Wood Analysis of an American Revolution War Campaign Chair

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Abstract

The New Brunswick Provincial Museum currently holds a campaign chair which is known to have been used during the American Revolutionary War. However, it is not know if the chair pre-dates the war or on which continent the chair was built. It is believed that campagin chairs made of oak were not produced after 1750 in the colonies. Images of the campagin chair were sent to the Mount Allison Dendrochonology Lab (MAD Lab) to attempt to identify the species of wood. Members of the lab independently examined the images, before corroborating on the identification of the species. It was determinded, through the images of the wood that the feet and legs of the chair are composed of oak, and the seat is of a different hardwood species, potentially beech. The lab was not able to determine the species of oak or beech; or whether it came from North America or Europe. If however, oak campaign chairs were not made in the colonies post 1750, then the chair had to either have been produced before 1750 or have come from Europe. Further anatomical details might but possible under a scanning electron microscope procedure, but it would require small samples of the various wood pieces to be removed from the chair.

Introduction

The New Brunswick Provinicial Museum contacted the Mount Allison Dendrochronology Lab (MAD Lab) in the fall of 2009 to assess the species composition of an American Revolutionary War campaign chair. It was believed to have been used during the war by Lt. Col. Isaac Allen of the New Jersey Volunteers. The chair has previously been assessed by a conservator of the museum and believed to be composed of oak, beech and birch; however, this was determined without certainty. Further investigation has lead to the belief that American oak was not used after 1750 in the colonies.

Chairs of similar design were common in the 15th and 16th centuries in Italy where they were known as "Sedic del Campo" or field chairs (Eberlein and Ramsdell, 1927). The finest of these chairs were constructed out of walnut with a leather, velvet or brocade for backing (Eberlein and Ramsdell, 1927). If the chair is older than the American Revolution and originated in Europe, it would potentially be composed of walnut.

Due to the doubt that American oak would be used to construct a Revolutionary War era chair, the New Brunswick Museum is interested in the MAD Lab's expertise, and hoped that they could provide further insight into the type and origin of the wood. This information could help the New Brunswick Provincial Museum discover the true provenance of the chair.

Methods

Images of the campaign chair were taken with a macro zoom by the New Brunswick Museum. They were taken from six different parts of the chair: foot rests, legs, arm rests, and seat rails (Figure 1). Images were sent to the MAD Lab for investigation. Three members of the MAD Lab analyzed the images independently before corroborating with one another.

Samples were first examined according to the three standard wood sections: tangential, transversal and radial (Figure 2). Trangential cuts are vertical cuts going with the grain of the wood; these cuts show ray cells and pores. Radial cuts are also vertical, but go across the grain of the wood and feature ray cellss and ring boundaries. Transversal cuts, also known as cross-sections, are horizontal and go across the tree; it displays the ring boundaries, pitch cells (conifers) and ray cells. Each species of wood has distinct characteristics in each cross-section of wood. These characteristics were examined in an attempt to help determine the wood species from the selected images.

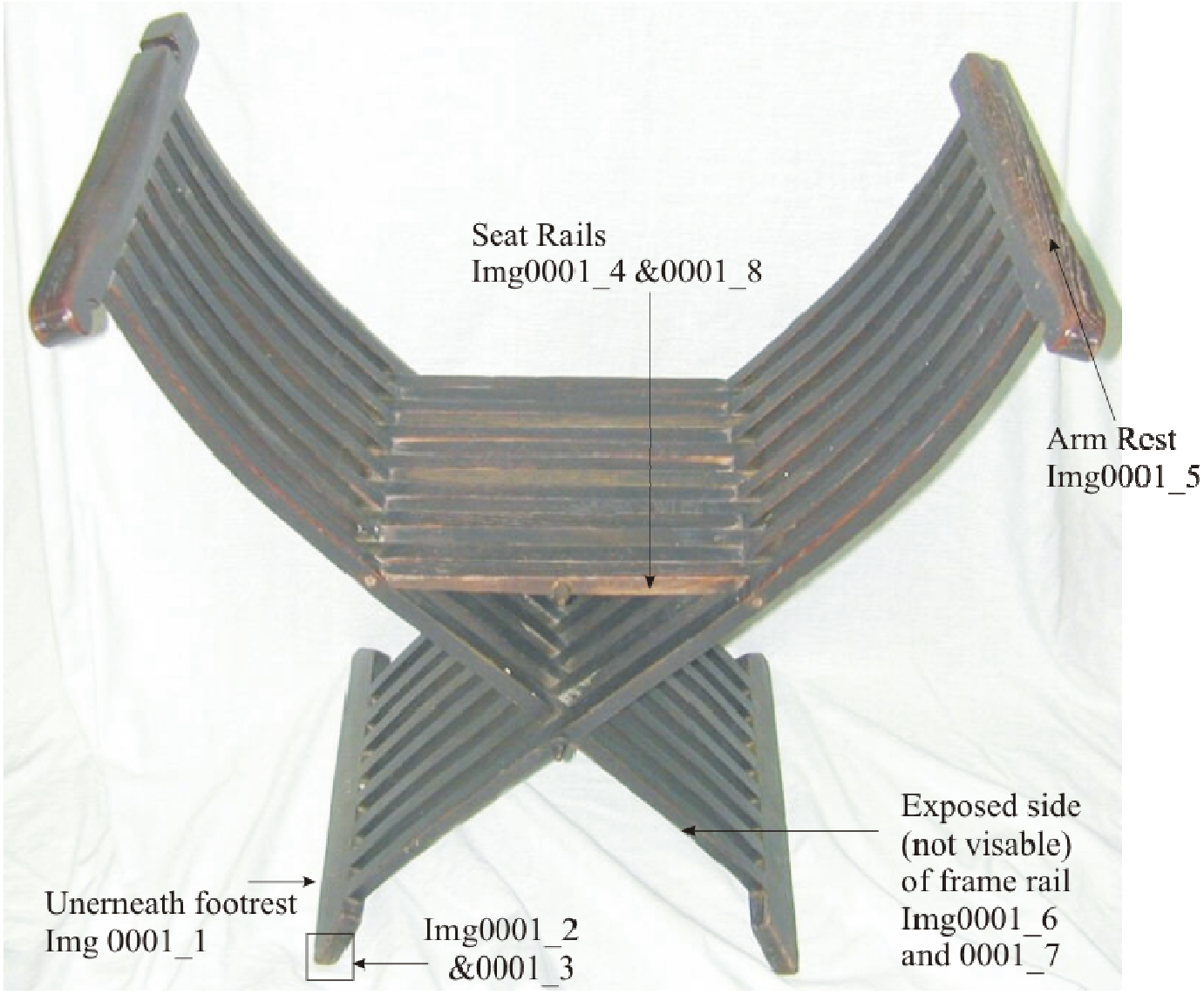

Figure 1. An image of the Revolutionary War campaign chair, labled with where other photographs were taken by the New Brunswick Provincial Museum staff.

Additional characteristics of the woods anatomy were examined. Hardwoods are split into two branches: diffuse porous and ring porous. Pores or tracheids are vertically running cells found in each tree ring used to transport water through the tree. Diffuse porous trees have pore scattered about within each tree ring (Figure 3b). Ring porous trees have distinct clustering of pores in the early wood of each tree ring (Figure 3a).

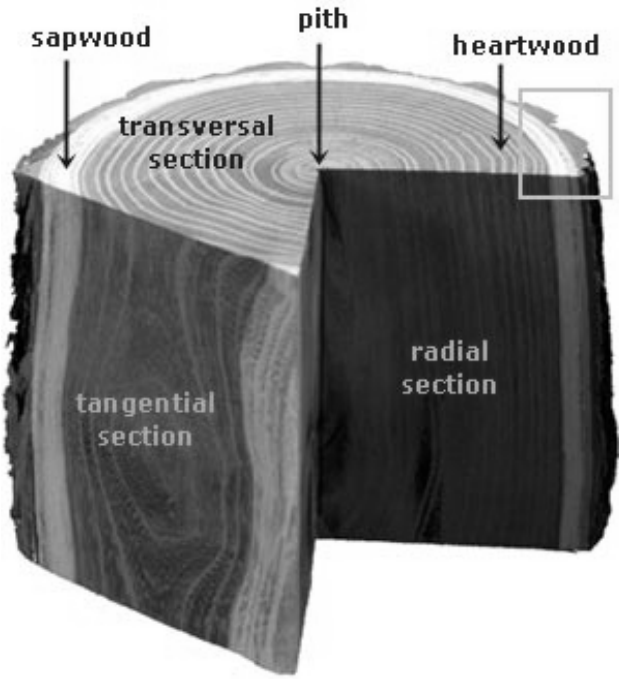

Figure 2. Standard sections used in wood anatomy: tangential, transversal and radial. (Source: http://www.woodanatomy.ch)

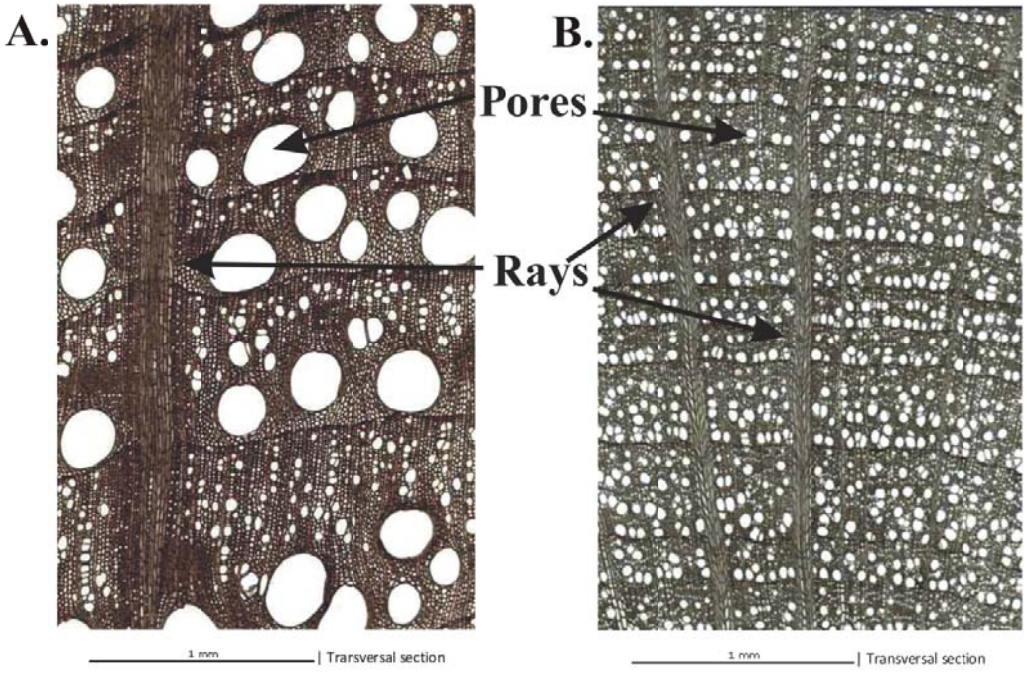

Figure 3. Transversal sections of (A) Oak (*Quercus* sp) and (B) Beech (*Fagus* sp.). The former has huge vessels concentrated in the earlywood with smaller pores desiminated in the latewood. The later is more diffuse porous where vessels are smaller than in oak and spread in the whole ring although they are more concentrated in earlywood. (Source: http://www.woodanatomy.ch)

Results and Discussion

The images suggest that the wood used in the chair was oak and possibly beech. Oak has general characteristics that include having large, distinct rays and clearly defined ring porus boudaries (Figure 3A). Beech is also characterized by distinct rays with diffuse porus ring boundaries (Figure 3B).

Three images were taken from the foot of the chair. The first image is of the bottom of the foot (Figures 1 and 4) and the other two are of the corner of the foot (Figures 1, 5 and 6). The image of the bottom of the foot is a radial view of the wood. This image displays many very large vessels, which are a common feature of the oak species (Figure 4).

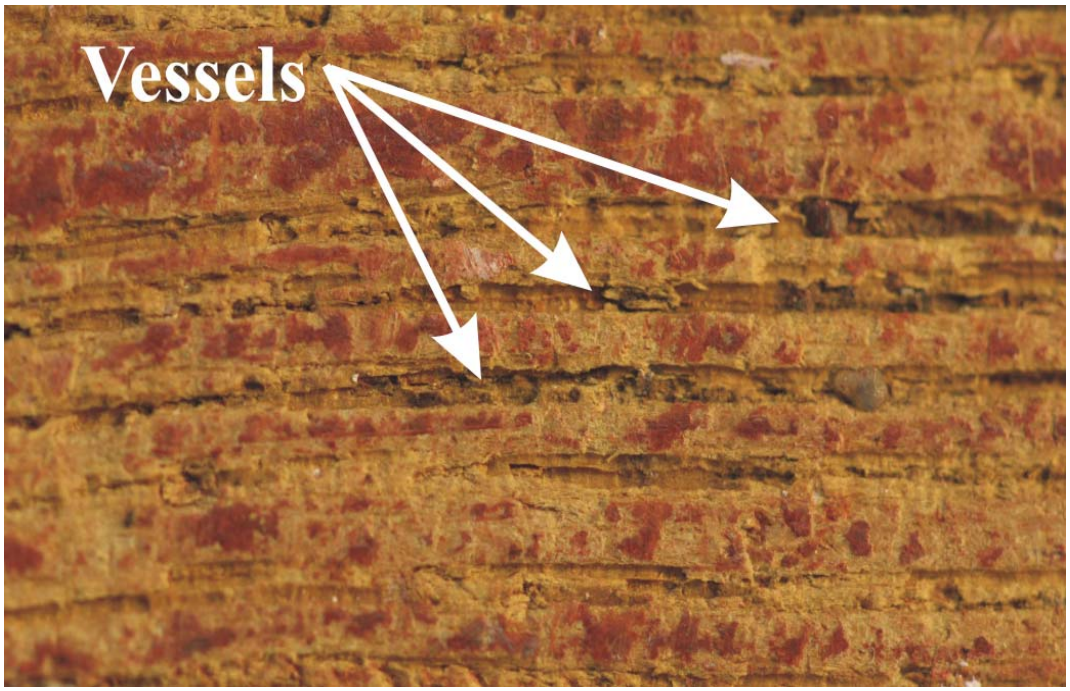

Figure 4. Image IMG0001_1, from underneath the footrest of the chair. Radial view illustrating many large vessels typical of the Quercus *genus*. The colour of the wood also points to oak rather than other possible species.

Images of the corner of the foot, also indicate oak (Figures 5 and 6). These images show transversal views of the wood which distinctly display ring boundaries. The rings appear to be composed of two parts: a lighter airier section and a denser section. As stated above oaks have very large pores in the early wood and small dense pores in the late wood (Figure 6).

Figure 5. IMG0001_2, view of the corner of the foot. The rings appear to show distinct zones which suggest a ring porous arrangement as is found in the oak species.

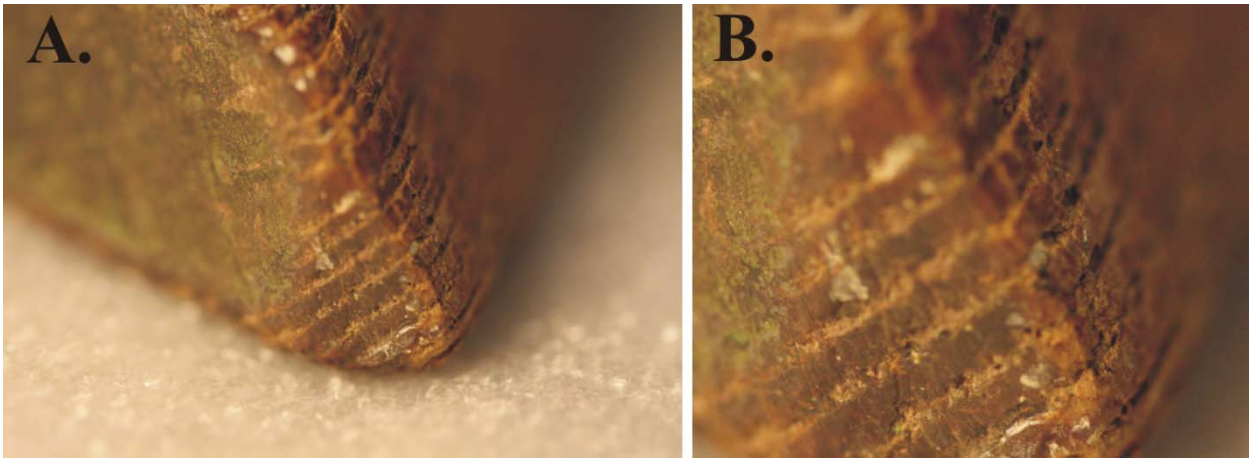

Figure 6. IMG0001_3, views of the corner of the foot. Left: full image; Right: zoomed in view of the rings. Here, a ring porous anatomical cell arrangement is even more evident.

Figure 7. IMG0001_4, view of the seat rail. The view is potentially a tangential section and is displaying a ray arrangement different than what is seen in an oak species.

Two images were taken of the front seat rail edge (Figures 1, 7 and 8). This edge appears to have been exposed due potentially to a user of the chair's legs having rubbed off the paint. Both images illustrate a light coloured piece of wood. Figure 7 shows a somewhat tangential view of the wood with rays apparent. Figure 8 does not show any distinct features though it does depict a shimmery surface, potentially a tangential cut. The rays in Figure 7 and the shimmer in Figure 8 suggest characteristics of a beech species of wood. In any case, the wood is different from the other parts of the chair.

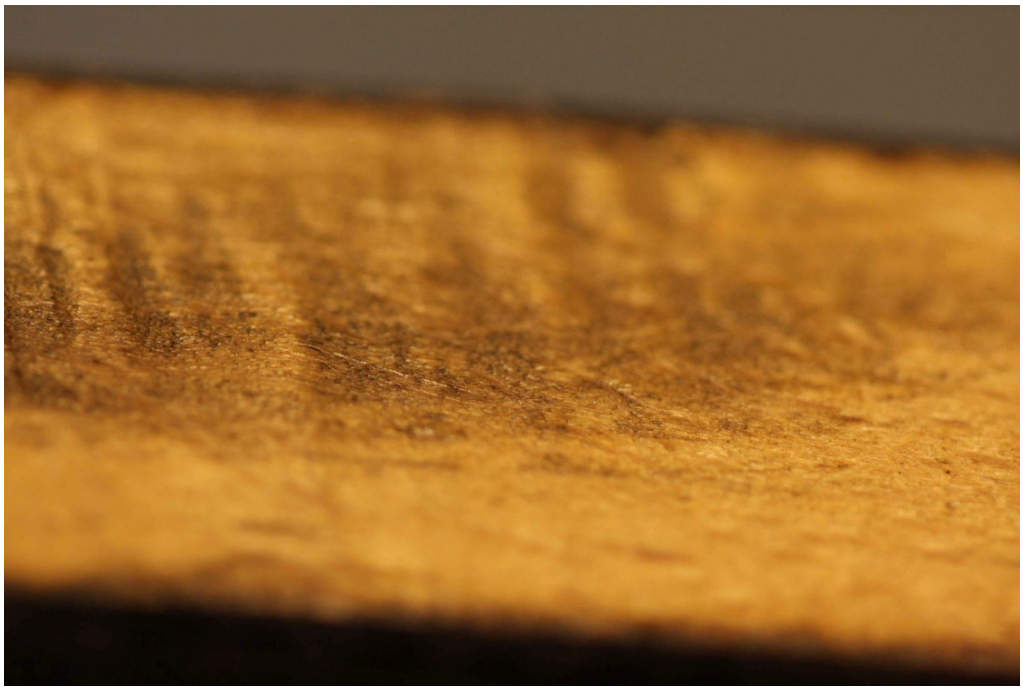

Figure 8. IMG0001_8, a view of the front seat rail. A shimmery surface suggests a tangential cut, though no distinct features are visible for identification.

One image was taken of the arm rest (Figures 1 and 9). This image reveals that there are rays present but it does not display a level of detail that was useful for further analysis.

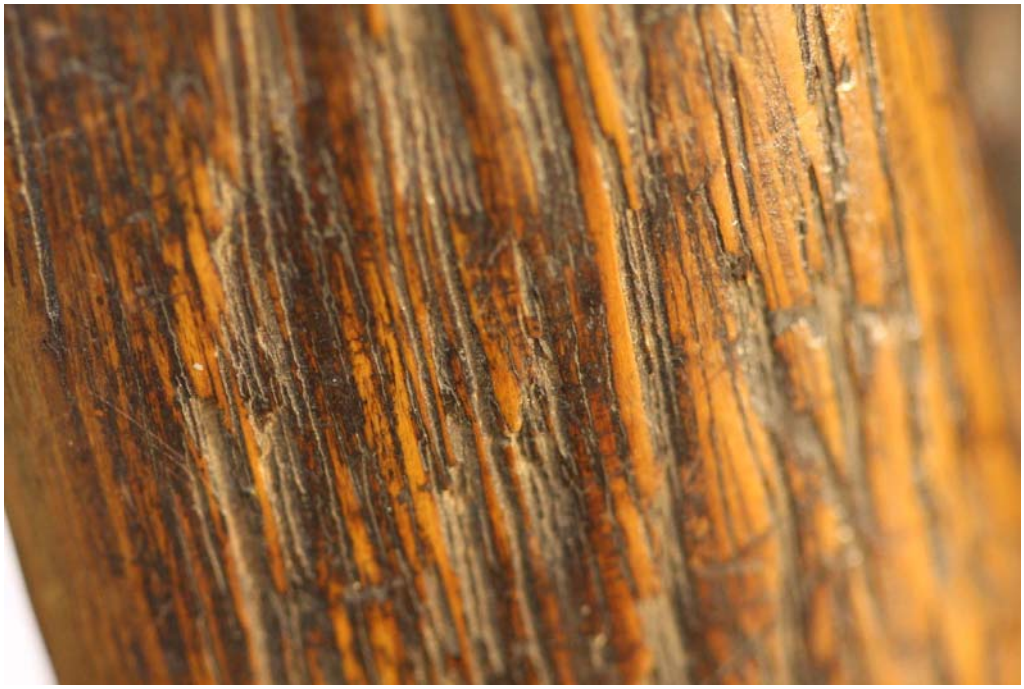

Figure 9. IMG0001_5, a view of the top of the arm rest. Possibly, a radial view illustrating very large vessels.

Figure 10. IMG0001_6, a view of an exposed side of a frame rail. This tangential section shows very large rays typical of oak wood.

Two images were taken of the frame of the chair (Figures 1, 10 and 11). Both images were taken on the tangential view of the wood. Figure 10 show distinct rays of a very large size suggesting an oak species. Other species also have many rays, such as walnut, however the latter has more numerous and thinner rays than those seen in Figure 10. Additionally, the colour of the wood is darker underneath the paint than would be found in walnut, further implying that it is likely oak. Figure 11 illustrates the difference between what the wood looks like when painted and that of the wood underneath the paint.

Figure 11. IMG0001_7, a view of an exposed side of a frame rail. Here again a tangential view consistent with oak, but less obvious. Large rays are suggested by the streaks on the exposed wood.

Conclusion

Analysis of the six macro images of the Revolutionary War campaign chair strongly suggests that the foot and frame of the chair are composed of oak. The front rail of the seat is of a different wood type that could potentially be composed of beech. No determination of the wood type was available for the arm rest due to the picture angles. This analysis was not able to establish which species of wood the samples came from, only the genus. Thus it is still unclear whether the wood is from North America or Europe, or which time period the chair was made. It does confirm the use of oak in the construction of the chair. If oak was not used in making campaign chairs post 1750, then it suggests us to believe that the chair was built before this date. Further anatomical details might but possible under a scanning electron microscope procedure, but it would require small samples of the various wood pieces to be removed from the chair.

References

Eberlein, H. D. and R. W. Ramsdell. (1927) The Practical Book of Italian, Spanish, and Portuguese Furniture. J.B. Lippincott Company. Philadelphia and London.

Schoch,W.,Heller,I.,Schweingruber,F.H., and F. Kienast. (2004) Wood anatomy of central European Species. Online version: www.woodanatomy.ch