

Dendrochronological research of the panel painting depicting Samuel van Lansbergen by Bartholomeus van der Helst, Rijksmuseum collections (Amsterdam, the Netherlands)

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SUMMARY

The portrait of Samuel van Lansbergen at the Rijksmuseum collections was painted and signed by Bartholomeus van der Helst in 1646. The panel consists of three boards of oak (*Quercus* sp.) disposed vertically. The middle board has a panel maker's mark stamped four times on the back, which has been interpreted as '4MM' (vertical mark, with the 4 on top). The aim of the dendrochronological research was to gain knowledge about this panel maker's practices by establishing the date and provenance of the wood, and determining whether this and/or other panels bearing the same mark share wood obtained from the same tree. The research was carried out on the transverse edges of the boards and resulted in the dating of all of them with Baltic chronologies in 1505 (right one), 1617 (middle one) and 1617 (left one) (dates of the outermost, most recent rings). The absence of sapwood rings hampers estimating the felling date of the trees. Therefore, it can only be estimated that the trees were cut *after* 1511 and 1623 C.E.. Considering the seasoning time, at least two to five years should be added to estimate the earliest possible production time of the painting, but the date in 1646 indicates that a large portion of wood (probably all sapwood) was removed from the boards before assembling the panel. The lack of matches between the boards but positive agreement with boards of other paintings bearing the same mark indicates a mixed assortment of Baltic oak.

INTRODUCTION

The portrait of the Remonstrant Minister in Rotterdam Samuel van Lansbergen (oil on panel, h 68cm × w 58cm; Rijksmuseum collections, <http://hdl.handle.net/10934/RM0001.COLLECT.8659>) was painted and signed by Bartholomeus van der Helst (Haarlem 1613 – Amsterdam 1670) in 1646. This panel painting has a mark stamped four times on the back (Fig. 2), which has been interpreted as 4MM (placed vertically with the number 4 on top). This mark has been identified as that of a panel maker active in the Northern Netherlands in the first quarter of the 17th century (Wadum, 2014). As part of a larger study that aims to shed light on the location of the workshop (and possibly on the identity) of this panel maker, the goal of the dendrochronological research was to determine the date and provenance of the wood, and whether this and/or other panels bearing the same mark share wood obtained from the same tree.



Figure 1. Portrait of Samuel van Lansbergen by Bartholomeus van der Helst (oil on panel, h 68cm × w 58cm). Source: Rijksmuseum collections <http://hdl.handle.net/10934/RM0001.COLLECT.8659>.

¹ Research carried out within the Wood for Goods project (<https://www.nwo.nl/projecten/016veni195502-0>)

MATERIAL AND METHODS

The inspection of the painting was done at the depot of the Rijksmuseum. The panel consists of three boards made of oak (*Quercus* sp). disposed vertically (Fig. 2, left photo). It is bevelled on all sides, but on the upper part the bevelling line is discontinuous from board to board. This suggests that, on that part, the bevelling was done on each board, in one stroke on a left-to-right motion once the panel was already assembled.

Four 4MM marks are located on the lower part of the central board and placed downwards (Fig. 2). They all are partial marks, missing some of the elements of the M letters or of the number 4 that we have observed in other panels where the mark is complete. This could be result of using a worn-out tool first, and having to try again with a newer one, or of having an inexperienced person marking the panel and trying several times until a more complete mark was stamped (that would be the top-right one in Fig. 2, right photo). Evenly spaced saw marks are evident on the central board (Fig. 2, right photo). This board has been processed in a semi-tangential direction from the stem, whereas the outer boards have been processed radially. The boards are not levelled, being slightly thicker on the side corresponding to the outer part of the tree (Fig. 3). Pith and sapwood are absent in all of them.

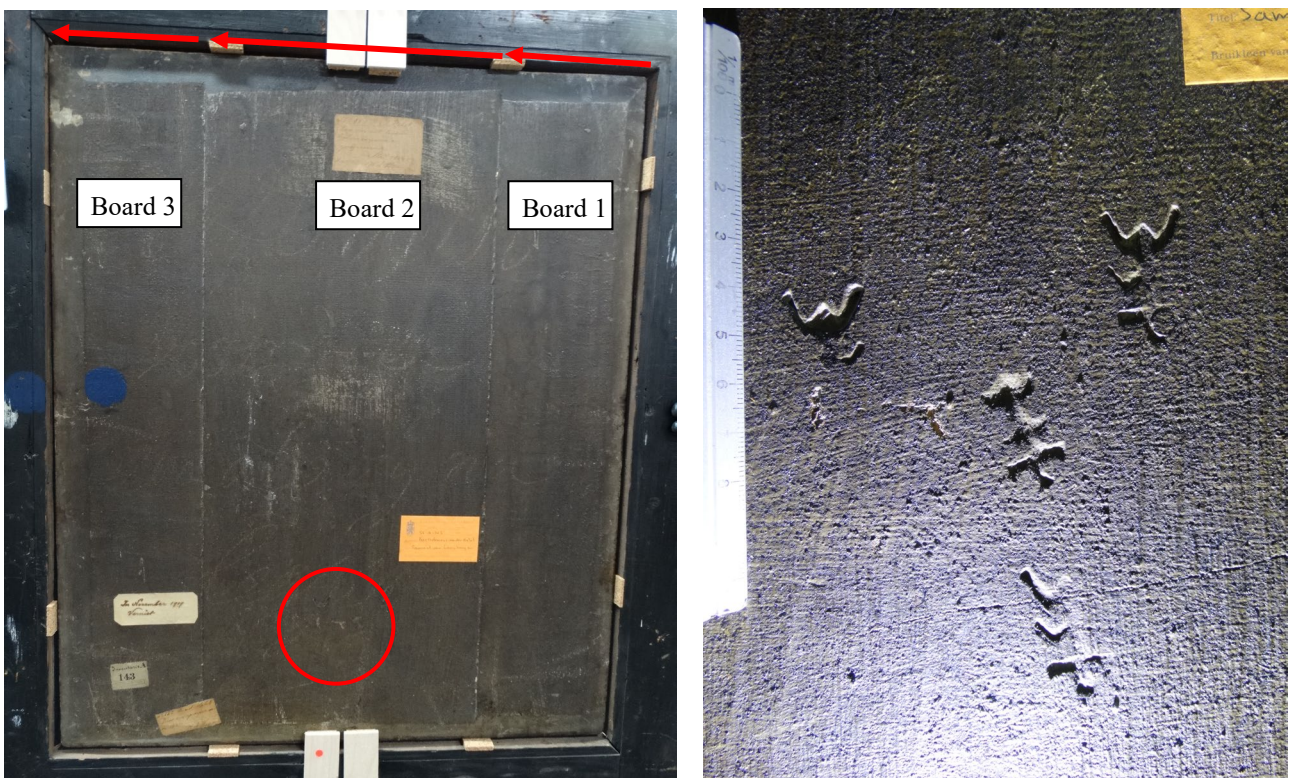


Figure 2. Back of the painting where three boards can be observed. The circle encloses the four marks, and the arrows indicate the direction of tree growth in the parts where the boards have been researched (photos: M. Domínguez-Delmás).

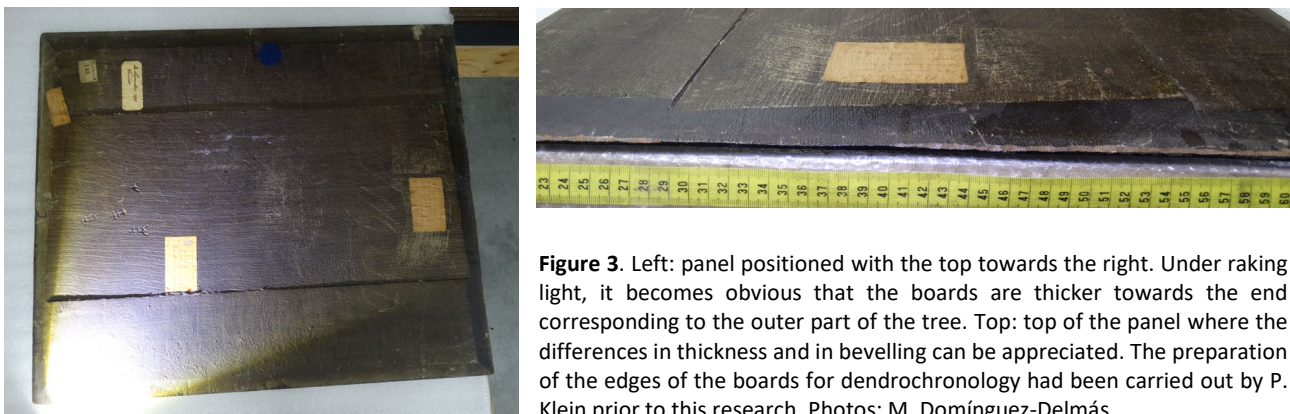


Figure 3. Left: panel positioned with the top towards the right. Under raking light, it becomes obvious that the boards are thicker towards the end corresponding to the outer part of the tree. Top: top of the panel where the differences in thickness and in bevelling can be appreciated. The preparation of the edges of the boards for dendrochronology had been carried out by P. Klein prior to this research. Photos: M. Domínguez-Delmás.

The research was carried out on the top end of the boards. Portions of the transverse ends had been cleaned with knives by P. Klein prior to this research (Fig. 3, top photo). To visualise the tree rings on the unprepared parts of the edges and obtain the longest possible tree-ring series for each board, a slight preparation of the wood was carried out by cleaning a shallow and narrow line along the transverse surface with sharp blade knives. Tree rings were photographed with a macro lens, and ring widths were measured on screen with CooRecorder (Cybis). The photographs included a ruler to allow the calibration of the measurements. Therefore, the obtained ring widths represent absolute values. Crossdating was done in PAST4 v. 4.3.102 (SCIEM).

RESULTS DENDROCHRONOLOGICAL RESEARCH

A measurement series containing 207 tree rings was obtained from the central board, whereas the right and left one (referenced as when looking at the back of the painting) have 124 (Board 1) and 122 (Board 3) respectively. Internal crossdating (i.e. comparison of the measurement series from the boards between them) did not result in significant matches, which indicates either that each board was obtained from a different tree and that the trees grew in different areas, or that there is no overlap (or a very short one) between the tree-ring series.

Crossdating with reference chronologies from central and northern Europe resulted in the dating of the boards in 1505 (Board 1), 1617 (Board 2) and 1609 C.E. (Board 3) (Table 1, Figs. 4 to 6). Those years represent the dates of the last, most recent rings in the boards, and were provided by chronologies representing different areas in current Lithuania (Daly and Tyers, 2022). The statistical matches are not very strong for Boards 1 and 3, which indicates that the wood may originate from different areas in Lithuania.

The absence of sapwood rings in the wood hampers the estimation of the felling date of the trees within a range of years. Therefore, only a *terminus post quem* date can be provided. Considering the sapwood statistics of trees growing in the eastern Baltic provided by Sohar et al. (2012), it can be estimated within a 95% confidence interval that the trees from which the Boards 2 and 3 were obtained were cut *after* 1623 (Table 1), whereas the tree used to make the Board 1 was cut after 1511 (this board was obtained from an inner part of the stem; hence the early date of the outermost ring). In addition to the years covered by the absent sapwood and the unknown number of heartwood rings to the sapwood border, some years must be accounted for the transport and seasoning of the wood. From observations of panel paintings signed by the artists and retaining partial sapwood it has been proposed that the seasoning time was about 2 to 5 years in the 17th and 18th centuries (Klein et al., 1987; Wadum, 1998). Those numbers would place the earliest production time of the panel in the late 1620s or in the first half of the 1630s. However, the signature of the painting in 1646 suggests that either there was a considerable portion of sapwood (with many tree rings) removed, and possibly also heartwood, or that the seasoning time was longer. Since the panels were made upon request, it seems unlikely that the panel maker stockpiled boards.

The comparison of the tree-ring series from these three boards with those from boards of other panel paintings bearing the 4MM mark has revealed very good matches of Board 2 (40280021) with boards for other two paintings (Table 2, Figs. 7 and 8). One is the top board of an anonymous painting entitled '*Huis te riviere*' at the Stedelijk Museum Schiedam (Domínguez-Delmás, 2022a; dendro-code 40420011, Fig. 7) and the other one is the middle board of the portrait of Samuel van Lansbergen's wife at the Rijksmuseum collection (SK-A-144), also painted and signed by Bartholomeus van der Helst in 1646 (Domínguez-Delmás, 2022b; dendro-code 40290021, Fig. 8). These trees likely grew in the same area.

Table 1. Results dendrochronological research. N: number of measured rings. Pith: estimated nr of rings missing to pith; SW: number of sapwood rings; WK: bark edge: -, absent/number in brackets indicates estimated number of missing rings to bark edge. CC: correlation coefficient; TBP: Student's *t*-value according to Baillie and Pilcher (1973); %PV: percentage parallel variation (Eckstein and Bauch, 1969); ## and ###, significance level of %PV at $p < 0.01$ and $p < 0.001$ respectively.

Element	DR Dendrocode	N	Pith	SW	WK*	Begin year	Last year	Estimated felling date	CC	TBP	%PV	Reference chronology
Board 1	40280011	124	-	0	>6	1382	1505	After 1511	0.41	5.1	63.7###	2021BLT3
Board 2	40280021	207	-	0	>6	1411	1617	After 1623	0.46	7.5	62.8###	2021BLT3
Board 3	40280031	122	-	0	>6	1496	1617	After 1623	0.34	4.11	68####	2021BLT2

*Estimation based on Sohar et al. (2012).

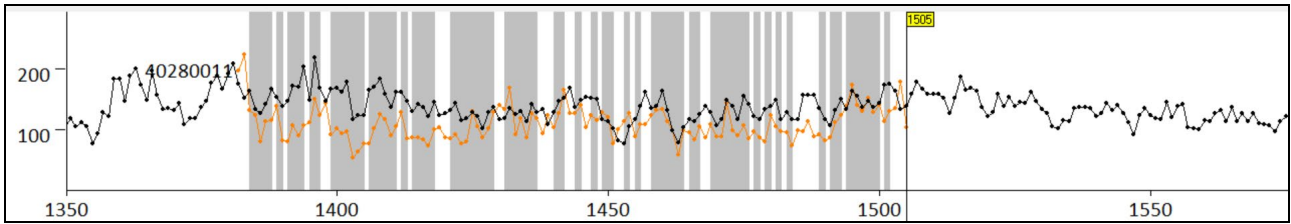


Figure 4. Visual match between the tree-ring series obtained from Board 1 (40280011) and the reference chronology 2021BLT3 (black). Y-axis: ring-width (1/100 mm); x-axis: calendar years. The shaded area shows the percentage of parallel variation (%PV) between the tree-ring series.

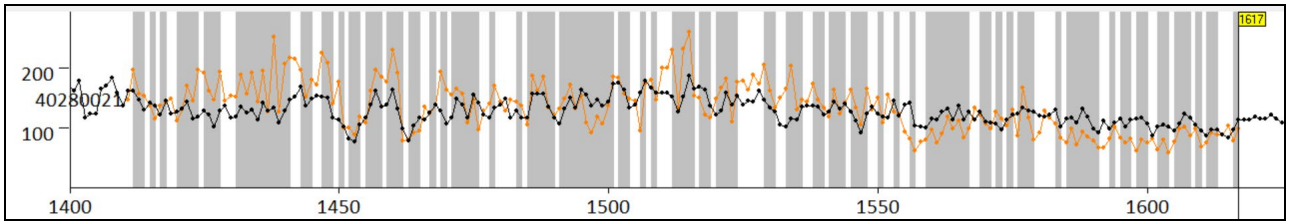


Figure 5. Visual match between the tree-ring series obtained from Board 2 (40280021) and the reference chronology 2021BLT3 (black). Y-axis: ring-width (1/100 mm); x-axis: calendar years. The shaded area shows the percentage of parallel variation (%PV) between the tree-ring series.

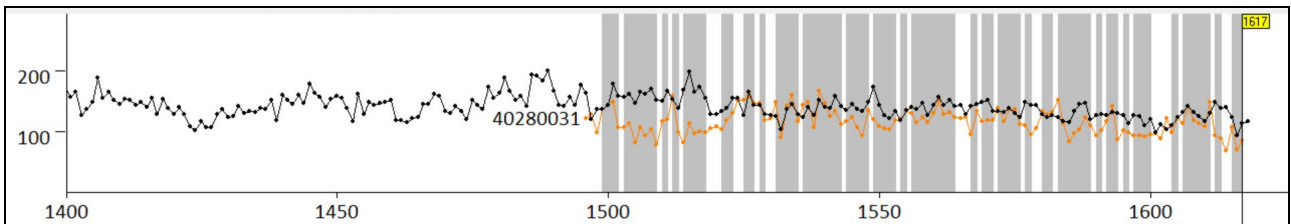


Figure 6. Visual match between the tree-ring series obtained from Board 3 (40280031) and the reference chronology 2021BLT2 (black). Y-axis: ring-width (1/100 mm); x-axis: calendar years. The shaded area shows the percentage of parallel variation (%PV) between the tree-ring series.

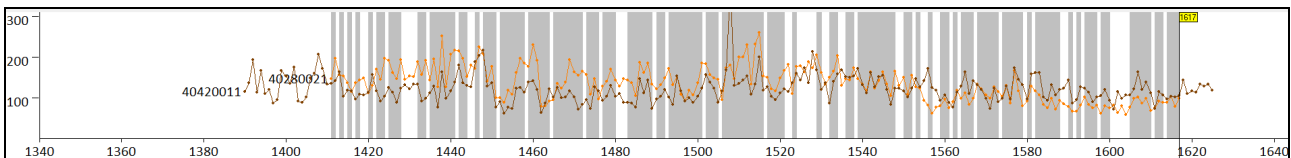


Figure 7. Visual match between the tree-ring series obtained from Board 2 (40280021, in orange) and the tree-ring series from the top board of the panel painting '*Huis te riviere*' at the Stedelijk Museum Schiedam (40420011, in brown). Y-axis: ring-width (1/100 mm); x-axis: calendar years. The shaded area shows the percentage of parallel variation (%PV) between the tree-ring series.

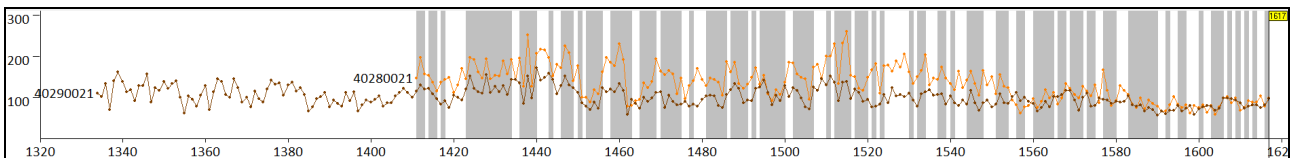


Figure 8. Visual match between the tree-ring series obtained from Board 2 (40280021, in orange) and the tree-ring series from the middle board of the portrait of Samuel van Lansbergen's wife from the Rijksmuseum collections (40290021, in brown). Y-axis: ring-width (1/100 mm); x-axis: calendar years. The shaded area shows the percentage of parallel variation (%PV) between the tree-ring series.

Table 2. Relevant statistical results between the tree-ring series of different paintings. OI: overlap; CC: correlation coefficient; TBP: Student's *t*-value according to Baillie and Pilcher (1973); %PV: percentage parallel variation (Eckstein and Bauch, 1969); ###: significance level of %PV at $p < 0.001$.

Tree-ring series DR Dendro-code		OI	CC	TBP	%PV
	40420011	207	0.58	10.5	69.6###
40280021	40290021	207	0.47	8.09	61.4###
40420011	40290021	228	0.42	7.87	64.3###

CONCLUSIONS

The dendrochronological research has provided a date for the boards making up the panel (1505, 1617 and 1617 C.E.) and an estimated date for the felling of the trees after 1511 and 1623. Considering a seasoning time of two to five years (Klein et al., 1987; Wadum, 1998), the earliest production time for the panel would be the late 1620s or early 1630s. However, the signature of 1646 suggests that there was a large portion of wood removed (likely all sapwood), as a long stockpiling period for boards seems unlikely. Furthermore, the fact that there was wood from different areas within current Lithuania supplying the workshop suggests that the wood got mixed at the harbour of origin, or eventually at the timber market where the panel maker purchased the wood.

The panel maker's mark present on the middle board has been found in other paintings by artists from the Northern Netherlands. A forthcoming publication by J. Wadum, A. Jager and M. Domínguez-Delmás (Wadum, forthcoming) will shed light into the location and practice of this panel marker's workshop practices.

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DR_R2022002, Portrait of Samuel van Lansbergen by Bartholomeus van der Helst, Rijksmuseum collections (Amsterdam, the Netherlands)

Appendix A. Glossary and abbreviations

N	Total number of measured rings in the sample;
Pith	Centre of the tree; +1/-, pith present/absent;
SW	Number of sapwood rings present on the board.
Bark edge (WK)	Boundary between the last ring and the bark; WK: bark edge present; when absent, an estimation of the number of rings to the bark edge might be given depending on the wood species;
Begin year	Date of the first ring (closest to the pith of the tree) measured in the sample;
Last year	Date of the last ring (most recent ring, closest to the bark of the tree) measured in the sample;
Estimated felling date	Date of the last ring plus the estimated mean number of rings to the bark edge when the WK is not present;
TBP	Value of the Student <i>t</i> -test according to Baillie and Pilcher (1973); this value is used to identify the match between two tree-ring series for which the correlation reaches its highest value. Student's <i>t</i> values over 5 for an overlap of 100 rings are likely to indicate a match;
%PV	Percentage of parallel variation; this value indicates, for the overlapping period between two tree-ring series, the percentage of years in which the ring-widths increase or decrease similarly. Values higher than 65%, for an overlap of 100 rings are highly significant and indicate a match;
Overlap (OI)	Number of overlapping rings between two curves in their matching position;
Reference chronology	Chronology used to date the sample.