Report on a Special Investigation of the Shosoin Treasures an Investigation of the Leather Used in the Treasures

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Outline

An investigation of the leather used in the Shosoin treasures was conducted over the course of 3 years starting in 2002. This was the first investigation conducted by 4 leather specialists. The purpose of this investigation was to determine what kinds of animal skins were used in which treasures. The investigation was conducted without damaging the subjects; the subjects were observed with the naked eye as well as by stereomicroscope for identification and comparison with numerous (more than 1000) microscopic photographs in order to determine the kinds of leather. Roughly counted, more than 200 Shosoin treasures contain leather. Among them, 65 items were investigated during the 3 years: 12 items of equine equipment, 8 pieces of armor, 4 swords, 13 items of footwear, 3 leather belts, 4 hide boxes, 8 musical instruments, and 13 other objects.

During the investigation, we learned that the leather used in those approximately 1300-year-old treasures had noticeably aged and deteriorated over time. Unlike present-day leather, none of the specimens showed any clear cut section or grain side. In addition, having been conducted without destroying the subjects, the investigation and observation entailed obvious limitations.

Uses of the leather

Leather comprised the major parts of footwear, equine equipment, archers' wrist protectors (*tomo*), and boxes, while in other objects it was used as a supplementary material.

Footwear: Technically, the use of leather in footwear can be divided into four categories. The uppers, sides, and soles of shoe exteriors were made of cattle hide while the liners were made of deer skin (chamois-like, grain-removed leather; all the deer skin used in the treasures was processed in this way). The leather used in the side parts of ceremonial shoes was processed with a unique technique. Red cattle hide was used with the inner tissue exposed;the technique was applied to cattle hide uniquely in this case. It is highly possible that the grain side, not the flesh side, was scraped away to expose the inner tissue so as to bring about a touch of softness, which is otherwise rarely found in cattle hide.

Stringed instruments: The sides of stringed instruments such as the *genkan* lute, the *kugo* harp, and the *biwa* lute had leather applied for decoration as well as protection. The leather applied to the horizontal leather pieces at the front of the instrument (*kanpachi*) and at the body (*rakutai*) was extremely thin and was overlapped with other materials. Although cortices were recognizable, the animals in question were not able to be identified.

The heads of *tsuzumi* hand drums: The condition was so poor that the structure of the leather would be easily destroyed with the application of external force. The leather was extremely thin. While the hair remained, the animal was not identifiable.

Gigaku masks: Leather was used as attached strings, and spacers at the joints of movable chins. The leather attached to the lower chin of No. 124 *Shishi* (a mythical Chinese lion) mask was, uniquely, a single sheet

of bear skin with fur, which the investigators believed to represent the creature's beard.

Equine equipment (saddles): Seal skin with the grain side inward was used in saddle's pad (*shitagura*). The saddle seat cushion (*kurajiki*) and pads placed on the horse back (*name*) were made of deer skin, which had previously been believed to be smoked leather, but the present investigation found it to have been dyed. The tail sacks (*obukuro*) were made of either deer skin or cattle hide. The leather used as stirrup leather (*chikaragawa*), breastplates (*munagai*), girths (*haraobinone*), stirrup straps (*mizuo*), cruppers (*shirigai*), and headstall (*omogai*), were cattle hide. Fenders (*aori*) were all made of bear fur skin. The cords attached to saddle's pads (*shitagura*) and saddle frame (*kurabone*) were made of deer skin.

Armor: Leather was employed for armor, archers'wrist protectors (*tomo*), bows, and quivers. The strings attached to armor and quivers were all deer skin. Bear skin, cattle hide and horse hide were possibly used for the bodies of *tomo*. The hand covers of the *tomo* were made with cattle hide while the cords were made of deer skin. Deer skin was employed in the grips of bows, while cattle hide was assumed to be used in loops (*tsuruwa*) and serving (*saguri*).

Leather belts: Whereas several techniques were supposed to be applied for the creation of leather belts, much of the material was assumed to be cattle hide. However, those with less luster were possibly made of horse hide.

Lacquered leather boxes: It is assumed that comparatively large ones were made of cattle hide while smaller ones were made of deer skin. However, since the boxes were covered with a layer of lacquer, confirmation was impossible. It was recognized that the skins of wild boars were used in some fragments of boxes.

Swords: The shark-skin-like leather applied to the hilts was actually the skin of rays. A trace of animal tissue was identified on the part supposed to cover the scabbard. Most of the cords were made of deer skin.

THE USAGE AND TECHNIQUES APPLIED TO THE LEATHER USED IN THE SHOSOIN TREASURES

Kiminaga Deguchi

An overview of the technical characteristics identified in the present investigation follows:

The sides of ceremonial shoes were possibly made of cattle hide with the grain side deeply scraped away.

The technique of cattle hide grain removal would have been found.

A solid sheet of bear fur skin was used below the chin of No. 124 gigaku mask.

The skins of animals other than cows and horses were possibly used in leather belts.

Deer skin leather was all grain-removed.

It was confirmed that in some cases the surface of deer skin was treated with heat.

The skins of animals other than bear would have been used in the bodies of archer's wrist protectors (*tomo*).

The technique to reduce the thickness of leather was found.

It was lacquer which made some leather brown in color.

There were some cases suggestive of the existence of a depilation technique.

Triangular needles were used to sew thick leather.

The leather used for saddle seat cushion (*kurajiki*) and pads placed on the horse back (*name*) was not smoked but dyed.

The skins of rays were applied to sword hilts.

We have attempted to review the above issues.

A Dendrochronological Investigation of Construction Materials Used in the Shosoin Repository (Ⅱ)

Takumi Mitsutani

Arguments regarding the construction of the Shosoin Repository had roughly been divided into the following three views. None had been proved or disproved prior to this investigation.

1) The three rooms, the North Section, the Middle Section, and the South Section, were under a connecting roof from the beginning.
2) The South Section and the North Section were originally independent buildings.
3) The original structure comprised only the North Section and the South Section under one roof and later the Middle Section was boarded to add extra storage space.

This dendrochronological investigation of the Shosoin Repository, conducted twice, in 2002 and again in 2005, has revealed that the structure has been in the present style with the three sections part of one building since the Nara Period, bringing the long-standing arguments to an end.

To be more specific, the outermost annual ring of the wall panels in the Middle Section was determined to date back to 679+α A.D., which suggests it is very likely that the trees were felled around the middle of the 700's. Some boards used for the ceiling of the first floor and the floor of the attic in the Middle Section were dendrochronologically dated to 718 or 719, although few outer edges of the trees remained. These structural materials could not have existed without walls.

The investigation also revealed the fact that a large scale renovation of the Shosoin Repository was carried out around 1200.

A Bibliographic Examination of Daihoko Butsu Kegon Kyo (the Flower Sutra, Avatamsaka-Sutra), Fascicles 72 Through 80, in the Shogozo Repository

Nobuyoshi Yamamoto

Among the Buddhist sutras stored in the Shogozo Repository of the Shosoin, Sutra Copy No.10, *Ko* type, Category 5, is *Daihoko Butsu Kegon Kyo* (the Flower Sutra, Avatamsaka-sutra) (one scroll). This is one of *Hachiju* (80-fascicle) *Daihoko Butsu Kegon Kyo* (New translation), translated into Chinese by Siksananda during the reign of Empress Wu Zetian in the Tang dynasty, China. The sutra was copied by Buddhist monks specialized in copying sutras. The calligraphy was excellent, in the style of the middle Tang dynasty, and was assumed to date from the first half of the 8th century.

The sutra is a scroll of 26.0 cm in height and 30.84 m in total length. 55 sheets of paper, with an average length of 56.8 cm, were used for the main text.

The major characteristics of this hand-copied sutra are as follows;

1) In this one scroll, 9 fascicles, numbers 72 to 80, were copied successively.
2) There are numerous omissions and only about 46% of the original sutra was copied in this scroll. The main text of the last fascicle, Fascicle 80, was left uncompleted, with the last title added at the end.
3) There is no annotation to show that the sutra was recited or studied.
4) Paper used for this scroll is *hakucho* 白楮 (white paper mulberry) paper without ruled lines.
5) The number of the sheets of paper used was noted below the main title, the unit of which was indicated with a Chinese character, *cho* (張).

There are some examples, in Japan, of *Hokke Kyo* (the Lotus Sutra) and *Konkomyo Saisho-o Kyo* (the Golden Light of the Most Victorious Kings Sutra) copied in small characters such that several fascicles were copied in one scroll to make it easy to carry, but no such examples have been observed with *Kegon Kyo* (the Flower Sutra). On the other hand, such instances are often found in Korea, and the oldest examples are two scrolls of *Kegon Kyo* (the Flower Sutra) (New translation) stored in the Ho-Am Art Museum 湖巖美術館, hand-copied in the 14th year of the Emperor Gyeongdeok's reign in the unified Shilla Period. One of the scrolls contains fascicles 41 to 50 with 34 letters in one line in small characters.

Using *hakucho* 白楮 (white paper mulberry) paper and the *cho* (張) character as the counting unit for sheets of paper are characteristics often seen in ancient copied and printed sutras in Korea. It is considered that the text was partly omitted in the process of copying in order to reduce the volume of the sutra which contained as many as 80 fascicles.

It was a common practice in Korea to place *Kegon Kyo* (the Flower Sutra) within Buddhist statues and pagodas for dedication. Many of the existing *Kegon Kyo* copied in the unified Shilla and Koryo Periods were found in Buddhist statues and pagodas.

Details are unknown with regard to how and why this *Daihoko Butsu Kegon Kyo* in the Shogozo Repository was brought to the Todaiji Temple. It is most likely that the temple treasured the sutra copy because it had been stored in the manner commonly practiced in ancient Korea. If the above conclusions are correct, this sutra should be worth noting as the oldest existing copied sutra from the unified Shilla Period.