Figure 1. Late 18th c. American chest of drawers. Primary wood is cherry. Private collection.

Figure 2. Baleen showing color variation and hair-like outer edge. Mystic Seaport Museum.

Baleen: Its Use as Line Inlay on an 18th century Chest of Drawers

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Abstract

Baleen was found as line inlay on an 18th century American chest-of-drawers. This paper focuses on baleen source, working properties, and historical use. The identification of baleen will be described, focusing on gross examination, microscopy, and physical properties. The paper concludes with a closer look at the chest on which the baleen was found, discussing how it was used and the particular construction details of the chest.

Introduction

In the summer of 2002 a graduated chest-of-drawers came into the lab for conservation (fig. 1). The chest arrived with four other objects that required treatment, all of which needed considerable conservation work. However, after initial examination, the chest required only minor compensation of several losses to the inlay and minor in-painting of the coating. The treatment seemed straightforward and little attention was paid to the chest until the actual treatment was started. Now under closer inspection of the line inlay, I noticed that the darker line appeared to be a semi-opaque green-colored wood that had a strange appearance. Looking more closely, I suspected that it was not wood. I had never seen baleen used as a line inlay on a case piece of furniture. My only exposure to baleen was while as an intern at the Mystic Seaport Museum in Mystic, Connecticut. During my time there, I was exposed to a very special class of materials that are often associated with nautical objects, one of them was baleen. At this point I was intrigued by even the thought of finding baleen on a case piece of furniture and even more interested in how it was bent into such tight radiuses.

Baleen

To get a better understanding of this material, a brief overview of baleen is in order. Baleen is a flexible, horn-like material from the upper jaw of the whale, that grows in plates. (fig. 2) There are two basic classes of whales, the difference between them is defined by their feeding mechanism. Toothed whales feed by tearing their food and baleen whales feed by the special filtration created by the baleen. Baleen grows in triangular sheets that can reach lengths of 10-14 feet. The flat surface of the baleen is smooth with visible ridges and looks like horn; the inner surface of the baleen resembles coarse hair. The color can range from black, grey, brown, pale green, to cream. The color can vary depending on the type of whale that it came from and the location within the mouth.

Baleen is a protein, specifically keratin. Keratin is a sulfur-containing protein that forms the horn-like tissues, such as fingernail, hoof, horn, and hair. This protein is unaffected by polar solvents, but is easily broken down by alkaline earth sulfides (Lauffenburger 1993). Keratin can be softened and then easily worked by boiling or soaking in hot water.

History

Historically, baleen has been used for centuries and more recently was a by-product of the whaling industry. It found its height in the American market in the mid 1850s. It was used as an early form of plastic because of its ability to be bent and when cooled, retain its shape. Therefore it was used for corset stays, buggy whips, combs, brushes, and in native Alaskan culture, it was used extensively for making baskets.

Figure 3. Whale bone, ivory, and baleen box, ca. 1900. Work of the King Island Eskimos. Mystic Seaport Museum.

Figure 3 is an example of a whalebone and walrus ivory box. It is the work of the King Island Eskimos and was made before 1900. The box has a wood substrate wrapped with baleen. The four long rectangles and four seals are of walrus ivory and are lashed to the box with baleen.

In the 19th century, baleen was processed and sold in strips. At the peak of the baleen market, the amount of baleen harvested could pay for an entire whaling voyage (Matthews, 1968). The price of baleen fluctuated dramatically from as much as $5.00 per pound in 1907 to as little as seven cents a pound in 1912 (Lee 1983).

Examination

Returning now to the line inlay on the chest, it was still only speculation on my part that the material used for this inlay was indeed baleen. My first step was to view the inlay under the stereo microscope and I saw no indication of the characteristic of wood. No rays, vessels, fibers, etc. My next thought was to probe the inlay with a hot needle and the odor of burnt hair was observed. Finally I received permission to sample the inlay. The sample was split into two sections. The first section was placed in a ceramic well, with the addition of sodium hyperchlorite. I observed that the sample slowly disintegrated. Both of these tests are simple ways of determining if a sample has a protein component.

The second section was embedded in epoxy resin and polished. I was also able to obtain a sample of baleen, courtesy of the Mystic Seaport Museum and embedded that sample as well, for comparison with the sample taken from the chest. The samples were then taken to the Conservation Department at the Metropolitan Museum of Art and viewed using a Zeiss Axioplan 2 compound light microscope equipped with two UV cubes.

Figure 4 is of the baleen sample given to me by the Mystic Seaport. Notice the characteristics of a three-part structure: a central section of tubulars, a cementing mixture and the horny outer layer. This sample is particularly nice since it shows the tubular structure. Positive identification of baleen is made easier if the sample shows all three of these characteristics. Figure 5 is a photomicrograph of the sample of the inlay taken from the American chest. Notice it has the same characteristics of the sample from the Seaport (fig. 4) but lacks the presence of the tubular structure. If we now compare Figures 4 and 5 with that of a sample of ebony. (fig 6) I think it is now safe to say that the line inlay found on the chest-of-drawers in not wood, but rather baleen.

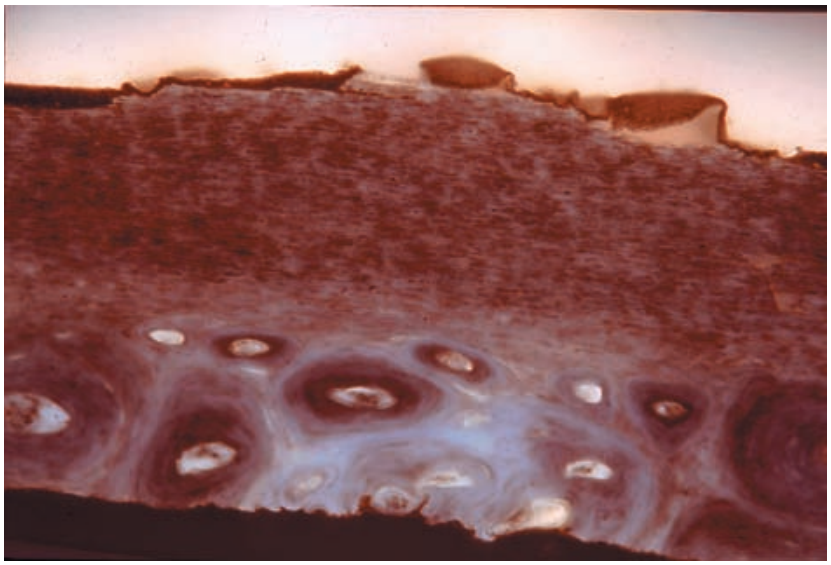

Figure 4. Baleen sample courtesy of the Mystic Seaport Museum (100X).

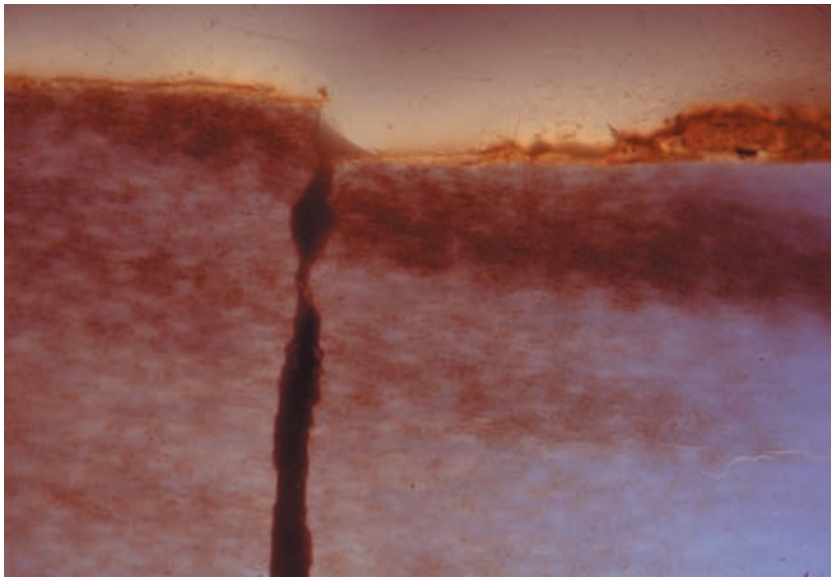

Figure 5. Baleen sample taken from the American chest of drawers in Figure 1 (100X).

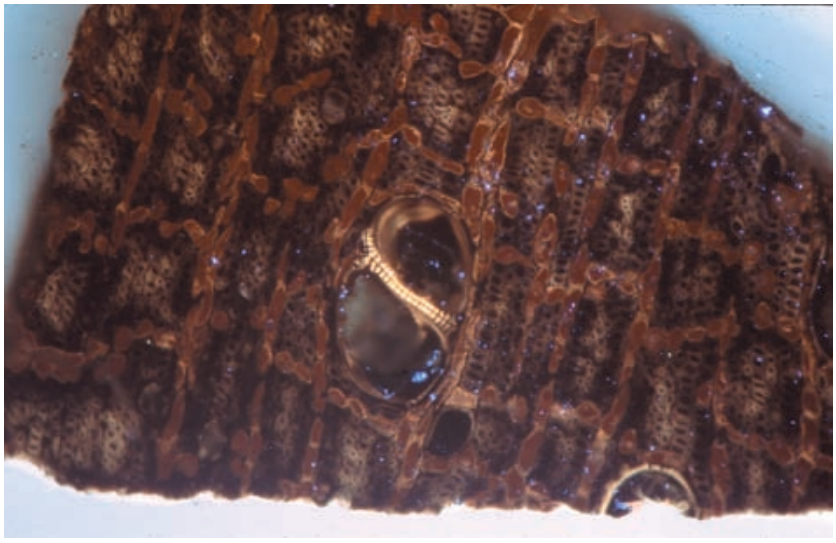

Figure 6. Ebony. Courtesy of Mechthild Baumeister, Metropolitan Museum of Art.

Figure 7. Line inlay wave pattern on the drawer fronts.

Before continuing with a discussion of the inlay found on the chest, I would like to make a few comments about identifying baleen. First of all, different colors of baleen auto-fluoresce differently. In this particular case, the sample of baleen taken from the Seaport was black in color and fluoresced a bright blue. The sample taken from the chest was grey-green in color and fluoresced white, similar to fingernails. Second, the length of the baleen can be the only positive way to differentiate it from horn. If the inlay in question is short, less than 12 inches, it could be horn. But if the inlay in question is long, in the case of the inlay on this chest, which was 20″–25″ in length, it rules out the possibility of horn. I did explore the option of having FTIR analysis performed on the sample but learned that it would only yield results consistent with keratin but not distinguish between horn and baleen. Finally, it can be particularly difficult to positively identify baleen by sight alone.

Figure 8. Shield detail inlayed into the front of the case of the chest.

Figure 9. Detail of the quarter sawn cherry inlayed between the baleen and light wood.

Baleen on an American Chest of Drawers

Confident now that the line inlay was baleen, a closer look at its use on the chest is appropriate. The history of the chest is unknown and has no provenance. The owner of the chest lives in upstate New York and the chest descended down to her from her grandmother who lived in New York City. This is the only information I have about the chest's origin. The chest is made of cherry and has poplar and pine secondary woods. One of the first things that struck me about the chest was its unusual form. I believe the chest to be a transitional piece due to the ogee bracket base and the use of line inlays. Also of note is the shape of the drawer fronts, which are simply concave.

The baleen inlay was used both on the front of the chest sides, between the two inlayed shields and on the drawer fronts as line inlayed into a wave pattern. Most intriguing was how the baleen was bent and how the person who made this chest clearly knew it was easier to bend baleen into a tight radius than it was to bend wood. (fig. 7) The baleen was chosen to be used for the line inlay to conform to the shape of the shield. (fig. 8) Notice how tight the radius is and how the baleen tapers to almost nothing at the ends.

Equally intriguing are particular construction details of the chest. Notice the lozenge shapes between the line inlays. (fig.9) Although these pieces are cherry, they are not part of the drawer front, but rather are cut from quarter-sawn cherry and inlayed into the drawer front between the baleen and the light wood. This is a highly sophisticated technique. It would be difficult enough to do this on one drawer front, but remember, the drawers are graduated, so the period of the alternating wave pattern has to change to accommodate the difference in drawer height while still maintaining a consistent width.

There are other interesting construction methods used in the fabrication of the chest. The top of the chest is attached to the case sides by means of mortise and tenon. The top of the case sides has a series of tenons, 3/8″ wide x 13/16″ long, extending along the entire width of the side. The top was mortised to accept the small tenons and simply glued down. The drawer lips are unusual as well. One would expect to see an overlaid drawer front, typical of the Chippendale style, or cock beading, more typically found on Federal furniture, but true to form, this chest is unique in all its aspects and has a simple quarter round applied to all sides of the drawer front. The top of the chest is inlayed as well. It has a single line inlay with two of the same lozenge-shaped quar-

ter sawn cherry motifs inlayed into the front corners. Finally the back leg of the ogee bracket base is dovetailed to the side bracket.

The main point for calling attention to all of the construction details is to suggest that even though the form of the chest is unusual and might be considered a rural craftsman's attempt to duplicate a higher-style urban chest, the actual techniques used in constructing the chest are highly refined and took considerable skill.

Conclusion

In conclusion, it is my belief that baleen was used as a line inlay on the chest-of-drawers. My simple chemical analysis, along with the microscopy strongly suggest that the inlay was baleen. Furthermore, and probably more important in the identification, is the length. With sections in length of up to 25 inches, it almost certainly rules out the possibility of horn. It has been suggested that baleen has been used in the decorative arts for centuries. Its popularity grew a availability increased and thus reached its peak use during the height of the whaling industry. Baleen went from being used infrequently and being found only on nautical objects, to being processed, machined, and packaged for sale abroad.

In addition, baleen has excellent working properties, making it an almost perfect form of early plastic. Its color variation lends itself to be easily substituted for ebony, bone, and in this case, pale green wood.

Armed with all this information, that baleen has excellent working properties, was readily available, had nice color variation, could be worked in long lengths, it would be logical that baleen should be found quite frequently on American furniture, certainly on furniture made in the seaport cities. But logic does not always bear out the facts. To my knowledge, this is the only American piece of furniture having baleen used as a line inlay. I have polled curators, conservators, and collectors, and Robert Mussey was the only person who had even seen baleen used before. I believe he said that he had seen it on a chest in Bermuda.

My main goal for presenting this information is not to make anyone an expert on identifying baleen, but rather raise our profession's awareness to the possibility that some of the objects in our care or collections may indeed have baleen as an inlay. I suspect that it was used far more frequently used than we have discovered.

Acknowledgments

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