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OBITUARY

Mike Baillie – Slices of Time

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Mike Baillie
1944–2023

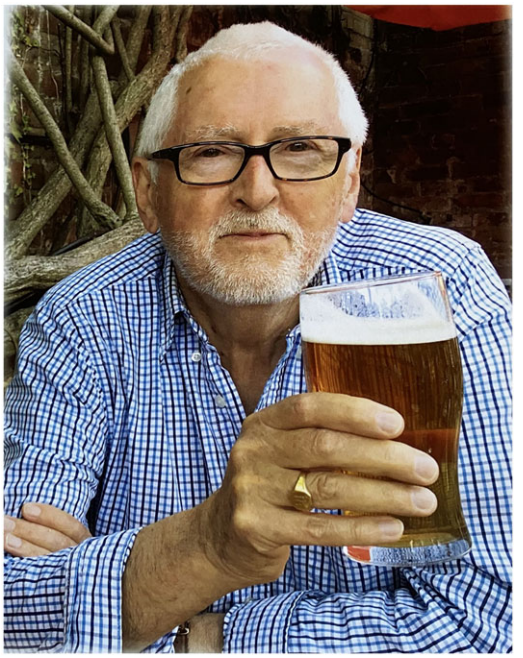

Photo courtesy of Deborah Baillie

Michael "Mike" George Lockhart Baillie was born in Belfast where he attended the Belfast Royal Academy. He graduated from Queen's University Belfast with a Physics degree and joined the Palaeoecology Laboratory as a research assistant in 1968. His first job was assisting with sample preparation for the newly commissioned *Radiochemistry Inc*. "Radiocarbon Laboratory" marking Mike's first foray into the world of chronology building. This self-contained machine had the gas-chemistry, counters and electronics in a single unit. Unusually at the time, it was based on proportional

counting of methane rather than carbon dioxide. His work in the laboratory was part-time allowing him to pursue a PhD in dendrochronology a technique that was only just being pioneered in Europe. He set off to build an oak tree-ring chronology for Ireland, initially building a tree-ring sequence from living trees in Ireland and England which he extended using timbers from a range of historic buildings. Mike and others in the laboratory were then building a series of floating chronologies from the hordes of bog oaks revealed by motorway construction and wetland drainage in the 1970 and 1980s. Mike was able to forge the links between these floating sections, most notably by using the chance discovery of bog oaks from northeast England first seen from a train window (Pilcher and Brown 2024). The completed 7272-year oak chronology was published in 1984 (Pilcher et al. 1984). This annual sequence became the basis for the radiocarbon calibration curves in use today. Mike also participated in the development of the Irish pine chronology (Pilcher et al. 1995). The Irish pine chronology extends from 3451 to 2569 BC, with an additional section from 6327 BC to 5553 BC which has since been linked to the Irish oak chronology (Torbenson et al. 2015).

Mike took a sabbatical at the Laboratory of Tree-ring Research in Tucson, Arizona, in 1986. While there, it's likely he discussed the frost-damaged rings in the bristlecone pines, which LaMarche et al. (1984) suggested were indications of cooling events caused by sulfur emissions from volcanoes in the past including the Bronze Age eruption of Thera. This may have inspired his interest in the "narrowest ring" events in Irish oak sequence—places in the tree-ring chronology where the tree-rings were narrower than average—particularly 4375 BC, 3195 BC, 2345 BC, 1628 BC, 1159 BC, 207 BC and AD 540 (Baillie 2002). Mike speculated that some of these narrow rings could be due to volcanic dust, noting the close timing between many narrowest ring events and large acid signals in Greenland ice cores (Baillie and Munro 1988; Baillie 1989, 1996). That the trees from Europe and North America experienced adverse growing conditions in the same years signalled climate events of global scale. As Mike was fond of saying, "Trees don't lie, and they were there."

Mike had a dogged interest in "getting it right" when it came to chronology. He and his colleagues showed that some of the English oak chronologies constructed from art-historical panels did not give consistent cross-dating and were most likely wood imported from the Baltic (Baillie et al. 1985). Through cross-dating trees from northern England, Ireland and Germany, they also found an error in the German oak chronology, resulting in a shift in the German chronology before 550 BC to 71 years older (Baillie 2009). The adjustment enabled consistent cross-dating between the Irish and German chronologies back to 3000 BC and a joint publication with the German dendrochronologists (Pilcher et al. 1984).

Mike extended his thinking about environmental impacts on trees to the potential effects of the same events on past societies, noting frequent clusters of historical and archaeological instances of societies experiencing a range of socio-economic or political upheavals spanning Europe and Asia (Baillie 1992, 1993, 1994, 1996; Baillie and Brown 2002). Pulling together supporting evidence from other archives, notably those dated by radiocarbon, led Mike to write his insightful "Suck-in and Smear" paper in which he highlighted the importance of chronological precision for recognising short-lived events and their repercussions in the past (Baillie 1991): chronological imprecision gave rise to the "smearing" of an event over an extended time period, but the flipside was the tendency to "suck in" and attribute potentially unconnected but closely contemporaneous events to a common cause. A case in point was the construction of seemingly defensive hillforts in later prehistoric Ireland, which emerging radiocarbon dates were starting to date to the period between 1200–900 cal BC (Grogan and Condit 1994; Mallory 1991; Mallory and Warner 1988). The imprecision of the radiocarbon dates from the archaeological sites raised the possibility that the sites were constructed in response to a societal crisis triggered by the same environmental downturn that caused an 18-year-long tree growth anomaly beginning in 1159 BC (Baillie 1995a)—or, to use one of Mike's favourite double-negatives, the radiocarbon dates were "not inconsistent" with a scenario of environmentally-driven societal response. More recent dating of Irish hillforts now demonstrates that their construction began centuries before this specific tree-ring event (O'Brien and O'Driscoll 2017), but Mike's provocation of discussion on human-environment relations in the past ensured that his legacy to Irish and British archaeology extended well

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beyond the confines of dating archaeological sites (Baillie 1999). His contribution to archaeological discourses included reflections on the manifestation of mass mortalities such as the Black Death on the frequency of dendro-datable archaeological timbers (Baillie 2006) and the significance of similar fluctuations in dendro-dated sites further back in time (Baillie 1995b; Baillie and Brown 1996).

Mike also considered seriously the possibility that some of the narrow-ring events could be cosmic in origin. The regular 470-year recurrence of some of the events suggested the regular return times of comets. He explored these ideas and the relation of the timings to historic and folklore mentions of catastrophes arriving from the sky in his book *Exodus to Arthur, catastrophic encounters with comets.* In his book with Patrick McCafferty *The Celtic Gods, comets in Irish mythology* (McCafferty and Baillie 2005), he examined the folklore and folk images that also suggest regular cometary effects in history and prehistory.

Mike's meticulous scrutiny of tree-ring, ice-core, archaeological and historical sources eventually led to a consilience: the past had been marked by distinct episodes of sudden and drastic environmental events that could be pinpointed to the year. With improvements in ice-core chronologies, he recognised similar time gaps between growth anomalies in the trees and volcanic signals in the ice cores (Baillie 2010). The ice-core community resisted his suggestion that they revisit their chronology, and the interchange of correspondence was the subject of many an entertaining coffee-break at the Palaeoecology Centre. By this stage, tephrochronology had been added to the chronological repertoire of the Palaeoecology Centre, and Mike's colleagues were collaborating with the Danish ice-core community on the search for tephras in Greenland ice cores. Notably, they looked for ash from the AD 79 eruption of Vesuvius, as well as the AD 1104 eruption of Hekla, two events that underpinned the precise dating of the last two millennia of the Greenland ice core chronology (Vinther et al. 2006). They found neither (Coulter et al. 2012). Reports of minute particles with a geochemistry consistent with Vesuvius seemed to support the ice core chronology (Barbante et al. 2013), however, implying a lack of correspondence between tree-ring and ice-core "events" and resulting in an unsatisfactory understanding of the link between these two critical palaeoenvironmental records. A resolution was soon at hand, however, as cosmogenic radionuclide signals common to both the tree-rings (^{14}C) and ice cores (^{10}Be) were recognised by Sigl et al. in the ice cores (2015). Aligning these signals demonstrated that Mike's deduction of an ice-core chronology offset was indeed correct. The independent synchronisation of the two records has since enabled greater recognition and understanding of volcanic impacts on climate and society, a long-lasting legacy of which Mike could be very proud. As for the impact of the Thera eruption, subsequent research has since corroborated Mike's assertion that the ~1641 CE sulfate spike in the Greenland ice cores was indeed contemporary with the precisely dated growth anomaly in North American and European trees, but recognition of tephra in the ice cores revealed the culprit eruption to be that of Aniakchak, Alaska (Coulter et al. 2012; McAneney and Baillie 2019; Pearson et al 2022). The search for the precise date of the Thera eruption and its impact continues.

Mike made several visits to New Zealand in the late 1990s and accompanied Jonathan Palmer, Alan Hogg and Ed Cook on field trips in both the North and South Islands. The trip to the North Island involved visiting various subfossil kauri (*Agathis australis*) sites, and Mike continued to have an active interest in the immense time span of preserved log material (Hogg et al. 2006; Palmer et al. 2006). On one trip to the South Island, with Palmer, Pilcher, Hogg and Cook, the team were seeking to add subfossil sections of silver pine (*Manoao colensoi*) at Oroko Swamp to extend the chronology further back in time. The bog site was densely forested, making walking difficult because of the tangled roots and water-filled hollows. They were stopping for lunch, and as luck would have it, Mike leant on a heavily mossed mound that turned out to be a very large old fallen log. It was sampled and immediately named "Baillie's Wall."

In addition, Mike was one of the founding members of the IntCal Working Group which was established in 2002 to update and extend the international radiocarbon calibration curves (Reimer et al. 2002). He provided valuable insights into the tree-ring data included in the curves and closely followed, and commented on, the discussions and controversies leading to the present calibration curves.

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Mike Baillie was a true polymath with knowledge spanning science, archaeology and history. His wit and wisdom will be sorely missed.

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