Years War which cut the trade routes across the Baltic Sea. Finally the Second Swedish/Polish War from 1655 to 1660 caused the total breakdown of the Weichsel trade¹³.

With the detection of the provenance for the oak panels new evidence for the sapwood allowance arises. A preliminary analysis of the number of sapwood rings from 180 oaks, from North Poland, results in a median value of 15 with 50% of all values lying between 13 and 19, the lower and upper extremes are 9 and 36, so far. The indication of a west-east gradient of decreasing sapwood rings¹ is thus supported. On the basis of the new placement-in-time and the new sapwood allowance the dating of ten Rembrandt paintings are summarized in Table 1. All ten panels have some sapwood remained and the paintings contain an authentic time signature. Since through the correction a net-shift of only one year resulted, there are no serious art-historical consequences for the respective paintings. All these considerations also apply to the English art-historical objects of the same tree-ring pattern¹, but not to other art-historical exercises. Thus dates established for oak panels, sculptures¹⁷ and furniture¹⁸ with ring patterns of genuine Dutch³, French¹⁹ or West German¹⁶ type are unaffected as are dates for beech panels bearing paintings by artists such as Lucas Cranach²⁰, and stringed instruments of spruce²¹.

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Dating of art-historical artefacts

FROM statistical studies, Baillie *et al.*¹ propose the re-dating, which we accept, of oak tree-ring chronologies² referred to by us as Type A, and make suggestions, to which we here add information, concerning the provenance of the timber and the relevance of absent sapwood to the dating of artefacts of art-historical interest in northern Europe^{2,3}.

The first suggestion is that oak timber exported westward from east Prussia and Poland to Flanders and England was used for the panels of many late mediaeval paintings now in Flanders and England. The Type A chronologies largely derived from the timbers cover the years AD 1250-1550, which coincides with the activity of Hanse merchants^{4,5}. We find further support for the Baltic provenance in that the species of oak of many such panels have affinity to pedunculate oak, which is more prevalent than sessile oak in eastern Europe⁶. This evidence derives from wood structure analysis on the exposed edges of the panels with rings sufficiently wide (>2 mm) to permit classification by the method of Huber *et al.*⁷. Introgression of the two species being common in north-west Europe^{8,9}, it is not feasible to identify the species for many samples, but finding an affinity to one or the other is possible. Our finding that Type A panels have affinity to pedunculate oak is relevant to the poor match noted between Type A and Type H (sessile oak) chronologies. This is consistent with the finding of Cousens⁹ that woodlands dominated by pedunculate oak exhibit greater variability than those with sessile oak.

The other points of Baillie *et al.*¹ concern first, movement of our Type A chronologies forward by 4 years, and second, the relatively low number of sapwood years on Baltic oak. We suggested the former at one time¹⁰ but for various reasons replaced it with chronologies in other positions. However, we substantiate the dating of Type A chronologies now proposed by Baillie *et al.* Their second suggestion was deduced from *Quercus robur* on Finnish sites for oak 120 yr old and confirms what has already been reported for sapwood by Bräthen¹¹ for west Sweden. Bräthen examined mediaeval oak

from excavations at Lödse on the Gotha River and for 69 trees found means of 16 yr (range 13-21 yr) for trees 100-200 yr old, and 20 yr (range 14-23 yr) for older trees. In contrast to the research on sessile oak referred to by Baillie, and on modern oak in Ireland and north-west England, our experience for pedunculate oak in southern England in Bagley Wood¹² and for mediaeval⁸ and Roman¹³ times indicates that trees of fast growth—that is, with wide rings—have relatively few sapwood rings.

The interesting suggestions raised by Baillie *et al.* have added to our knowledge, and the long-standing problem of dating Type A chronologies of slow growth has been resolved. The suggestions do not significantly affect our results for Tudor and other paintings on panel, for which our aim has been to derive the probable date to within 15-20 yr.

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