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DISROBING: RESEARCH AND PREVENTIVE CONSERVATION OF PAINTED HIDE ROBES AT THE ETHNOLOGICAL MUSEUM, NATIONAL MUSEUMS BERLIN, GERMANY

ANNE TURNER GUNNISON, HELENE TELLO, PETER BOLZ, AND NANCY FONICELLO

ABSTRACT

The North American collections at the Ethnological Museum in Berlin, Germany include a selection of 18 painted bison and cattle hide robes. Within this collection are seven rare and early examples of bison robes, collected in the 1830s by Prince Maximilian zu Wied on his travels along the Upper Missouri River. Due to their size, the robes present a challenge for the museum to store, exhibit, document, examine, and conserve. For almost 20 years, 14 of the robes were inappropriately stored, hung from trouser hangers clamped along their edges, in a case with limited access. This method of storage made it difficult to examine the objects for ethnological and conservation research.

An extensive preventive conservation project was undertaken to re-house the robes horizontally on trays, in a purpose-built storage unit. The robes were documented and condition checked. The project also incorporated an in-depth study of a Piegan (Blackfoot) robe collected by Prince Maximilian. This study included identifying the dyes and pigments used in the quillwork and painted iconography, using high performance liquid chromatography and Fourier transform infrared spectroscopy. Experiments in dyeing quills with native dye material and using these dyes as paint on tanned bison hide were also undertaken.

As pesticide contamination is a prevalent problem in the Ethnological Museum collections, it was decided to identify and quantify the possible chemicals, including chlorine containing compounds like dichloro-diphenyl-trichloroethane, lindane or polychlorocamphene, and heavy metal compounds like mercury(II)-chloride or arsenic trioxide, used on this robe, as well as two others, using gas chromatography-mass spectrometry and inductively coupled plasma mass spectrometry. Mercury was found at extremely high levels; this will present enormous problems when these objects are handled and studied. Current and future work must be carried out under strict protocol, including the use of suitable personal protective clothing.

1. INTRODUCTION

The Ethnological Museum of the National Museums Berlin, Germany, which has its origins in collections from the 1500s, houses approximately 30,000 North American objects. Among these holdings is an 1844 acquisition of 47 objects, collected between 1832 and 1834 by the German explorer and naturalist, Prince Maximilian zu Wied during his expedition with Swiss artist Karl Bodmer up the upper Missouri River in the western United States. Included in this purchase were 11 painted child and adult-sized bison robes. Eight of the adult size robes remain. The museum has 10 other painted adult-sized robes from a variety of North American Indian tribes collected between the early 1800s and early 1900s. This paper will discuss the re-housing of 14 of these hide robes, and a more thorough investigation of one.

The initial objective of the project, which began in 2007, was preventive conservation: to assess the overall conditions of the robes and to implement a more sympathetic storage environment, enabling easier access. Fortunately, time allowed for an investigative project of one Blackfoot, or Piegan robe, catalogued as IV B 199, collected in 1833. While work is still ongoing, identification of the dyes and pigments used on the robe was attempted in order to understand the original cultural context of the Piegan tribe during early years of contact with fur traders and explorers. Secondly, as contamination of the robe with pesticides was likely, we identified the pesticides present, as to inform future handling and study.

2. THE RE-HOUSING PROJECT

Four of the bison robes are on permanent display. For the past 20 years or so, thirteen robes were kept in a glass-front, upright storage case in the permanent storage of the American Ethnology Department. The robes were hung with trouser press hangers clamped along the edges, and the hangers were hung on cords strung across the case. Because of inadequate space within the case, the robes were extremely difficult to access, preventing examination in any detail.

Helene Tello, objects conservator for North and South American collections, Peter Bolz, curator for North American collections, and Mario Graber, conservator for leather and related materials, decided that these robes should be removed from this case, and stored flat in a purpose-built storage unit within the collections area.



Fig. 1. The old storage case (Photograph by Helene Tello)

Ms. Tello and Mr. Graber removed the robes and temporarily stacked them on a table. Anne Gunnison, an intern from the MSc course for Conservation for Archaeology and Museums at the Institute of Archaeology, University College London, subsequently assisted with condition checking the robes and thoroughly documenting with photographs. All information and images were entered into the museum database.

Because pesticides containing organochlorines and heavy metal compounds were historically used on the collection, all work in close proximity to the robes was done wearing facemasks, zip-up Tyvek suits and nitrile gloves. Wearing this equipment can be tiring when lifting heavy robes, but was necessary.

The robes are in a variety of conditions; some have clearly suffered from pigment loss, moisture damage, staining, and inappropriate conservation treatment, including the application of large patches to repair losses. While a majority of the robes are made of bison hide, a few are likely cattle hide, indicating a later date of production and collection. Cattle hides were used

during the reservation period after the bison population had been severely depleted, and most Native Americans had been removed to reservations by the late 1800s to early 1900s (Dempsey 2007, 58; Bolz 2008).

A new storage cabinet was constructed with MDF-board, wood crossbars, and gaskets by the in-house carpenters who work for the National Museums, Berlin. The trays are constructed wood frames, covered with Tyvek that is secured with stainless steel staples. Wood components were treated with neemspray, a liquid insecticide and fungicide.



Fig. 2. Helene Tello removes robes from the old storage case
(Photograph by Lars Malareck, Ethnological Museum, Berlin. Used with permission)



Fig. 3. The robes were examined and assessed while wearing personal protective equipment
(Photograph by Ines Seibt, Ethnological Museum, Berlin. Used with permission)

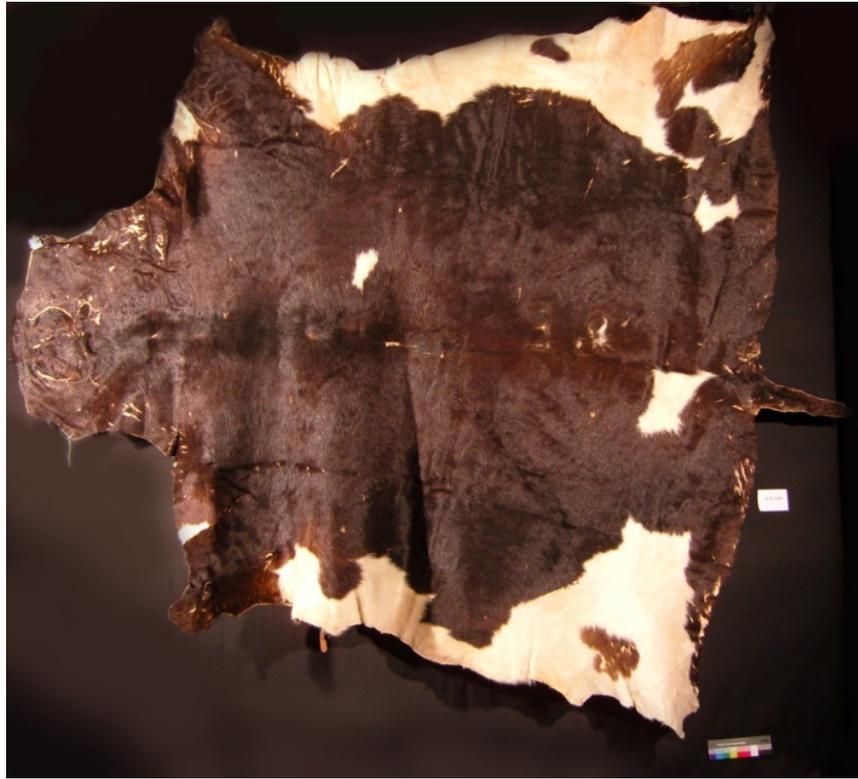


Fig. 4. A cattle hide robe, IV B 7626, Ethnological Museum, Berlin
(Photograph by Anne Gunnison and Helene Tello. Used with permission)



Fig. 5. Staining on a hide robe V B 7968, Ethnological Museum, Berlin
(Photograph by Anne Gunnison and Helene Tello. Used with permission)



Fig. 6. The new storage case (Photograph by Lars Malareck, Ethnological Museum, Berlin. Used with permission)

2.1 FURTHER STUDY

One robe, IV B 199, was chosen for further study because of its history within multiple contexts. It is a significant piece for its early collection date. There are few North American hide objects that date before 1800 within any museum collection; other robes described as “early” are dated from the 1840s to the 1860s (Dempsey 2007).

Prince Maximilian’s journals from the expedition between 1832 and 1834, were published in English in 1843, with accompanying illustrations by Karl Bodmer. The most recent translation was published in 2008. Maximilian’s first-hand accounts and Bodmer’s illustrations give insight into many tribes including the Piegan tribe, from whom the robe originated, as well as materials and technologies utilized by the makers to create these robes (Maximilian 1843; Witte et al. 2008). Maximilian’s detailed descriptions of painted buffalo robes were some of the earliest written (Dempsey 2007).

The robe’s more recent history as war booty taken by the Red Army to the Soviet Union after World War II is also considered significant. An estimated 5,800 objects from the North American collections including six hide robes were unaccounted for after the war. The robe spent time in Leningrad, today called St. Petersburg, and later in Leipzig, in former East Germany. Little is known about its time in the USSR, but it was amongst the objects secretly transferred from St. Petersburg to the *Museum für Völkerkunde* in Leipzig in the 1970s (Bolz and Sanner 1999, Bolz 2008).

In 1990, after German reunification, 45,000 ethnographic objects in Leipzig, including the robe, were returned to the National Ethnological Museum collections in Berlin. Some objects that were thought lost, reappeared, although many in disrepair. Many objects are still unaccounted for (Bolz and Sanner 1999).



Fig. 7. Robe IV B 199, Ethnological Museum, Berlin
(Photograph by Anne Gunnison and Helene Tello. Used with permission)

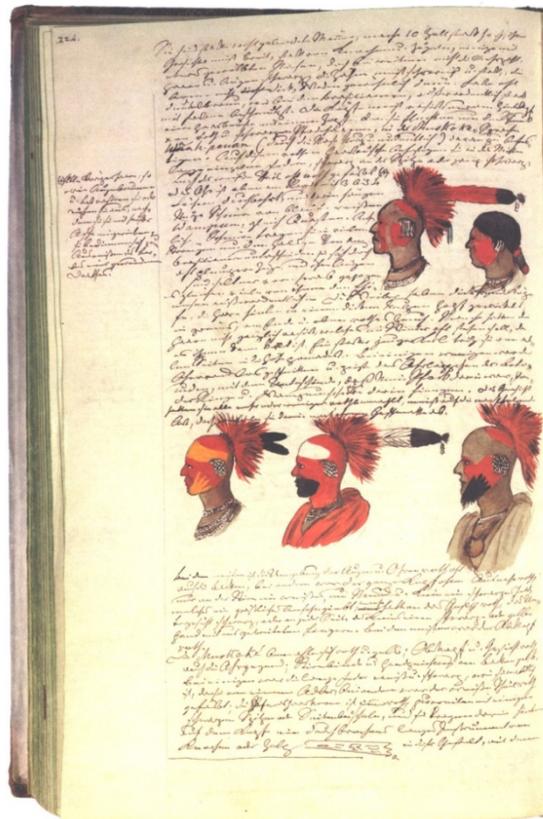


Fig. 8. From the journal of Prince Maximilian zu Wied (From Witte et al. 2008)

3. THE ROBE—IV B 199

Examining the bison robe in more detail, the hide was semi-tanned, most likely using animal brains as the tanning agent, and the hair left intact. Holes cut around the edge to stretch the hide for the tanning process remain. The edges are fringed.

There is a sinew-sewn seam lengthwise down the centre, indicating the hide was tanned in two pieces and re-sewn. Most of this seam is covered on the flesh-side by a separate strip of hide decorated with yellow, orange, and white quillwork, with an additional brown plant fibre component. The orange and yellow quills are dyed, while the white is likely un-dyed. There is a small patch of vibrant red textile that has been sewn onto the flesh-side of the robe.

The flesh-side of the robe has been painted with human figures, guns, bows, quivers, and other items using three different colours: green, orange, and a dark brown. The ears of the bison that remain on the hair side are covered with quillwork and are decorated with hide fringe wrapped with quills.

3.1 COLLECTION HISTORY AND CULTURAL CONTEXT

The robe was likely collected at Fort McKenzie where Maximilian and Bodmer stayed from August to September 1833. Members of the Piegan tribe camped close to the fort, which was established in 1832. Before this time, there was little contact between the Blackfoot tribes and fur traders (Maximilian 1843).

The Blackfoot tribe is actually a blanket term for a nation of four tribes: the Blackfoot, now called Siksika First Nation; the Blood; the Kainia, now called the Kainaiwa First Nation; and the Piegans, or Pikuni, which are now divided into North Piegan, or Aputohsi-Pikuni, now called the Pikani First Nation, and the South Piegan, or Amiskapi-Pikuni, now called Blackfeet Indians of Montana. The tribe, which Maximilian calls Piekann, would be the Piegan or Pikuni. The Blackfoot territory extended from Battle River in Alberta, down to the Missouri River in what is now Montana (Dempsey 2007).

During the 1830s, bison were the most important commodity to Plains Indians tribes. The Blackfoot were no exception. The bison were used for food, shelter, medicine, tools, and of course, as a source of clothing. Maximilian wrote specifically about the use of robes as a garment:

The chief article of their dress, the large buffalo robe, is, for the most part, painted on the tanned side... Others, again, are painted with representations of their warlike exploits, in black, red, green, and yellow. The figures represent the taking of prisoners, dead or wounded enemies, captured arms and horses, blood, balls flying about in the air, and such objects. Such robes are embroidered with transverse bands of porcupine quills of the most brilliant colours, divided in to two equal parts by a round rosette of the same. The ground of the skin is often reddish-brown, and the figures on it black. All the Missouri Indians wear these robes... During the summer, the fur is worn on the outside, and in winter inside. The right arm and shoulder are generally bare... (Maximilian 1843, 248-249)



Fig. 9. Detail of quillwork on seam, red textile patch, and painted images on IV B 199, Ethnological Museum, Berlin
(Photograph by Anne Gunnison and Helene Tello. Used with permission)



Fig. 10. Detail of quillwork on ears on IV B 199, Ethnological Museum, Berlin
(Photograph by Anne Gunnison and Helene Tello. Used with permission)



Fig. 12. *Piegan Blackfoot Man*, Karl Bodmer (From Moore 1997)

3.2 CONDITION

The robe is in stable condition. However, stiff creases in the hide have caused damage and loss of quill and plant material in the decorative elements on the central seam. There are areas of staining and discolouration, including rust, across the surface of the flesh side. The hide is not as malleable as descriptions of robes in use may suggest. It has apparently suffered from exposure to moisture, which could have occurred at several points in its history.

Maximilian wrote, “[A]s the boat had no deck, and we found to our great dismay, that this new vessel was very leaky so that the greater part of our luggage was wet through... When the sun had risen a little higher, we landed on the south bank, and made a large fire... Our drenched buffalo robes and blankets were brought on shore to dry” (Maximilian 1843, 287).

It has been said that many of the war spoils were transported to the Soviet Union in open boxcars during the winter, thus leaving them exposed to inclement weather. Exposure to excessive moisture was also possible in Leipzig, where there was a large flood in the collections of the museum in the 1980s. It is also possible an aqueous pesticide or insecticide was applied during this time (Bolz and Sanner 1999).

3.3 PREVIOUS TREATMENT

Heavy metal compounds, such as arsenic and mercuric salts, were in use by the 1830s by naturalists and explorers to preserve organic objects (Hawks 2001). These types of preservatives may well have been utilized by Maximilian, although he does not mention them in the 1843

English translation of his journal; he does mention the use of brandy alcohol to store animal specimens (Maximilian 1843).

Aware of the destruction wrought by pest infestation, Maximilian wrote of an American colleague's collection, "Mr. Say's entomological collection was continually damaged by the rapacious insects, which are much more dangerous and destructive here than in Europe" (Maximilian 1843, 87). But he also noted, "The furs in the interior of North America are free from a nuisance so common among us, I mean insects, especially moths, which are unknown on the Upper Missouri" (Maximilian 1843, 189).

Because of the robe's overall good state of preservation, it was assumed that it had been treated with a pesticide at some point in its history. There are no known written records of treatment performed on this object during its time in St. Petersburg or Leipzig. It is known that the insecticide dichloro-diphenyl-trichloroethane, or DDT, was used in great quantities (Tello 2008). It is also known that objects in the German Democratic Republic were treated with an insecticide Texyl-Spray, which was varying formulations of lindane and polychlorocamphene or lindane and permethrin (Graber 2008).

Six robes, including IV B 199, were returned from Leipzig folded in wooden cases. They were stiff, dry, brittle, and difficult to unfold and were treated by the leather conservator Mr. Graber in 1994 and 1995 (Graber 2008). Mr. Graber detailed his treatment of the returned robes. They were left in a fume hood for several weeks to ventilate. The hair and flesh sides of the robe were cleaned and a leather softener, Lederweicher, applied. The robes were unfolded and weighted heavily in an attempt to flatten them. A fungicide called Lysoform was also applied (Graber 2008). This application of the leather softener may have helped flatten the robe, but the moisture imparted may have, over time, resulted in the current stiffness of the hide.

4. SAMPLING AND ANALYSIS

As noted above, at the time of Maximilian's travels to Fort McKenzie, trade contacts with Blackfoot groups were still relatively new. It was of interest to this project to understand whether the Blackfoot tribes had begun to utilize new materials, still employed the old methods, or used a combination.

Whether the robe had been treated by pesticides was also of interest. This helps inform what to expect on other robes in the collection, especially those returned from Leipzig, and how to develop handling guidelines to mitigate any health risks.

Some pigment analysis has previously been completed. In one area, there is residue of a red pigment on the surface of the robe. In 1998, Ms. Tello had a small sample of the red analyzed by x-ray fluorescence, or XRF. The tests revealed a significant concentration of mercury, seemingly indicating the presence of vermilion pigment. However, as research results will indicate below, there may be another reason for the presence of mercury.

Using a scalpel and tweezers, samples of the yellow and orange quill, the brown fibre component of the quillwork, and the orange, green, and brown pigments or dyes were removed on the flesh side, and a white crystalline substance found on the flesh and hair sides of the robe was also removed. One gram of hair was pulled off from across the surface of the hair side of the robe.



Fig. 14. Sampling locations on the robe IV B 199, Ethnological Museum, Berlin
(Photograph by Anne Gunnison and Helene Tello. Used with permission)

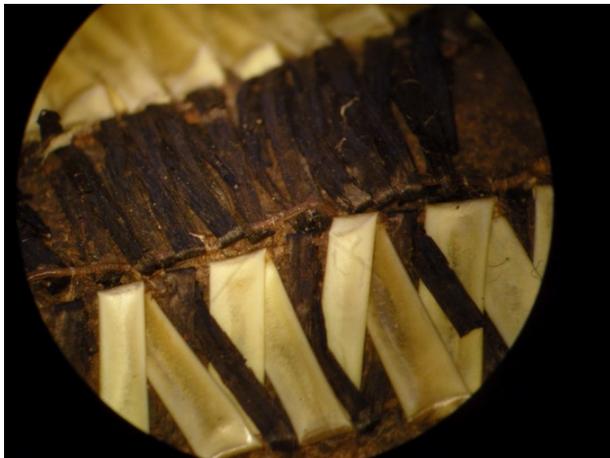


Fig. 15. Plant fibre component of quillwork on
IV B 199, Ethnological Museum, Berlin
(Photograph by Anne Gunnison. Used with permission)

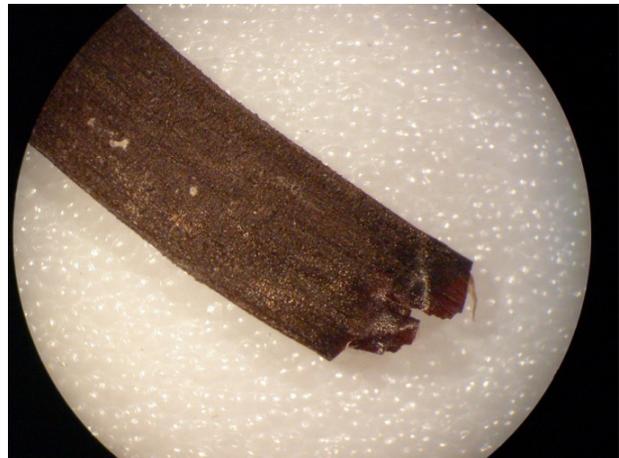


Fig. 16. Detail of known Horsetail (*Equisetum* spp.)
root. (Photograph by Anne Gunnison)

The brown in the quillwork on the robe is likely from the root of the *Equisetum* plant, commonly called ‘horsetail’ as suggested by Nancy Fonicello, a specialist in quillwork (Fonicello 2008). Bill Holm noted in his monograph, “Quill-wrapped horsehair: two rare quilling techniques,” “black was a difficult colour to achieve in dyeing quills in the early nineteenth century, and dark brown or black vegetal matter was often substituted, probably the rhizome of the horsetail” (Holm 2001, 59-60). George Bird Grinnell in his 1923 account “The Cheyenne Indians” also references the use of the *Equisetum* species by Cheyenne quill workers (Grinnell 1972, 167).

There is scant information about original quill dyeing recipes, and there has not been to date a considerable amount of analytical work done to identify quill dyes used by Native American tribes in different geographical regions. Maximilian did record in his journals of the Blackfoot that quill workers, “to produce the beautiful yellow colour, they employ a lemon-coloured moss from the Rocky Mountains, which grows in the fir trees... A certain root furnishes the beautiful red dye, and they extract many other bright colours from the goods procured from the Whites. With them they dye the porcupine quills and the quills of the feathers...” (Maximilian 1843, 249-250).

Two colours of dyed quill are represented on the robe: a yellow and an orange/orange-red. Ms. Fonicello believed that these colours could have been produced by native, natural dyes, including dock root or wolf moss for the yellow, and bloodroot for the orange-red.

Maximilian noted in his journals that the samples of the vegetal dyes described were among the part of collections that were lost when they were shipped, but his descriptions correspond to wolf moss, and bloodroot.

Using raw materials from the root of dock plants (*Rumex crispus*), wolf moss (*Letharia vulpine*), and bloodroot (*Sanguinaria canadensis*) gathered in Montana by Ms. Fonicello, and following her dyeing instructions, new porcupine quills were dyed to create a visual comparison with the quills on the robe. The colours obtained, most particularly, from the bloodroot and the wolf moss, were similar to those found on the robe, thus making it plausible that these were the dyes used.

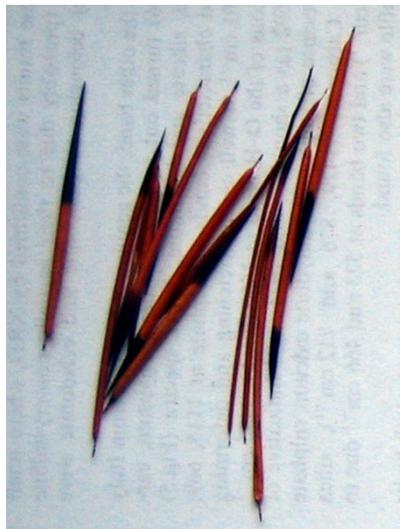


Fig. 17. New quills dyed with bloodroot
(Photograph by Anne Gunnison)

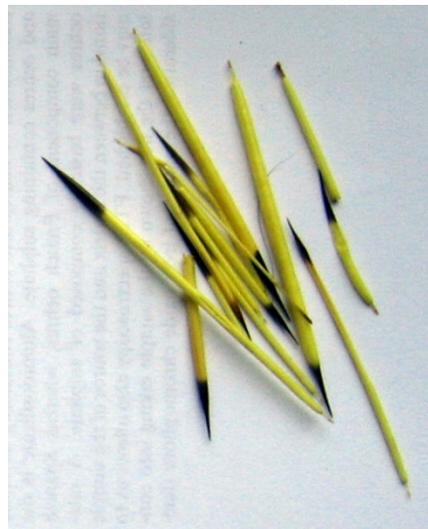


Fig 18. New quills dyed with wolf moss
(Photograph by Anne Gunnison)

Professor Dr. Unger from the University of Applied Sciences in Potsdam completed preliminary high performance liquid chromatography (HPLC) analysis of the dyed quills and green painted hide. The samples from the robe as well as the reference materials, dye samples of wolf moss, bloodroot, and yellow dock, and quills dyed with these known materials, both prepared by Ms. Tello, were prepared for HPLC.

While this work is still ongoing, there are some preliminary findings. HPLC results show that the yellow quill from the robes was dyed with an unknown natural organic material. Yellow dock and wolf moss, however, were likely not used.

In the case of the orange quill, a colorant could be detected, but there were no indications for the application of an orange dye, indicating that bloodroot was not used. Ms. Fonicello has suggested another possibility for the orange-red quill dye: the root of the *Gallium* species, commonly known as bedstraw, which produces a madder-based dye. This has yet to be tested.

More testing for identification of pigments and dyes is planned for the future. Using previously published databases, such as that published in “Analysis of the paints used to decorate Northern Plains hide artifacts during the nineteenth and early twentieth Centuries,” by Moffat, Sirois, and Miller, as well as historic accounts listing materials that may have been used by the Blackfoot tribes to guide our analysis, it is hoped that the dyes and pigments on the robe can be more specifically identified.

4.1 PESTICIDE ANALYSIS

When removing the hair sample from the robe with nitrile-gloved hands, we noticed that a shiny residue formed on the surface of the glove, indicating the object had been treated with a chemical. It was theorized that the crystalline substance, which can be seen on the robe, was DDT crystals, which occur when an object has been saturated with the chemical.

The hair was sent to the Analyse Labor Berlin (ALAB), where gas chromatography mass spectroscopy (GCMS) was used to identify organic compounds, and inductively coupled mass spectroscopy (ICPMS) to identify heavy metals. The preliminary results of this analysis were rather startling. While it confirmed the presence of DDT, it also confirmed the presence of mercury, likely a mercury(II)-chloride in surprisingly high and dangerous levels, with the initial results finding 10,000 mg/kg of sample (ALAB 2008; Tello 2008).

Values for the acceptable daily intake for humans are currently not available. But while an appropriate toxicology expert would be needed to analyze the exact risks, the material safety data sheet, or MSDS, for mercury(II)-chloride indicates that the lethal dose taken orally by a rat is 1mg/kg of body weight, while severe skin irritation, during an acute toxicity test, occurs on a rabbit with 500 mg over a 24-hour period (Environmental Health and Safety 2008).

This is sobering news for access and study of the collection. While precautions were taken, this information indicates that this robe could truly be highly toxic.



Fig. 19. A shiny residue on the surface of the glove (Photograph by Anne Gunnison and Helene Tello)



Fig. 20. Crystalline substance found on areas of robe IV B 199, Ethnological Museum, Berlin (Photograph by Anne Gunnison)

5. CONCLUSION

The re-housing and preventive conservation of the robes is an important step for the improvement of conditions for the historically significant collection. It has enabled greater access to the robes, some of which had never been seen or examined by the curator. It is now known, however, that greater access may also mean greater personal risk, as we have established the presence of hazardous chemicals on at least one robe. While the mercury-based pesticide may be the reason the robe is still in good condition, the consequence will be that extreme care must be taken when handling or studying the collection.

While work on the investigative conservation project is ongoing, the current research fits into a broader context of cultural knowledge, by elucidating a better understanding of the material culture and practices of Piegan tribe at the early stages of interaction with American fur traders. This data can be used in order to define the types of dyes and pigments one could expect to find on objects from a similar time period and region. It can also be used to identify dyeing recipes, which have been lost over time.

This research has the potential to expand. It would be an incredible opportunity to examine the entirety of the Maximilian collection and make the research more inclusive by collaborating with not only with conservation professionals, but also with the source communities. Descendants of many of the tribes Maximilian met still live in the United States and Canada. These source community members should be contacted and a more open discourse about these objects could be established, with a reciprocal exchange of knowledge.

Researching cultural, technological, and conservation histories and providing better access and storage conditions furthered the appreciation of this important collection of robes in the Ethnological Museum. It is hoped that data collected will also inform a greater knowledge and understanding of painted and quilled objects in other collections in Europe and the Americas.

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