

RESPONSE: JAMES CROLL AWARD

To join the ranks of those previously recognised by the award of the James Croll medal was not only the greatest honour I have ever received but also a very humbling experience.

Looking back over a research career that spans half a century, I'm aware how fortunate I have been in enjoying the support and collaboration of many people: mentors, supervisors, friends, colleagues and research collaborators. It has, at times, been a bumpy ride, punctuated by intervals of self-doubt, discouragement and depression. Over the past three decades, however, I have enjoyed the unflagging support of my wife, Rebecca, who has not only patiently endured my absences on fieldwork, but also tolerated the many evenings and weekends when I retreated to a hut in our garden to work on research.

My initial interest in geomorphology and Quaternary Science was stimulated by Rob Price at Glasgow University, in particular by the excursions he led to introduce his Honours geomorphology class to moraines, meltwater channels and gravel pits. Another vital influence was Brian Sissons' book *The Evolution of Scotland's Scenery* (1967), which introduced me to the links between geomorphology and the interpretation of Quaternary environmental history. Rob Price was also instrumental in suggesting that I pursue an MSc degree at McMaster University in Canada, where I had the wonderful opportunity of two 10-week field seasons in the high Arctic under the supervision of Brian McCann. Here my research focused on arctic rivers, but I also encountered the wonders of permafrost and the periglacial realm. Stimulated by these experiences I returned to Scotland to complete a PhD on periglacial landforms and environments on mountains in the NW Highlands under the daunting supervision of Brian Sissons, at a time when he and his PhD students represented the dominant Quaternary research group in Scotland. Rob Price, Brian McCann and Brian Sissons are no longer with us, but I owe to all of them an incalculable debt of experience and long years of friendship.

In the early 1980s, many Geography and Earth Science departments in the UK were shrinking and vacancies were few, so I was fortunate indeed to be appointed in 1980 to a lectureship at the University of St Andrews, at that time an ancient (1413) but small and rather provincial institution, albeit in a picturesque setting on the shores of the North Sea. I nearly missed the appointment interview by trying to buy a railway ticket to St Andrews, only to discover that the branch line had been axed back in the 1960s. I remained at St Andrews for the rest of my career, apart from periods of teaching in New Zealand. St Andrews University was then, and still is, a rather magical place, with a strong commitment to excellence in teaching, as recognised by its frequent recognition as first in the UK for student experience.

In my early years at St Andrews I sought to widen my horizons, joining research expeditions led by John Matthews to Jotunheimen and then leading my own expeditions to arctic Norway, but research on the Quaternary and periglacial landforms of Scotland continued to dominate my interests. An early highlight of my career was collaboration with Doug Benn, John Lowe and Mike Walker in research on the Quaternary of the Isle of Skye, which culminated in 1991 in an unforgettable QRA Field Meeting on the island, an event repeated 25 years later led by the same team of friends (Ballantyne *et al.*, 1991; Ballantyne and Lowe, 2016; Figure 1).

Another was collaboration with Charlie Harris in writing *The Periglaciation of Great Britain* (1994), an experience that, with Charlie's guidance, hugely widened my understanding of periglacial geomorphology. At the same time I had the good fortune to explore the latent potential of the paraglacial concept, initially through collaboration with Doug on paraglacial hillslope modification (e.g. Ballantyne and Benn, 1994), and subsequently through being granted research leave to write an extended review of paraglacial geomorphology that presaged an explosion of interest in this field in the present century (Ballantyne 2002).



Figure 1. The four horsemen ride again: Colin Ballantyne, John Lowe, Doug Benn and Mike Walker on the QRA Field Meeting on Skye, May 2016.

A chance discussion with Kurt Lambeck in 1993 led to my collaboration with John Stone of the University of Washington. John was a pioneer in the dark arts of cosmogenic nuclide exposure dating, and together we produced the earliest accounts of TCN dating of rock-slope failures and weathering limits. Together with John, Danny McCarroll, Atle Nesje and Svein-Olaf Dahl I also began to explore the possibility of identifying the altitudinal dimensions of the last British-Irish Ice Sheet from the evidence provided by trimlines on British and Irish mountains, but this proved a false dawn; we now recognise that the trimlines represent the altitudinal boundary between wet-based erosive ice on low ground and pervasive cold-based ice on summits, within a much thicker ice sheet that overtopped all high ground. I subsequently had the good fortune to collaborate with Derek Fabel in demonstrating the error of our earlier interpretation through TCN dating of high-level erratics (Fabel *et al.*, 2012).

Another landmark was an invitation from Hanne Christiansen and Ole Humlum to teach on the graduate-level course on Permafrost and Periglacial Processes at UNIS on Svalbard, a post I held for nearly two decades. Long days on snowmobile trips and discussions with outstanding graduate students rekindled my interest in the periglacial realm and the need for a more comprehensive textbook, ultimately (and after a prolonged, troubled gestation) resulting in publication of *Periglacial Geomorphology* (Ballantyne, 2018). A fruitful collaboration with

Peter Wilson on TCN dating of rock-slope failures in Scotland and Ireland showed that the majority occurred during Lateglacial and may have been triggered by glacio-isostatic uplift-induced seismic activity (Ballantyne *et al.*, 2014). As retirement approached I was fortunate to participate in the BRITICE-CHRONO project led brilliantly by Chris Clark, joining David Small, Colm Ó Cofaigh, Dave Roberts and others in sampling boulders for TCN exposure dating in Ireland and on remote Hebridean islands as part of what must be one of the greatest collaborative research initiatives in the history of Quaternary science (Clark *et al.*, 2022).

‘Retirement’ produced new opportunities, not least the time to write an accessible guide to Scotland’s mountain landscapes (Ballantyne 2019) and a detailed update on the periglacialiation of Great Britain with Julian Murton, the most outstanding permafrost scientist in the UK (Murton and Ballantyne, 2017). It also allowed me to collaborate with John Gordon in editing *Landscapes and Landforms of Scotland* (Ballantyne and Gordon, 2021). John has an unrivalled knowledge and understanding of the geomorphology of Scotland, and this venture would have been impossible without his patience and commitment.

For nearly 50 years the Quaternary Research Association has been a major part of my academic life. As an early-career researcher, it provided the opportunity to meet and learn from the most distinguished Quaternary scientists of the time in Field Meetings and Discussion Meetings, vastly increasing my awareness of other fields of Quaternary research. In later years, it provided a forum to meet with younger researchers, many of whom have subsequently made major contributions to Quaternary science. It has provided a stimulus for new initiatives and collaborations, and its publications (*Journal of Quaternary Science*, *Quaternary Newsletter* and the tremendous archive of *Field and Technical Guides*) represent an unparalleled nexus of communication within the Quaternary science community. Above all, QRA meetings have an unrivalled buzz factor; I’ve never left a meeting without feeling stimulated and excited by new ideas, old controversies, innovative approaches and the sheer delight of meeting with old friends and new researchers, whether in gravel pits, on peat bogs or in the pub afterwards. For me, and I hope many others, the QRA is addictive, providing stimulus to our efforts to unravel the mysteries of the Quaternary.

As this response indicates, whatever I have managed to achieve in Quaternary research owes much to Time and Chance. I have enjoyed great good fortune in the opportunities presented to me, but above all in the support, collaboration, friendship and wise council of numerous individuals, only a few of whom are identified above. In accepting the James Croll Medal, I know that I am doing so not just for myself, but on behalf of a multitude of others who made my own contributions to Quaternary research possible.

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