acta KonserveringsCentrum AB

2024-02-23

Conservation Report

Conservation of Corn Cobs

Location
Nobel Prize Museum

Client
Nobel Prize Museum
Ulf Larsson

Owner
Cold Spring Harbor Laboratories

Conservator
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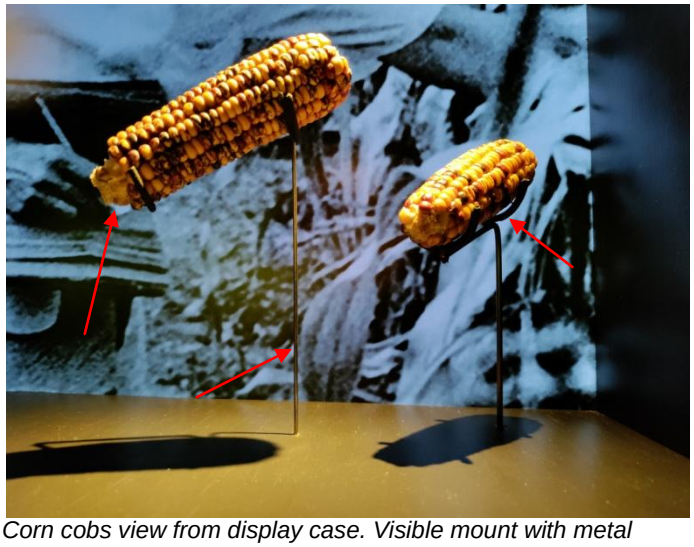
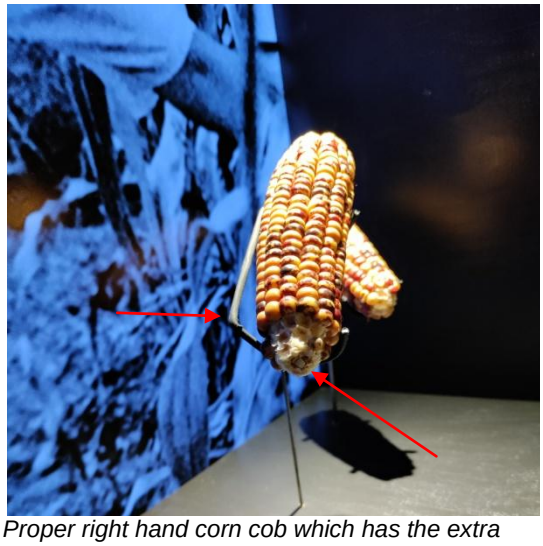
Description and condition of the object

- Two corn cobs used by Barbara McClintock in her research, leading her to win the Nobel Prize in Physiology or Medicine in 1983.
- The two corn cobs consist of the Maize only (meaning they do not have any of the husk/stalk or tassel attached).
    - Consist only of the kernels attached to the core.
    - The kernels are loose and move if touched.
        - The museum collected a loose kernel and which was kept in storage in an old match box.
- The corn cob found of the proper right hand side (left if you are looking at the corn) is slightly larger in size. (Identification number: 2001.008.001)
    - The corn kernels vary in colour (yellow, burgundy and purple) and are speckled.
    - It is missing multiple kernels on the ends of the cob as well as a few in the middle (these have fallen off over the years).
    - The kernels are loose.
- The corn cob on the proper left hand side (right if you are looking at the corn) has much less loss and appears to be more stable. (Identification number: 2001.008.002)
    - The corn kernels vary in colour (yellow, burgundy and purple) and are solid coloured
    - It is missing multiple kernels on the ends of the cob (these have fallen off over the years)
- The mount for the corn cobs are made of thin metal like wires rods that have been lined with a black plastic like material
    - The mounts consist on a rod sticking out vertically from the wooden shelf in the display case which is then attached to the end of the cradle like support.

    - The cradle support consist of a central rod were on either end a curved rod is attached (the curve roughly matched the circumference of the corn cob) creating a cradle like mount for the corn to sit in.
        - The larger corn (proper Right) has an extra rod connecting the two curve rods together.
- The mounts are not equally/evenly touching the corn cobs and therefore adding pressure points.
    - Most of the contacts is on the top section of the curved rods
- The mounts are very shaky and easily move/vibrate



Corn cobs view from display case. Visible mount with metal rods and cradle. Missing kernels are visible.



Proper right hand corn cob which has the extra rod present in the cradle. Missing kernels are visible.

Conservation Measures

Step one: Dry Cleaning

- The entire surface was carefully dried cleaned using a natural hair brush and vacuum cleaner.
    - Areas where previously lost occurred were found to be much more unstable and only a brush was used in those areas.
    - Areas where small fibers (not part of the corn) were found, tweezers were used to gently remove them.

Step Two: Consolidation

- Paraloid B72 (acrylate co-polymer) in 1:1 Acetone/Ethanol was decided to be the best option for the consolidation of the corn cobs.
    - Since it was determined that all of the kernels moved to varying degrees when touched, it was deemed necessary to consolidate the entire corn cob.
        - Areas close to previous lost were extremely fragile and loose.
- Consolidation of the corn cobs was conducted using 5-10% Paraloid B72 in 1:1 Acetone/Ethanol.
    - The Paraloid was applied using a syringe with a very thin needle.
        - The thin needle allowed us to go between the kernels to apply the Paraloid directly at the base where they were loose. This prevented the outside/top surface of the kernels to be consolidated and appear shinny.

- Two coats of the Paraloid were applied at 24hr intervals to each of the corncobs.

Corn Cob: 2001.008.001 Before Consolidation

Corn Cob: 2001.008.002 Before Consolidation

Step Three: Mount Making- Display Boxes

As requested by the museum, white boxes and supports were made for each corn cob. These boxes not only support and cradle the corn cobs but can be used in their display.

- Archival cardboard was used to make the custom boxes. The same size box was used for each corn cob to make it aesthetically pleasing but also practical in display and transport.
- White Ethafoam (polyethylene) was then cut to fit perfectly into the box and was secured to the bottom and side of the box using both archival double-sided tape and 70% Paraloid B72 in 1:1 Acetone/Ethanol.
- The Ethafoam was carved to perfectly cradle and support each corn cob.
    - The corn cob was place 1/3 into the ethafoam, leaving 2/3 of the cob out.
    - This was done so that the cob could be easily viewed but still supported and secure.
- The craved-out section of the Ethafoam was covered by a piece of Tyvek (sheet of polyetenfibre).
    - The Tyvek was washed and the smooth surface was place touching the object.
    - This adds a barrier layer and creates a pillow like effect that is both visually appealing but also safer for the object.

Corn Cob: 2001.008.001- In Display Box

Corn Cob: 2001.008.001- In Display Box

Corn Cob: 2001.008.002- In Display Box

Corn Cob: 2001.008.002- In Display Box

Step Four: Mount Making- Outside Boxes

Two archival cardboard boxes were made for each corn cob in which the above boxes/trays could fit in. These boxes would be used for storage and transport.

- These boxes were made to be 1cm larger than the white boxes on each side so that the trays could easily be place in and removed without having to touch the corn cobs.
    - The gap around the trays allows for someone to easily pick up the tray from the sides.
- To secure the tray in the box and prevent any movement, Ethafoam cut-outs were secures in each corner of the box
    - These cut-outs are secured in the boxes using both archival double sided tape and 70% Paraloid B72 in 1:1 Acetone/Ethanol
    - This allows for the tray to be placed in the box and removed easily but prevents the tray for moving
- An Ethafoam block which was lined in Tyvek was added to the lid of each box to secure the corn in place.
    - The Ethafoam was carefully craved to the shape of the corn to secure it in place but not to add any pressure when the lid is closed

It is import to note that each lid fits a specific corn cob. To ensure that the lid is always placed correctly a guide was added to each box.

Box with guides for proper closing

View of the tray and ethafoam block on lid

Top view with gap around the tray for easy access- Can see ethafoam corner blocks

Close up of ethafoam corner securing the tray in place

Ethafoam block on lid to secure corn cob when box is closed

A single loose corn kernel was given to us in an old match box. The lose kernel was not treated in case it would be needed to scientific research in the future. The loose kernel was placed in a pipette container and placed in the box with the Corn 2001.008.001.

Part Five: Preventive Conservation

Since the object is organic it is much more susceptible to environmental changes (relative humidity, light, temperature) and handling.

Best practices to ensure longevity and prevent future damage.

- **Relative Humidity (RH)**: The humidity plays an important role in keeping organic objects stable. If the humidity is too high to can promote water adsorption swelling, attraction of dust and particles on the surface, disintegration but especially organic biohazards such as mold growth. On the other hand, if the environment is too dry is can cause the object to shrink, crack, change shape, break and powdering of the surface.
    - For organic materials it is often recommended to keep them in a stable environment with a relative humidity between 45%-55%.

        - When the RH goes above 65% it can promote mold growth. When the RH goes below 40% it promotes embrittlement.
    - It is also important to note that extreme and excessive fluctuation in the relative humidity should be kept at a minimal and that sudden changes can often have some of the most damaging effects.
    - If the RH is hard to control it is better to focus on a stable environment with the least amount of fluctuation or very gradual fluctuation.
- **Temperature**: Temperature plays an important role in keeping organic objects stable and plays an integral role with the relative humidity as they are directly related. When warm air is cooled, the RH goes up, similarly as when cool air is warmed the RH goes down.
    - The ideal temperature for organic materials is between 20^{o}C and 25^{o}C.
        - The temperature should ideally never exceed 25^{o}C.
    - As with relative humidity it is important to avoid sudden fluctuation in temperature.
- **Lighting/Lux levels**: Damage cause by light is cumulative and irreversible. Organic materials are very susceptible to light damage causing bleaching (change in colour) and embrittlement.
    - To prevent this light should be turned off when the object is not being viewed. (For example at night). Or you can have a sensor light. When the object is not on display it should be stored in a dark environment (box).

    - Lux levels should be kept around of below 150 lux for the corn cobs.

  Pest: All organic materials are prone to pest infestation. To prevent pest, it is important to maintain an optimal environment. All museums should have an Implementation of IPM (Integrated pest management). IPM includes some of the following: blocking access as much as possible to the object (display cases, storage boxes, pest traps, secure building, preventing outside sources (food, plants), monitoring.
    - The best course of action is to check on the object on a regular schedule.
- **Environment conditions**: The majority of damages to object happen during the handling of those objects. To prevent this, its import to understand the object before handling it.
    - Gloves…
    - Always make sure the object is stable before handling and always pick up the object where it is sturdier.
    - When on display make sure that the object is mounted in a stable manner to avoid vibration damage.

Since the corn cob is in a mounting/display tray is can now be handle less and moved in the tray itself. Always try to move the tray with the corn in it rather than directly picking up the corn cobs.

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Conservators