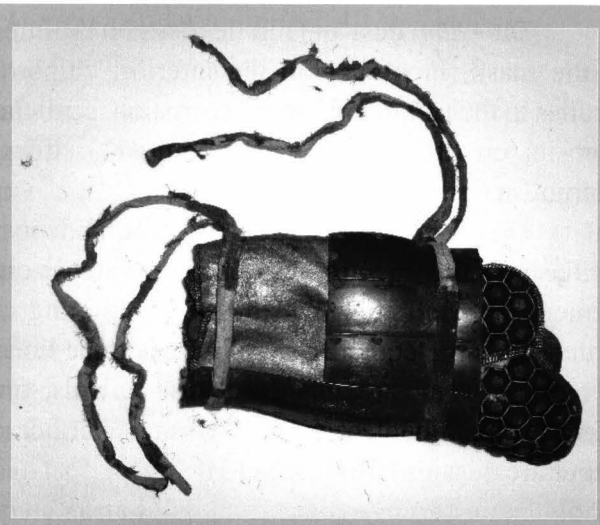


Fig. 14 - The greaves, after un-tying the strips; degradations: dust and dirt deposits, oxidization marks, scratches, oxidation stains, creases and loose fragments of silk, lacunas in the black fabric
Fig.14 - Apărătoarele pentru gambe şi genunchi, după demontarea şnururilor; degradări: depozite de praf şi murdărie, pete şi depuneri de produşi de coroziune, zgârieturi, cutări, lacune, fragmente desprinse de ţesătură

Fig. 15 - The left greave - the strips; degradations: frailty, discoloration, dirt deposits, corrosion marks, oxidation stains, creases, loose fragments, lacunas
Fig. 15 - Şnururile apărătoarei stângi pentru gambe şi genunchi; degradări: fragilizare, decolorare, depuneri de murdărie, pete şi depuneri de produşi de coroziune, cutări, lacune, fragmente desprinse de ţesătură

The thigh guards: dust and dirt deposits on the entire surface; oxidization marks and scratches on the metal elements; chips, crack and lacunas in the lacquered layers; discoloration of the textile elements; oxidation stains, thinning and lacunas in the silk fabric; loose threads and tears in the silk and metal threads fabric, as well as in the supporting material[7]; tears in the silk fabric, along the sewing line[8]; tears on the rim of the green silk fabric[9]; creases; lacunas in the leather strips[10]; tears along the sewing line joining the leather strips, the silk and support material, on each side of the right leather strip[11] (fig. 16).

Fig. 16 - The thigh guards; degradations: dirt deposits, oxidization marks, scratches, chips, crack and lacunas in the lacquered layers, rigidity and lacunas of the leather strips, discoloration, creases, folds, tears of the textile elements
Fig. 16 - Pantalonii bufanţi; degradări: depozite de murdărie, pete datorate produşilor de coroziune, zgârieturi, fisuri, aşchieri, lacune în stratul protector, rigiditate şi pete de diferite naturi prezente pe elementele din piele, decolorare, cutări, sfâşieri în elementele textile

[7] Probably caused by the pressure applied by the lacquered reinforcements, while the pants legs were folded.
[8] The tension of the joining sewing seam, the exposure to light and the fragility of the textile itself, speeded the deterioration.
[9] Probably due to the fragility of the fabric itself, combined with the friction between the textile and the shoe.
[10] The rigidity of the leather also added to the deterioration process.
[11] The deterioration of the leather strips and tears in the textile materials only occurred on the right pants leg.

The chest armor: dust and dirt deposits on the entire surface; oxidation stains; chips, crack and lacunas in the lacquered layers; discoloration of the textile elements; oxidation stains, thinning and lacunas in the silk fabric; stains and dust deposits on the leather materials; rigidity of the leather.

Conservation treatments. A series of remedial conservation treatments were performed in order to stabilize the object for its temporary display, as well as for its ulterior storage. The conservation treatment was applied taking into consideration the proprieties of each component material and the overall original function and aspect of the armor, while the construction of the mannequin was adapted to both the particularities of each individual component, and the display requirements.

Surface cleaning: a surface, mechanical dry cleaning (fig. 17) was conducted on all the elements of the armor, (back, front and interior), in order to remove the dust and loose dirt. The dry cleaning was performed using the following methods: brushing (using a soft brush), suction (using a vacuum cleaner of low capacity and a net as an interlayer), using a dry cleaning sponge, age-tested, (by passing the sponge over the surfaces lightly, without applying much pressure). During the cleaning of the back of the 8 lacquered plates attached to the chest armor, it was noticed that the lacquered layer was extremely fragile, even more so than the exterior layers, probably due to functional use (while worn, the plates would have hit against each other and the body, which might have triggered their vulnerability), which is why, for the duration of the display, black cotton covers were attached to each lacquered plate in order to protect them, as well as the thigh guards on top of which the plates originally rested (fig.18).

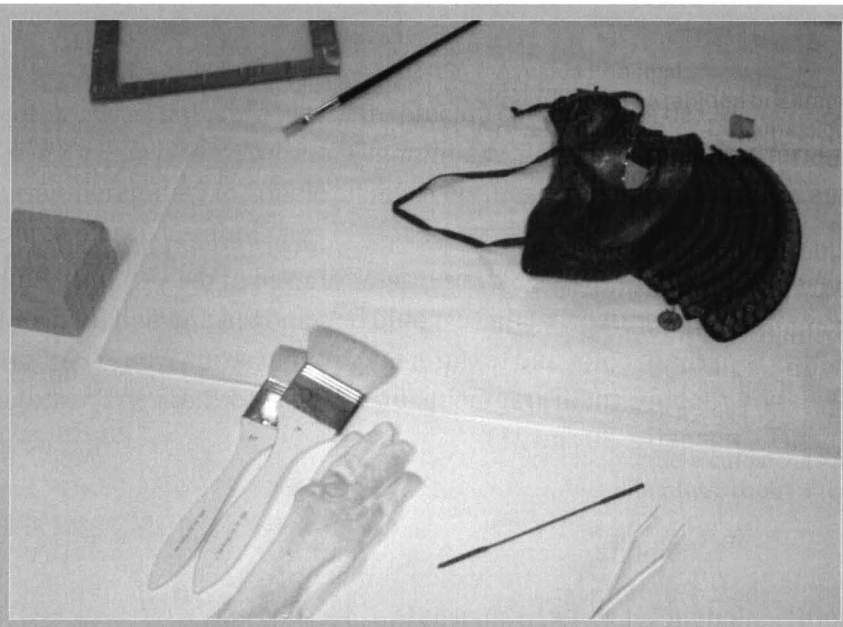


Fig. 17 - Surface dry cleaning: brushing
Fig. 17 - Curăţiri uscate de suprafaţă: periere

Fig.18 - Black cotton covers are being attached on the inner side of each lacquered plate
Fig.18 - Ataşarea apărătoarelor protectoare din pânză de bumbac negru pe interiorul plăcilor din zona inferioară a armurii – cuirasă

Humidification: the strips with which the thigh guards were tied around the waist were humidified, using cold steam and by applying pressure with the help of glass and sand containers, in order to relax the creases and folds (fig. 19); the strips were thus prepared for adding the new temporary silk net for the duration of the display. The strips were encapsulated in a silk net, similar in color and texture to the original, stitched to itself on the edges with silk thread.

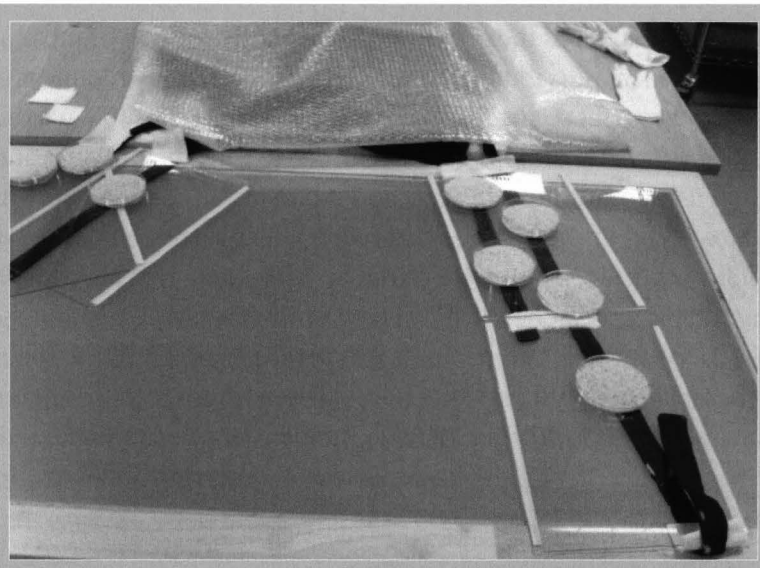


Fig. 19 - The humidification of the strips of the thigh pants, using cold steam and pressure
Fig. 19 - Umidificarea cordoanelor pantalonilor bufanți, cu vapori de apă rece, și presarea acestora pentru relaxarea cutelor

Temporary replacement: due to the extreme deterioration of the silk cover of the strips tying the greaves around the legs, it was decided that these would be removed and replaced for the duration of the display with new strips, similar in color and texture; the original strips would be stored separately. The strips were detached by wrapping small fragments of silk around them and removing them from the loops which held them in place (fig. 20 and 21).

Fig. 20 - Removing the greaves' strips
Fig. 20 - Demontarea șnururilor apărătoarelor de gambe

Fig. 21 - The temporary replacement of the original deteriorated strips with new, similar ones
Fig. 21 -Înlocuirea temporară a șnururilor originale deteriorate cu unele similare

Mounting on the display mannequin. At the request of the City Museum, the samurai will be displayed standing, therefore the mannequin had to be constructed as such. A metal stand was used for the skeleton of the mannequin, on which the upper support was attached. The entire mannequin consisted of: a helm and face mask support (carved from polyester foam and covered in black cotton to fit the helm rim exactly); a shoulder and sleeves support (wooden support, on which the sleeves support – acid free card board covered in white cotton and afterwards in black fabric for protection- and helm support were secured); a chest armor and thigh guards support (carved polyester foam covered in black cotton fabric, following the exact shapes of the chest armor and guards) on which the legs supporting the thigh guards (again covered in cotton wrapped in black fabric for protection) were secured (fig. 22).

Packing and transport: In order to transport the armor, a specialized moving company was hired. The most exposed and/or fragile parts of the armor, such as the decorative elements of the helm, were first covered in an extra layer of silk paper and cotton fabric, after which the entire mannequin was wrapped in several layers of protective materials (fig. 23).

Fig. 22 - The mannequin while mounting the armor
Fig. 22 -Manechinul în timpul montării elementelor componente ale armurii

Fig. 23 - The mounted armor, wrapped in several protective layers of cotton fabric and air bubble wrapping
Fig. 23 - Armura montată pe manechin, ambalată în straturi protectoare de pânză de bumbac şi folie cu bule de aer

Conclusions:

The examination, conservation treatments and mount construction were conducted after careful consideration regarding the characteristics of every constituent material, as well as the overall aspect and original function of the armor; thus, the purpose of the conservation treatment was to stabilize the object for the duration of its display, as well as in storage. The construction of the mannequin was designed so that it would best display the armor, while at the same time protecting its structural integrity.

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