The science of dating and vernacular buildings

Martin Bridge, UCL Institute of Archaeology and Oxford Dendrochronology Laboratory

The biggest change in scientific dating to affect the world of vernacular architecture over the last fifty years has been the rapid establishment of dendrochronological dating as a 'go to' dating method, with well over 4000 building phases having been dated in England and Wales alone (Fig 44)[63]. Alongside this, we have seen great improvements in radiocarbon dating, with the introduction of 'wiggle matching',[64] and in very recent years the early development of oxygen isotope dating of wood,[65] which holds the prospect of being applicable to many species. The application of blue intensity studies to dating pine also holds the prospect of assisting dendrochronological methods where necessary.[66] Whilst dating wood has probably seen the most effort of interest to the vernacular architectural community, other areas have been developed too, most notably the use of both thermally and optically stimulated luminescence in the dating of bricks, with the latter also used for dating lime mortars.[67]

In Britain, by far the majority of dendrochronological dating has been on oak, and the last millennium is now very well covered geographically. This allows the interrogation of the database to determine aspects such as woodland history, the age of trees used through different periods, and the movement of timber. More importantly for architectural history studies, the development of different roof and frame types, the duration of jointing types, and the ageing of features such as doors and windows can also be investigated. The database is now sufficiently large that the migration of changes in techniques and styles can also be traced.[68]

Collaboration with colleagues across Europe has enabled imported Baltic oak timbers (mostly boards) to be dated, together with the provenancing and dating of softwood imports.

We are now also beginning to find eighteenth- and nineteenth-century imports of American oak. Much of this proliferation in dendrochronological dating has been funded by Historic England (and its predecessor English Heritage), along with bodies such as the Royal Commission on the Ancient and Historical Monuments of Wales, Cadw, the National Trust, Historic Royal Palaces, and various interest groups, as well as individuals.

In cases where standard dendrochronology has not been able to date timbers, radiocarbon analysis (itself reliant on dendrochronology for calibration) has proved invaluable. There are periods in the last millennium where the calibration curve makes dating difficult because a measured value can equate to multiple potential positions on the curve. In the case of vernacular architecture, in particular, the whole of the sixteenth century gives very broad date ranges. However, improvements currently underway in IntCal20 (the international calibration determination) using single annual rings instead of the previous 5-year or 10-year blocks should mean that in the near future, wiggle-matching may achieve dates to within about an eleven-year uncertainty envelope. [69]

The study of oxygen isotopes, originally for climatic reconstruction, is now being applied to dating, with a chronology being established initially from dendrochronologically dated wood.[70] Initial results are very encouraging, and hold the prospect for being able to date slightly shorter sequences, fast-grown timbers, and species other than oak, especially elm - which is the second commonest building timber, but is usually unsuitable for tree-ring dating.

The measurement of blue light intensity in softwoods, another product of the intense research into climate change, also promises to enhance the dating of this category. This is an accurate proxy for the measure of the maximum latewood density of the wood, which has been found to be better correlated with climatic factors than the relatively crude ring-width alone. Recent work also suggests this may be applicable to hardwoods in the future.[71]

Although great strides have been made in the last fifty years, it appears we are on the threshold of a number of advances that promise to expand the application of scientific dating to a much greater range of buildings and artefacts in the near future.

NOTES

63 Meeson, "Structural Trends2

64 Hamilton et al., "Rev Thomas Bayes"; Bayliss, "Bayesian Buildings."

65 The Swansea University team of Neil Loader, Danny McCarroll and Iain Robertson have been developing this application under a Leverhulme Trust grant, in association with the Research Laboratory for Archaeology and the History of Art, Oxford University. See note 8.

66 Mills et al., "Dendrochronologically Dated Pine Buildings"

67 Stella et al., "Historical Mortars"; Stella et al., "Different Approaches to Date Bricks"

68 Pearson, "Tree-Ring Dating" and Meeson, "Structural Trends" have revealed these trends over the years as the database expands.

69 Alex Bayliss, personal comm., at a meeting at St Andrews University, December 2018.

70 Loader et al., "Tree Ring Dating."

71 Ryszard Kaczka, personal comm., at a meeting at St Andrews University, December 2018.